

ALH - Allied Health; AMB - Ambulatory; BAS - Basic Sciences; GP - General Practice; MP - Medicine and Paediatrics; NUR - Nursing; QLY - Quality; SUR - Surgical Disciplines;

## ALH001

### Identifying Predictors for Heart Failure Readmissions for the Development of a Teleprotocol in Singapore

J WONG<sup>1</sup>, EM YOW<sup>1</sup>, G RAJ<sup>1</sup>, K NG<sup>1</sup>, HN TAN<sup>2</sup>, J CHEAH<sup>3</sup>, YH CHAN<sup>4</sup>

<sup>1</sup>Cardiology, Tan Tock Seng Hospital, Singapore, <sup>2</sup>CPMP Disease Management, NHG, Singapore, <sup>3</sup>CPMP, NHG, Singapore, <sup>4</sup>Statistical Department, National University of Singapore, Singapore

**Aim:** The aim of this study was to identify risk predictors for the development of an effective teleprotocol suited to the local population.

**Methods:** A total of 697 patients were recruited from Tan Tock Seng Hospital between October 2002 and September 2004; mean age, 66 years. Approximately 84% of patients recruited to the heart failure programme agreed for telemanagement. Case managers conducted weekly to monthly calls to monitor patients' well-being and adherence to medical therapy. This paper attempts to identify the risk predictors for patients on telemanagement towards heart failure readmissions. Cross tabulation was used to analyse demographics, medications, co-morbidities, patient compliance for those on telemanagement. These were then compared with those in the programme but not on telemanagement. Logistic regression was utilised to predict heart failure admissions.

**Results:** Indians were at highest risk compared to Chinese [ $P = 0.004$ , OR 2.9 (1.4-5.8)]. Those who are single, divorced or widowed were at risk [ $P = 0.009$ , OR 2.2 (1.2-3.9)] compared to those with spouse. Also, patients with diabetes mellitus [ $P = 0.001$ , OR 2.4 (1.4-4.1)] and renal complications [ $P = 0.004$ , OR 2.8 (1.4-5.4)] were more at risk for heart failure hospital admissions. Weight [ $P = 0.001$ , OR 0.01 (0.982-0.996)] and exercise [ $P = 0.01$ , OR 0.989 (0.981-0.997)] compliance, those on telemanagement [ $P = 0.027$  (0.001-0.417)], were significant protective predictors. Other protective predictors included patients prescribed with Ticlid [ $P = 0.008$ , OR 3.3 (1.4-7.9)] and frusemide [ $P = 0.004$ , OR 3.4 (1.4-4.1)].

**Conclusion:** In developing a more precise teleprotocol for the Asian population, factors such as race, marital status, co-morbidities, patient compliance and medications should be taken into account.

## ALH002

### An Analysis of the Outcome Results of Patients on Clinical Pathways in IMH/WH

MM HENDRIKS<sup>1</sup>, R MAHENDRAN<sup>2</sup>, MS MAAROF<sup>2</sup>, V THAMBYRAJAH<sup>2</sup>, V THAMILSELVI<sup>2</sup>

<sup>1</sup>Case Management Unit, <sup>2</sup>General Psychiatry, Institute of Mental Health/Woodbridge Hospital, Singapore

**Aim:** IMH/WH introduced the first clinical pathway for first episode schizophrenia in 2002. Since then, 7 more pathways have been introduced. This paper a) illustrates the demographic profile of the patients placed on the clinical pathway b) reviews the average length of stay (ALOS) of these patients and c) studies the unplanned readmission rate of these patients.

**Methods:** This is a retrospective study of all patients placed on 5 clinical pathways in WH/IMH from January to December 2004. Data were collected using a survey form, which were then entered into the clinical pathway databases. Analysis of this data, using Microsoft Excel and Microsoft Access, was done to generate the quantitative results.

**Results:** 1870 patients were placed on the pathways, 975 (52.1%) males and 895 (47.9%) females. However, for the alcohol dependence and opiate dependence pathways, 90% were males and on the major depression pathway, 78.5% were females. The predominant ethnic group was Chinese (75.6%), but 47.8% of patients on the alcohol dependence pathway belong to the Indian ethnic group. 35% of the patients were between 38 to 47 years of age. The ALOS was 10.1 days for major depression, 17.9 days for first episode schizophrenia, 21.1 days for relapsed schizophrenia, 20.3 days for alcohol dependence and 14 days for opiate dependence. The unplanned readmission rate was 9.3% for major depression, 3.6% for first episode schizophrenia, 4.8% for relapsed schizophrenia, and 3% for alcohol dependence and opiate dependence.

**Conclusion:** Following this analysis, revisions were undertaken to make the pathways user friendly, psychological educational materials developed and addiction medicine treatment programmes streamlined to enhance quality care.

## ALH003

### Implementation of Clinical Pathways in a Psychiatric Hospital – A 2-year Review

MM HENDRIKS<sup>1</sup>, R MAHENDRAN<sup>2</sup>, V THAMBYRAJAH<sup>2</sup>, MS MAAROF<sup>2</sup>, V TAMILSELVI<sup>2</sup>

<sup>1</sup>Case Management Unit, <sup>2</sup>General Psychiatry, Institute of Mental Health/Woodbridge Hospital, Singapore

**Aim:** This paper aimed to demonstrate the progressive implementation of clinical pathways to effectively manage psychiatric diseases, their impact on the length of stay and unplanned readmission rates of patients.

**Methods:** This retrospective study of patients placed on 7 clinical pathways in WH/IMH from 2003 to March 2005 was achieved through the analysis of data collected using a survey form. Analysis, using Microsoft Excel and Microsoft Access, was carried out to generate the quantitative results.

**Results:** There was a 92% increase of pathways used between 2003 and 2004. Another 539 pathways were documented in the first quarter of 2005 indicating a 10% increase. Of the 1885 pathways utilised in 2004, 76% for relapsed schizophrenia, 5.6% major depression, 4.4% first episode schizophrenia, 6.2% alcohol dependence and 5.9% opiate dependence patients. There were slight differences for pathways utilised between January 2005 and March 2005: 69% for relapsed schizophrenia, 3.7% major depression, 2.9% first episode schizophrenia, 4.8% alcohol dependence, 7.4% opiate dependence, 7.2% mania/hypomania and 5% dementia patients. Unplanned readmission rates in 2004 were 4.8% for relapsed schizophrenia, 9.3% for major depression, 3.6% for first episode schizophrenia, and 3% each for alcohol dependence and opiate dependence pathway. Average length of stay recorded for relapsed schizophrenia was 24.4 days (2003) and 21.1 days (2004), major depression 13.8 days (2003) and 10.2 days (2004), first episode schizophrenia 16 days (2003) and 17.9 days (2004), alcohol dependence 23.5 days (2003) and 20.4 days (2004) opiate dependence 18.1 days (2003) and 14.1 days (2004), mania 14.2 days (2005) and dementia 19.6 days (2005).

**Conclusion:** The findings contributed to greater awareness for standardised care, improved resource utilisation management and development of the attention deficit hyperactive disorder and rehabilitation pathways.

## ALH004

### Coping with SARS in Singaporean Malay Families

DSS FUNG<sup>1</sup>, WC CHANG<sup>2</sup>, I BIN ISA<sup>3</sup>, JBK KOH<sup>1</sup>, ACC WANG<sup>4</sup>

<sup>1</sup>Child & Adolescent Psychiatry, Institute of Mental Health/Woodbridge Hospital, Singapore, <sup>2</sup>Division of Psychology, Nanyang Technological University, Singapore, <sup>3</sup>Social Work and Psychology, National University of Singapore, Singapore, <sup>4</sup>General Psychiatry, Institute of Mental Health/Woodbridge Hospital, Singapore

**Aim:** The SARS crisis in 2003 resulted in severe stress for healthcare workers and focused on individual resilience as a protective factor against stress. The more systemic nature of family resilience needs further study. This study aims to investigate the resilience elements of Singaporean Malay families encountering crises.

**Methods:** Semi-structured interviews were conducted. Two Singaporean Malay nurses with their families and 18 individual Singaporean Malay nurses were queried as to their coping with SARS. A standard set of interview questions were utilised and the average length of an interview was 2 hours.

**Results:** The critical aspects of effective coping include their (1) worldview/beliefs – they believed that crises were spiritual tests of fate and situations would be generally reframed utilising acceptance and in effect normalising these situations according to their perspective; (2) affect-regulation efforts – they prepare for possible adversities in the future pragmatically and emotionally while lightening the family mood; and (3) family solidarity – this solidarity

revolves around leadership figure which galvanises support for the entire family. Personal sacrifice and acts of love aimed at improving the coping of the family.

**Conclusion:** The findings discuss the perspective of family resilience within the Singaporean Malay context revolving tightly around the concept of religiosity. Strong beliefs of communal praying, surrendering one's fate to God, acceptance and leaning upon the family form the cornerstone of such resilience.

#### ALH005

##### **Coping with Crisis: Resilience of Singaporean Chinese Families**

**JBK KOH<sup>1</sup>, CWN CHANG<sup>2</sup>, DSS FUNG<sup>1</sup>, ACC WANG<sup>3</sup>**

<sup>1</sup>Child & Adolescent Psychiatry, Institute of Mental Health/Woodbridge Hospital, Singapore, <sup>2</sup>Division of Psychology, Nanyang Technological University, Singapore, <sup>3</sup>General Psychiatry, Institute of Mental Health/Woodbridge Hospital, Singapore

**Aim:** Compared to individual resilience, family resilience has been relatively less studied, particularly in the Asian context. In 2003, Asia was badly affected by the severe acute respiratory syndrome (SARS) outbreak. Families needed to garner any available resources that they could to cope with this healthcare epidemic. Families of healthcare workers, who had family members working on the frontline of the SARS attack, needed to be particularly strong. Focusing on this group of families, specifically the Singaporean Chinese families, this paper sought to examine the resilience factors that help these families cope in face of a major crisis.

**Methods:** An in-depth interview study was conducted. Two Singaporean Chinese nurses with their families and 18 individual Singaporean Chinese nurses were interviewed with regard to how their families coped during the SARS outbreak. A standard set of interview questions was used. Each interview lasted at least an hour.

**Results:** Singaporean Chinese families coped well because of their (1) world views/beliefs — they believed in accepting the situation, re-defining the meaning of the situation, normalising the situation, and believing in God; (2) affect-regulation efforts — they prayed to God and controlled negative emotions; and (3) family solidarity — they had a pillar in the family and they followed this leadership, and everyone was united, cooperative, being practical about dealing with the situation, take care of one another, had good communication, and engaged in both proactive and self-directed coping.

**Conclusion:** Chinese family resilience involves a highly practical-oriented approach to coping with crisis. Findings are discussed with respect to Chinese cultural values.

#### ALH006

##### **A Preliminary Examination of the Effectiveness of a Web-based Cognitive Behavioural Therapy Protocol for the Treatment of Selective Mutism in Singapore**

**M RAJA<sup>1</sup>, DSS FUNG<sup>1</sup>, JBK KOH<sup>1</sup>, YP OOP<sup>2</sup>**

<sup>1</sup>Child & Adolescent Psychiatry, Institute of Mental Health/Woodbridge Hospital, Singapore, <sup>2</sup>Psychological Studies, National Institute of Education, Nanyang Technological University, Singapore

**Aim:** Research has found that treatment for selective mutism (SM) is most effective when medication is used in conjunction with therapy. In view of this, a web-based cognitive-behavioural therapy programme ('Meeky Mouse') has been developed at the Hospital for Sick Children, Canada. The present paper sought to examine the effectiveness of the localised version of the 'Meeky Mouse' programme, which has been used in the Singapore Child Guidance Clinic (CGC). Compared to other childhood disorders, SM is a relatively rare psychiatric condition, this paper reports the findings from 3 SM cases.

**Methods:** Three SM children (1 boy and 2 girls, aged 9 to 11) participated in the 14-week long Meeky Mouse programme. They were all under medication throughout the 14 sessions. Their parents responded to a 36-item Selective Mutism Questionnaire (SMQ), which assesses the severity of SM in the i) home, ii) school and iii) other social situations, during the first consultation with the psychiatrist, and at the end of the programme.

**Results:** It was found that the severity of SM decreased in school and other social situations after 14 weeks of the 'Meeky Mouse' programme. In the home situation, where patients spoke the most even before any treatment, the pre- and post-treatment scores were found to remain stable.

**Conclusion:** The findings suggest some preliminary support for the effectiveness of the localised version of the 'Meeky Mouse' programme, when used in conjunction with medication. Further study is currently being conducted to tease out the respective effectiveness of medication versus Meeky Mouse.

#### ALH007

##### **Analysis of Antilipemics Usage in National Healthcare Group (2003-2005)**

**BP LIM<sup>1</sup>**

<sup>1</sup>CPMP, NHG HQ, Singapore

**Aim:** To assess the patterns of consumption and cost of antilipemics in NHG for year 2003 to 2005.

**Methods:** Dispensing data for antilipemics for various NHG institutions from 2003 to Q1 2005 were collected and analysed using WHO Anatomical-Therapeutic-Chemical classification/Defined Daily Doses (ATC/DDD) methodology (version 2005). Usage data for 2005 were projected based on Q1 2005 data.

**Results:** Statins were the leading antilipemics followed by fibrates in NHG for the study period. Their average percentages of usage by DDD were 91.6% and 7.9% respectively. The total expenditure for antilipemics has decreased (S\$3.32 to S\$3.06 million) despite the 59.2% growth in consumption (15.8 to 25.2 million DDD) for the study period. The increase in usage was mainly from lovastatin and simvastatin. The total expenditure has dropped by 12.0% from 2003 to 2004 but it was projected to increase by 4.8% in 2005 as compared to 2004 due to increased usage of high cost drugs like atorvastatin, rosuvastatin, ezetimibe and its combination. Pravastatin's usage by DDD has decreased 29.8% over the study period. Its projected expenditure for 2005 was S\$326,000. Rosuvastatin and ezetimibe's usage by DDD have increased by 428.1% and 4391.6%, respectively, over the study period.

**Conclusion:** Generally, the utilisation profile of various classes of antilipemics was similar over the study period. The use of more expensive antilipemics has significant cost implication to patients as well as institutions and warrants close monitoring. Outcome data are needed to rationalise the usage of some high cost antilipemics.

#### ALH008

##### **An Investigation of the Management of Stakeholder Expectations and Perceptions of the PACS Project**

**M ONG<sup>1</sup>**

<sup>1</sup>Diagnostic Imaging, National University Hospital, Singapore

**Aim:** This study was designed to investigate: i) stakeholders' awareness of a PACS initiative; ii) the level of stakeholder involvement; iii) stakeholder expectations of PACS in relation to their work and if they were met; iv) the structure, effectiveness and expectations of PACS training; v) stakeholder knowledge of the benefits of PACS; vi) problems encountered with PACS; and vii) stakeholders' overall perception of PACS.

**Methods:** This qualitative exploratory survey was performed at three university teaching hospitals involving key stakeholders of the PACS project. Participants were randomly sampled from each of these stakeholder groups from each hospital. Data were collected using semi-structured interviews and questionnaires.

**Results:** The majority of stakeholders were unaware of the PACS initiatives within their respective hospitals. Only the respondents from the management level of Radiology were involved in PACS project teams; and there was little formal, structured consultations of stakeholders. Expectations were largely unachieved with the partially implemented PACS. PACS training was informal and inconsistent, but sufficient for stakeholders to perform their duties. Stakeholders possessed good knowledge of the benefits of PACS and awareness of the current problems associated with PACS. There were mixed

feelings in the perceptions of PACS, but respondents were optimistic that there would be much improvement when PACS is fully implemented.

**Conclusion:** This study concluded that stakeholders were not properly managed, as a lot of information was not conveyed to the stakeholders in the hospitals that already acquired PACS, and serious consultations were absent in these hospitals, which led to some dissatisfied staff.

#### ALH09

##### Bulimia Nervosa – An National University Hospital Study

**SL LIM<sup>1</sup>, EH KUA<sup>2</sup>, EK UNG<sup>2</sup>**

<sup>1</sup>Dietetics, <sup>2</sup>Psychological Medicine, National University Hospital, Singapore

**Aim:** Bulimia nervosa causes psychological distress to the sufferer and family members. We studied the demographic data of bulimic patients who were referred to the dietitians in the National University Hospital from 1990 to 2004.

**Methods:** We did a retrospective nutritional notes review and collected data on body mass index (BMI) and demographics on 28 patients.

**Results:** Ninety-six per cent of the patients were female and 75% were Chinese. Their BMI at initial consultation ranged from 14.4 to 30.7 kgm<sup>-2</sup>. Majority of the cases (57%) were within the normal BMI range of between 18.5 and 24.9 kgm<sup>-2</sup>. Twenty-five per cent were underweight and 18% were overweight. Their age ranged from 12 to 43 years. Most cases (64%) occurred between the ages of 15 and 26 years. Forty per cent were primary/secondary school students, 18% were junior college/university students, 21% unemployed /homemakers and 21% holding occupations ranging from model/dancer to office worker (engineer, military personnel, bank manager and accounts assistant).

**Conclusion:** The demographics of these bulimic patients referred to our department are quite similar to those from western countries. Most were females, of normal weight and had the onset of bulimia during the post-pubertal teenage years and early twenties.

#### ALH010

##### The Pursuit of Thinness — A Follow-up Study of Anorexia Nervosa

**SL LIM<sup>1</sup>, EH KUA<sup>2</sup>, EK UNG<sup>2</sup>**

<sup>1</sup>Dietetics, <sup>2</sup>Psychological Medicine, National University Hospital, Singapore

**Aim:** As in many western countries, anorexia nervosa (AN) is a growing problem among young female Singaporeans. We studied the demographics and follow-up data of AN patients referred to NUH dietitians for nutritional intervention.

**Methods:** A retrospective nutritional notes review was done on 94 patients seen from 1992 to 2004. We collected data on body mass index (BMI), patient demographics and outcome.

**Results:** Ninety-six per cent of the patients were female and 86.2% were Chinese. The median BMI at initial consultation was 14.7 kgm<sup>-2</sup> (range, 8.6–18.8 kgm<sup>-2</sup>). Seventy-six per cent were between 13 and 20 years old. Eighty-three per cent of the patients came back for follow-up appointments with the dietitians in addition to consultation with the psychiatrist. Overall, there was significant improvement in weight and BMI from average 37 to 41 kg and 14.7 to 16.4 kgm<sup>-2</sup> between the first and final consultation ( $P < 0.001$ ). The average duration of follow-up was about 8 months. Among the patients on follow-up, 68% showed improvement with an average weight gain of 6 kg. Patients that improved had more outpatient follow-ups with the dietitians (4.2 consultations vs 1.6 consultations;  $P < 0.05$ ), lower BMI at presentation (14.2 kgm<sup>-2</sup> vs 15.7 kgm<sup>-2</sup>;  $P < 0.01$ ) and shorter duration of disease at presentation (1 year vs 3 years;  $P < 0.05$ ) compared with those who did not improve. Seven patients with disease for more than 2 years did not show improvement with follow-up.

**Conclusion:** We gained valuable understanding of our local AN patients — 2/3 of whom improved with adequate follow-up treatment. Patients that had suffered AN longer before seeking help appeared more resistant to improvement.

#### ALH011

##### Insight and Psychopathology in First Episode Psychosis

**LY POON<sup>1</sup>, S VERMA<sup>1</sup>, SA CHONG<sup>1</sup>**

<sup>1</sup>Early Psychosis Intervention, Institute of Mental Health/Woodbridge Hospital, Singapore

**Aim:** Impaired insight in psychosis is a leading cause of treatment non-adherence. Studies show poor insight correlates with greater symptom severity; however, few have looked at whether a shift in insight with improvement in psychopathology exists. This study investigates the association between changes in insight and psychopathology in patients with first episode psychosis during a one-year follow-up.

**Methods:** Consecutive patients accepted into the Early Psychosis Intervention Programme (EPIP) were assessed at baseline, 6 months and 1 year. Insight was measured using the Scale to Assess Unawareness of Mental Disorder (SUMD) tapping dimensions such as awareness of mental disorder, consequences of illness and effects of medications. Psychopathology was assessed by the Positive and Negative Syndrome Scale (PANSS) consisting positive, negative and general psychopathology subscales.

**Results:** Sixty-two patients (27 females and 35 males) with a mean age of 28.29 ( $\pm 6.14$ ) years were included in the study. Changes in SUMD and PANSS scores were computed for 6 months and 1 year, relative to baseline. Spearman's partial correlations were used, controlling for age and gender. Mean percentage improvement in PANSS scores were 38.47% at 6 months and 41.58% at 1 year. Mean percentage improvement in SUMD scores were 33.09% at 6 months and 41.29% at 1 year. A significant correlation was found for change in SUMD and total PANSS scores at one year relative to baseline ( $r = 0.26, P < 0.05$ ).

**Conclusion:** Our results suggest that awareness of one's illness does not remain static; it changes during the course of illness and is positively associated with improvement in psychopathology.

#### ALH012

##### Laboratory Usage of MRSA Chromogenic Agar

**KW CHAN<sup>1</sup>, K CHOW<sup>1</sup>**

<sup>1</sup>Laboratory Medicine, National University Hospital, Singapore

**Aim:** The study was conducted to test the selectivity, differential ability and reproducibility of the chromogenic agar with the use of stock culture isolates and direct sample inoculation.

**Methods:** Mixed cultures seeded with MRSA were used to test the selectivity and differential properties of the agar. Eighty known *Staphylococcus aureus* strains (44 MRSA and 36 MSSA) were used to test reproducibility in terms of growth and colour. One hundred samples were inoculated directly onto the plate.

**Results:** The presence of MRSA is indicated by a deep-pink (mauve) colour resulting from the hydrolysis of the chromogenic substrate. The growth of other bacteria did not interfere with either colour production or interpretation, they show blue, green or white colour but never pink. The presence of 2.5% salt and cefoxitin also inhibit and/or reduce the growth of other bacteria. The MRSA's grew and showed the same uniform pink colour while MSSA did not grow.

**Conclusion:** The MRSA chromogenic agar has proven to be a good selective and differential medium. It can give a rapid identification of MRSA within 18 hours' incubation and is useful in routine screening and outbreak surveillance.

#### ALH013

##### Comparative Evaluation of the Urine Albumin-to-Creatinine Ratio Assay Using the Bayer Clinitek Analyser (Semi-Quantitative) and the Synchron LXi Auto-Chemistry Analyser (Quantitative)

**AT CHONG<sup>1</sup>, Y LEOW<sup>1</sup>, P LIM<sup>1</sup>, S SETHI<sup>1</sup>**

<sup>1</sup>Laboratory Medicine, National University Hospital, Singapore



**Aim:** The urine albumin-to-creatinine ratio (ACR) is routinely used to aid clinicians in the early detection of diabetic patients at risk of developing kidney damage.

**Methods:** The Clinitek (Bayer Diagnostics, Elkhart, US) is a portable point-of-care device for the semi-quantitative measurement of ACR. In the Clinitek system, ACR is determined from the semi-quantitative measurement of albumin and creatinine in the urine and the ratio is calculated from the results obtained. The Synchron LXi (Beckman Coulter, Fullerton, US) is an integrated auto-chemistry analyser that determines ACR quantitatively, from measurements of both microalbumin and creatinine in urine. We evaluated the Clinitek and Synchron LXi against the current Vitros 250/Immagine results. Microalbumin was measured quantitatively on the Immagine system (Beckman Coulter, Fullerton, US), while urine creatinine was quantitatively measured on the Vitros 250 (Ortho-Clinical Diagnostics, Rochester, US). In this study, 69 freshly collected random urine samples were evaluated for ACR using Bayer Clinitek against the Synchron LXi and the Vitros 250/Immagine systems.

**Results:** The urine microalbumin results, when compared between the Synchron LXi and the Immagine, gave a correlation coefficient of 0.9983. A correlation coefficient of 0.9977 was obtained when the Synchron LXi creatinine method was compared against the Vitros 250 method. The percentage agreement of ACR results obtained from the Clinitek and Synchron LXi was 80.7% for ACR 300 mg/g (n = 21).

**Conclusion:** The Clinitek analyser provides semi-quantitative results which is suitable for microalbuminuria screening in a point-of-care setting. Abnormal results, however, should be confirmed with quantitative methods.

#### ALH014

##### Rapid PCR-based Molecular Typing of *Acinetobacter baumannii* And Methicillin-resistant *Staphylococcus aureus* (MRSA) at the National University Hospital

RTP LIN<sup>1</sup>, XL BOO<sup>1</sup>, TM NG<sup>2</sup>, E KOAY<sup>1</sup>

<sup>1</sup>Laboratory Medicine, <sup>2</sup>Nursing, National University Hospital, Singapore

**Aim:** To use PCR-based typing based on IS256 elements for MRSA, and on repetitive extragenic palindromic (REP) sequences for *A. baumannii*, to characterise the MRSA and *A. baumannii* strains isolated from patients, to determine the source or nature of spread.

**Methods:** The samples were collected from various wards at the National University Hospital, Singapore over a period of 3 months. Twenty-two MRSA isolates and 28 *A. baumannii* isolates were typed. Polymerase chain reaction (PCR) analysis of inter-IS256 spacer polymorphism was used to type MRSA. Gel-based PCR typing of *A. baumannii* was performed by amplifying REP sequences (REP-PCR).

**Results:** Typing showed multiple clones for MRSA and *A. baumannii*. An apparent outbreak of MRSA in 1 unit was shown to be multi-clonal, suggesting repeated introduction rather than cross-contamination within the unit. *A. baumannii* was shown to be multiclonal, and not due to the spread of a predominant clone.

**Conclusion:** The PCR-based method was rapid, inexpensive and provided discrimination among strains which was useful for infection control surveillance. Attention should be paid to measures such as antibiotic management as the results showed that spread of a dominant clone could not account for most cases of infection.

#### ALH015

##### Comparison of the IDI-Strep B PCR Assay versus Bacterial Culture for the Detection of Group B Streptococci from Genital Specimens

SY NG<sup>1</sup>, JWS CHENG<sup>1</sup>, LL CHIU<sup>1</sup>, RPT LIN<sup>1</sup>, C CHOW<sup>1</sup>, E KOAY<sup>1</sup>

<sup>1</sup>Laboratory Medicine, National University Hospital, Singapore

**Aim:** 1) To compare the performance of a commercial real-time PCR test (IDI-Strep B) vs bacterial culture for the detection of group B streptococci from genital specimens. 2) To compare the ease of performance and turnaround

time of the PCR test vs. conventional culture.

**Methods:** Genital swab specimens were divided into 2 aliquots. IDI-Strep B assay was performed using the Smart Cycler real-time PCR machine. Bacterial culture was done by direct plating on trypticase soy agar with 5% sheep blood.

**Results:** Group B streptococcus was detected in 19.3% (16/83) of specimens by culture and 12.0% (10/83) by PCR. The breakdown was: 9 PCR+ culture+, 7 PCR- culture+, 1 PCR+ culture-, with concordance of 90.4% (75/83). Relative to culture, PCR had sensitivity of 56.3%, specificity 98.5%, PPV 90.0% and NPV 90.4%. A positive culture result required overnight growth; PCR was easy to perform and required 1-2 hours.

**Conclusion:** The PCR assay could achieve rapid detection of group B streptococcus, but could not replace culture as it was not sensitive enough. The clinical utility of the IDI-Strep B assay is thus limited as it cannot exclude patients who might require intrapartum group B streptococcus antibiotic prophylaxis.

#### ALH016

##### Laboratory Automation — A New Paradigm in Healthcare

SK ONG<sup>1</sup>, S SETHI<sup>1</sup>

<sup>1</sup>Laboratory Medicine, National University Hospital, Singapore

**Aim:** To study the key performance indicators in the pre-analytical phase of laboratory processes after laboratory automation

**Methods:** The NUH Laboratory has embarked on a journey to a fully automated laboratory system that will integrate clinical chemistry, haematology, immunochemistry and coagulation tests on one platform. This consolidation of high volume tests has blurred the traditional pathology disciplines. This new paradigm of embracing opportunities will change the workflow processes, re-design laboratory capabilities and transform the "current practices" of the staff. Laboratory automation is a transformational change. A series of sophisticated specimen handling modules, robotic arms, tracking systems and the state-of-the-art analytical equipment will result in a laboratory system in which a specimen is completely untouched by the human hands after receipt of the specimen in the laboratory. The tangibles are: a) improve staff safety by minimising biological exposure (robotic decapping, aliquoting and recapping processes) improve staff safety, b) error reduction by minimising repetitive tasks (thus a safe patient report), and c) redundant processes elimination (reduced consumables, hence a positive social responsibility). Key performance indicators data before and after automation are being collected.

**Results:** Pre-automation and post-automation data will be available during the poster presentation.

**Conclusion:** Automation aims at reducing the pre-analytical time, the shorter turnaround time thus enable doctors to arrive at diagnosis earlier and provide even more timely intervention and treatment for patients. This ensures a competitive edge to service excellence in addition to safe working environment and safe patient care. Automation is a partnership between the technical/professional, the clinical staff, supplier and management based on sound decisions with cost containment. The NUH-vendor partner Bayer Diagnostics (a division of Bayer Healthcare, Germany) has committed a capital investment of US\$4.5 million towards the NUH placement. This is an excellent example of a technology driven application towards patient service excellence.

#### ALH017

##### Laboratory Detection of Vancomycin Resistant Enterococci (VRE)

SL POH<sup>1</sup>, PG GO<sup>1</sup>, K CHOW<sup>1</sup>, LF TAN<sup>1</sup>, SM ONG<sup>1</sup>

<sup>1</sup>Laboratory Medicine, National University Hospital, Singapore

**Aim:** To discuss our experience during mass screening and the workflow instituted for rapid detection and identification of vancomycin resistant enterococci (VRE) in a cost effective way.

**Methods:** Two categories of samples were received for analysis from April to June 2005. Two hundred samples were from contacts of VRE positive

patients and 300 stools were from nosocomial diarrhoea cases. Enterococcal agar with vancomycin (6 ug/mL) was used for screening. Conventional biochemical tests and commercial kits were used for confirming the identity. MIC values for vancomycin were determined by the E-test strip method. Epidemiological patterns were determined by molecular methods.

**Results:** Twelve per cent from 200 contacts were positive from screening, 5 cases turned out to be VRE. Three cases were identified as *E. faecium* and molecularly tested to be Van A/B. The remaining 2 cases were ruled out as *E. gallinarum* /*E. cassiliflavus* which were Van C and epidemiologically insignificant. Twenty-five per cent of 300 stool samples were positive by the screening procedure, 6 cases were confirmed to be VRE: 3 cases were *E. faecium* and 1 case was *E. faecalis*. Molecular methods confirmed them to be Van A/B which is epidemiologically significant. The remaining 2 cases of other Enterococcus spp. turned out to be Van C.

**Conclusion:** Speciation of enterococci is costly and cumbersome. Preliminary screening together with conventional tests and phenotyping reduce cost. However, phenotyping requires skills and is subjective. API20 Strep or Vitek II does not provide accurate speciation, API30 is more reliable but costly. Molecular methods are essential to rule out Van C producers.

#### ALH018

##### **Bioterrorism Preparedness: Lessons From the New York City Health Department (NYCHD) and Role of Clinical Laboratories in Singapore**

**P KRISHNAN<sup>1</sup>**

<sup>1</sup>Laboratory Medicine, Tan Tock Seng Hospital, Singapore

**Aim:** Biowarfare has existed since ancient times and has been used sporadically during military operations in the last century. However, it is over the last 5 years that bioterrorism has gained enough magnitude to impact on the day-to-day functioning of clinical laboratories in some countries. The NYCHD laboratories have, in particular, investigated several suspects and real biothreats and have undergone various operational changes.

**Methods:** In the event of a covert bioterrorism attack, clinical microbiology laboratories may be the 'first responders', testing specimens from affected patients. These laboratories would then play a critical role in the management of the bioterrorism event by rapid detection of possible pathogens and ruling out threat agents.

**Results:** Most clinical laboratories in Singapore (as worldwide) are ill-equipped to rule out suspicious agents. The NYCHD has drawn out algorithms to recognise salient laboratory features of the most likely bioterrorism agents and conducts periodic workshops to update laboratory personnel. These protocols include sample collection, biosafety aspects, colony and microscopic characteristics and key biochemical tests; the agents include *Bacillus anthracis*, *Burkholderia pseudomallei* and *mallei*, *Yersinia pestis*, *Brucella* species and *Francisella tularensis* — details will be presented. Using this workflow in Singapore laboratories, certain hazardous organisms can be ruled out with rapid turnaround time and those suspicious samples sent to reference laboratories for further testing.

**Conclusion:** Preparedness could help counteract vicious surprise attacks and although the above list is not all-encompassing and excludes toxins and viruses, information on common bioterrorism-agents will play a vital role in increasing confidence in handling such dangerous pathogens.

#### ALH019

##### **Screening for Pyuria and Bacteruria Using Dipsticks**

**HM YEO<sup>1</sup>, R HAWKINS<sup>1</sup>**

<sup>1</sup>Laboratory Medicine, Tan Tock Seng Hospital, Singapore

**Aim:** Urine microscopy is often requested to evaluate possible urinary tract infection. This is a time consuming and manual procedure. The aim of this study was to assess whether urine dipstick testing can be used to screen for pyuria and bacteruria.

**Methods:** All urine specimens received over a 5-day period for routine

microscopy were additionally tested using the automated UrinQuick dipstick reader (using 11 parameters Quickvue dipsticks). Staff performing microscopy were blinded to the dipstick results. Dipstick results for nitrite and leukocyte esterase were compared to the presence/absence of bacteria and white blood cells respectively. Sensitivity, specificity, and predictive values were calculated.

**Results:** Four hundred and eighty-eight urine samples were evaluated. The prevalence of pyuria and bacteruria was 47% and 48%, respectively. Both pyuria and bacteruria were present in 37%. The sensitivity and specificity of urine nitrite testing for the presence of bacteria was 12% and 98% and of leukocyte esterase testing for the presence of urine white blood cells was 61% and 83% respectively. Combining nitrite and leukocyte esterase results gave a sensitivity and specificity of 55% and 83% for presence/absence of pyuria and/or bacteruria.

**Conclusion:** Urine dipstick testing cannot be used to rule out pyuria or bacteruria. It therefore cannot be used to screen out unnecessary samples for urine microscopy. However, the high specificity of nitrite and leukocyte esterase testing shows that positive dipstick testing has a high predictive value for bacteruria and pyuria and can be useful in the acute setting in guiding clinical management.

#### ALH020

##### **Urine Protein and Glucose Testing Using the Quickvue UrinCheck 10+ SG Urine Dipstick**

**HM YEO<sup>1</sup>, R HAWKINS<sup>1</sup>**

<sup>1</sup>Laboratory Medicine, Tan Tock Seng Hospital, Singapore

**Aim:** This study assessed the agreement between the Quidel Quickvue UrinCheck 10+ SG urine dipstick and the Bayer URS-2P dipstick presently used in the laboratory.

**Methods:** Urine samples on outpatients submitted for glucose and protein dipstick testing using the routine Bayer URS-2P dipstick were additionally tested using the Quickvue dipstick. Quickvue dipstick testing used the automated UrinQuick dipstick reader while the Bayer URS-2P dipsticks were read manually. Staff reading the Bayer URS-2P dipsticks were blinded to the Quickvue results. Agreement was assessed using the kappa statistic.

**Results:** Two hundred and three urine samples were analysed. The prevalence of proteinuria and glycosuria using the Bayer dipstick was 34% and 5% and with the Quickvue dipstick was 18% and 5%, respectively. The kappa coefficients for the glucose and protein testing were 1.00 and 0.56, respectively.

**Conclusion:** There is excellent agreement between the Quickvue dipstick and the existing Bayer URS-2P dipstick for glucose testing but less satisfactory agreement for protein testing. Compared to present testing, the new strip will underreport proteinuria. Further studies are required to determine which of these strips are more accurate.

#### ALH021

##### **Are Support Groups for Caregiver of Dementia Patients Effective in Reducing Caregiver Burden?**

**CY TAN<sup>1</sup>, KM HOW<sup>2</sup>, P YAP<sup>3</sup>**

<sup>1</sup>Medical Social Work, Alexandra Hospital, Singapore, <sup>2</sup>Social Work and Psychology, National University of Singapore, Singapore, <sup>3</sup>Geriatric Medicine, Alexandra Hospital, Singapore

**Aim:** To assess the effectiveness of a support group in reducing the burden felt by caregivers of demented patients.

**Methods:** Mixed methods research design which involved single-subject research design, followed by qualitative interviews with the caregivers at the end of the support group programme. The quantitative and qualitative data served unique and different purposes and acted to reinforce each other to strengthen the social work process. In using this mixed methods of evaluation of the support group programme, we were not only able to measure the level of burden faced by the caregivers but also able to understand how and why the support group was or was not beneficial.

**Results:** The results suggest that the subjective burden faced by caregivers do not decrease due to the fact that their demented relative's condition has not

improved. However, what the support group does is that it alters the caregivers' reaction to the patients' behavioural problem, thereby decreasing the objective burden felt.

**Conclusion:** Even though support groups can probably be used as a valuable preventive method. The effects of these groups have not yet been established firmly with quantitative research. Qualitative research, on the other hand, has prompted us that our caregivers experience significant positive effects on appraisal and coping. Despite these results, this study would have beneficial effects, either by giving scientific justification for the support group program, or by stimulating research into the development and assessment of other kinds of intervention for caregivers to decrease their burden and maintain their well being.

## ALH022

### Female Problem Drinkers: How Different are They from Their Male Counterparts?

**BK SENG<sup>1</sup>**

<sup>1</sup>Medical Social Work, Institute of Mental Health/Woodbridge Hospital, Singapore

**Aim:** The aims of this paper were to study female problem drinkers admitted for treatment and to compare them with male problem drinkers to determine differences in profiles and characteristics. Treatment and services could then be tailored to meet their needs to bring about better treatment outcomes.

**Methods:** The study looked at both male and female problem drinkers admitted to the IMH for treatment over a 2-year period. Those who agreed to participate were recruited and a self-designed questionnaire was administered. Percentages, chi-square and *t*-tests were used to analyse the variables and to make comparisons.

**Results:** Data from 95 male and 40 female problem drinkers were analysed and compared. The females were noted to be younger and with shorter drinking histories. The type of alcohol consumed and where they drank were also different from the men. There was also a greater propensity to physical and mental health problems in the women. One important finding was that unlike men, women problem drinkers often had significant underlying social triggering factors.

**Conclusion:** Female problem drinkers presented a bigger problem because of their greater vulnerability. Not only were they medically more vulnerable because of their genetic make up; but socially their predicament also seemed worse off. With the greater odds against them, there is a need to pay more attention to their management.

## ALH023

### An Effective Pilot Community Weight Management Programme for Malay Females in Singapore

**ASCY CHANG<sup>1</sup>, SN SYED ABU BAKAR<sup>2</sup>, YY CHAN<sup>2</sup>, GHC WONG<sup>1</sup>, C KOH<sup>3</sup>, YL NG<sup>2</sup>**

<sup>1</sup>Nutrition and Dietetics, Alexandra Hospital, Singapore, <sup>2</sup>National Healthy Lifestyle Programme, Health Promotion Board, Singapore, <sup>3</sup>Research and Evaluation, Health Promotion Board, Singapore

**Aim:** Obesity is prevalent among Malays (19.1%), followed by Indians (13.4%), and Chinese (4.2%). The ethnic differences were more evident in females than males. This pilot study assessed the additional contribution of culturally tailored dietary intervention on body mass index (BMI) reduction among overweight Malay women who were already engaging in regular physical activity.

**Methods:** A total of 76 overweight Malay women (BMI  $\geq 25$ ), recruited from local brisk walking clubs attended an 8-month pilot weight management programme of 10 sessions. They were educated on skills to prepare lower calorie meals relevant to their culture, through workshops, cooking sessions, and supermarket tours by a dietitian. Their BMI and waist circumference were measured every session, using standardised protocols. Questionnaires were administered pre- and post-intervention to assess changes in knowledge, attitude and practice. ANOVA was performed.

**Results:** The mean age of participants was 47 years and 74% had primary

education. At baseline, 59% had BMI between 25 and 29.9 and 41% had BMI  $\geq 30$ . At post-intervention, BMI significantly reduced by 1.7 ( $P < 0.0001$ ). Waist circumference reduced by an average of 2.6 cm ( $P < 0.0001$ ). Significant improvements in knowledge, attitude, and practice for healthier eating were observed. There was a 59.4% improvement in participants' ability to modify and substitute foods for calorie reduction. 72.4% reported healthier food selections at home and when eating out. 98.5% were fully aware of obesity-related health risks.

**Conclusion:** Dietary intervention demonstrated BMI reduction among overweight women who regularly exercise. Culturally tailored activities and social support proved advantageous. These factors should be considered in community-based weight management programmes.

## ALH024

### The Beneficial Effects of a Very-Low-Calorie-Diet in the Perioperative Preparation for Laparoscopic Gastric Banding Surgery

**SWH TAY<sup>1</sup>, BH TEY<sup>2</sup>, HG BALADAS<sup>3</sup>, GHC WONG<sup>1</sup>**

<sup>1</sup>Nutrition and Dietetics, <sup>2</sup>Medicine, <sup>3</sup>Surgery, Alexandra Hospital, Singapore

**Introduction:** Laparoscopic gastric banding surgery in the obese patients (Asian BMI  $\geq 32.5$  kgm<sup>-2</sup>) is made technically difficult by copious intra-abdominal fat that obscures the laparoscopic view from below and a large fatty liver from above. Perioperative risk is also increased from related co-morbidities. **Aims:** 1) To improve co-morbidities. 2) To improve ease of operation. 3) To reduce mortality risk.

**Methods:** Eight patients (BMI 40.6-100 kgm<sup>-2</sup>) were prescribed a very-low-calorie-diet (VLCD) for 4 to 13 weeks prior to laparoscopic gastric banding (LGB). The VLCD comprises drinking a commercial formulation (456 kcal, 45.0 g carbohydrates, 51.9 g protein, 6.9 g fats), 2 to 3 litres of water and 200 g of low carbohydrate vegetables without dressings/sauces daily. No other food was allowed. Laboratory investigations included blood glucose, renal panel, uric acid, liver function test, electrocardiogram, urine ketones and blood gases. Patients were weighed daily as inpatients and weekly as outpatients. Relevant laboratory investigations were repeated. Dietitians monitored patients' compliance to VLCD weekly.

**Results:** Percentage weight loss ranged from 9.6% to 22.8% and 2.4% to 10% in compliant and non-compliant patients, respectively. Patients compliant with VLCD had more weight loss. The amount of weight loss was also dependent on the duration and motivation and compliance of the patients to VLCD. Fat was preferentially lost from around the neck, omentum and liver in all patients, resulting in technically easier and safer surgery. Two patients with diabetes mellitus and high blood pressure had their medication stopped or dosage reduced.

**Conclusion:** VLCD is an effective method for weight reduction to ease LGB. More research is needed to quantify this degree of effectiveness.

## ALH025

### Patient Satisfaction Survey as a Quality Control Measure for Nutrition Counselling Services

**YP LIM<sup>1</sup>**

<sup>1</sup>Nutrition and Dietetics, Tan Tock Seng Hospital, Singapore

**Aim:** The study aims to evaluate patients' perspective on nutrition counselling services before and after improvements are made, and to show that patient satisfaction survey (PSS) acts as an outcome and quality control measure.

**Methods:** The PSS, using a 4-point scale, was developed to evaluate the nutrition counselling services. Patients were randomly selected from both the inpatient and outpatient settings. The diet technician interviewed all patients. Target areas were identified for improvements to be implemented. A second and third PSS were conducted at 6 months and 1 year, respectively. Independent samples *t*-tests were performed to evaluate if significant differences ( $P < 0.05$ ) in ratings between the first and second, and second and third PSS were observed.

**Results:** The study recruited 100 patients for the first PSS and 119 patients for the second and third PSS. More than 90% of the patients rated satisfied



or very satisfied with the service in all the PSS. Significant improvements ( $P < 0.05$ ) in the ratings for usefulness of consultation, relevance of information, amount of information, clarity of explanation and overall quality of consultation were shown in the second PSS after the initiatives were implemented. There were no significant differences ( $P > 0.05$ ) in ratings between the second and third PSS.

**Conclusion:** Patients were satisfied with the nutrition counselling services provided by the dietitians. The ratings increased significantly after the identified target areas were improved on. These increased ratings were maintained over 6 months. The PSS was shown to be a useful outcome and quality control measure for dietetic services.

## ALH026

### The Indications and Diagnostic Yield of Long-term Paediatric Epilepsy Monitoring in the Children's Medical Institute

**PC LOW<sup>1</sup>, HT ONG<sup>1</sup>, KJL LIM<sup>2</sup>, SKH TAY<sup>2</sup>, PS LOW<sup>2</sup>**

<sup>1</sup>Paediatrics, National University Hospital, Singapore, <sup>2</sup>Paediatrics, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** To analyse the indications for long-term paediatric epilepsy monitoring and to determine its usefulness for patients with seizures or non-epileptic paroxysmal events.

**Methods:** We retrospectively reviewed the paediatric epilepsy monitoring recordings performed during a 4-year period from January 2001 to December 2004. The indications were divided into the following groups: diagnosis, classification, seizure quantification and seizure localisation (epilepsy pre-surgical work-up).

**Result:** A total of 61 patients were monitored. The duration of a single monitoring session ranged from 0.5 to 5 days (average, 1.2 days). The indications included diagnostic work-up in 44 patients, epilepsy syndrome classification in 5, seizure quantification in 7, and epilepsy localisation for pre-surgical work-up in 5. In the group for diagnostic evaluation, 11 were confirmed to have epileptic seizures, whereas 29 had non-epileptic events and 4 had no events at all during the monitoring period. The epilepsy monitoring was useful towards deciding on the epilepsy syndrome for 5 patients, proving non-convulsive/subtle status epilepticus in 7 patients, and for epilepsy localisation for surgical candidacy in 5 patients. Out of 5 patients, 3 were suitable candidates for epilepsy surgery. The monitoring was helpful towards clarifying non-epileptic spells in 65% of our patients in this study.

**Conclusion:** The indications for long-term paediatric epilepsy monitoring are similar to those reported by other epilepsy centres. For our centre, the use of long-term epilepsy monitoring for paediatric patients was to confirm the diagnosis of either epileptic seizures or non-epileptic events, and thus, allowing appropriate medical management.

## ALH027

### From the Oncogenic Signalling to the Biochemical Endpoints: Deciphering the HER-2/neu-mediated Proteomic Profiles Using Comparative Proteomics and Bioinformatics Tools

**LK TAI<sup>1</sup>, DH ZHANG<sup>2</sup>, SK SETHI<sup>2</sup>, ESC KOAY<sup>2</sup>**

<sup>1</sup>Pathology, <sup>2</sup>Laboratory Medicine, National University Hospital, Singapore

**Aim:** The HER-2/neu (cerbB2) oncogene is involved in regulation of tumour growth, proliferation and metastasis of breast cancer. Overexpression of HER-2/neu is strongly correlated with reduced survival, especially in node-positive disease. We thus aim to identify the proteins whose expressions are strongly associated with the aggressive phenotype of HER-2/neu-positive breast cancer, and assess their potential as targets for therapeutic intervention.

**Methods:** Laser capture microdissection (LCM) was used for procurement of pure tumour cell populations from both HER-2/neu-positive and negative tumours. Two-dimensional gel electrophoresis (2-DE), MALDI-TOF/TOF MS/MS and NCBI database interrogation were applied for protein identification. Western blotting and immunohistochemistry on a tissue microarray format were used for validating the statistical associations.

**Results:** Using the gel-based proteomics, we identified 18 proteins showing at least 5-fold changes of expression level in HER-2/neu-positive tumours vs

negative tumours. Nine proteins involved in glycolysis, lipid synthesis, chaperone, antioxidant and detoxification pathways were upregulated in HER-2/neu-positive tumours. HER-2/neu-dependent differential expressions of these proteins were further validated in a panel of breast cell lines and clinical specimens by 2-D immunoblotting and Western blotting. Statistical correlations of these proteins with HER-2/neu status were further verified by immunohistochemical staining of sections from a tissue microarray containing 97 breast cancers.

**Conclusion:** This study highlights the global correlations of HER-2/neu signaling with the enhanced metabolic, stress-responsive, antioxidant and detoxification processes that confer a survival advantage for the neoplastic cells. Our findings provide an insight into biochemical endpoints of HER-2/neu-related networks and potential targets for prognosis and therapy in HER-2/neu-positive breast tumours.

## ALH028

### A Survey of the Attitudes of Pathology Laboratory Technologists Towards Continuing Education

**KB TAN<sup>1,2</sup>, TP THAMBOO<sup>1,2</sup>, YC LIM<sup>1,2</sup>**

<sup>1</sup>Pathology, National University Hospital, Singapore, <sup>2</sup>Pathology, National University of Singapore, Singapore

**Aim:** Continuing education is important to laboratory technologists. It helps them keep pace with the advances in medicine and pathology and thus to provide quality service. A survey was conducted to assess the attitudes of our laboratory technologists towards the different educational tools, in a bid to better understand their needs in this area.

**Methods:** Relevant departmental continuing education tools include lectures, case discussions, journal-clubs, short courses and scientific conferences. Technologists were asked for their views on these various tools, scoring each item 1-5 out of 5.

**Results:** The response rate was 66% (19/29) and the respondents' work experience ranged from <3 years to >20 years. Short courses was rated the most highly — 89% of respondents considered it good/ excellent. General medical knowledge and the rationale of key histopathology procedures were the preferred lecture topics. Most respondents (95%) were interested (4-5/5) to have their own journal club. 84% of respondents were fairly keen/keen (4-5/5) to participate in conferences. 74% responded that they were fairly keen/keen to consider pursuing higher education. 84% were fairly keen/keen to upgrade themselves and to assume higher responsibilities

**Conclusion:** The results indicate a positive outlook of our technologists towards continuing education. The planning of future lecture topics has taken into account their preferences while a technologist-dedicated journal club/seminar programme is being explored. Talks on the pursuit of higher education have been organised. It is hoped that these measures will help boost the usefulness of continuing education and enhance the work environment.

## ALH029

### Cost Effective Direct Blood Culture Workup for Commonly Isolated Gram Negative Bacilli

**F FOK<sup>1</sup>, SY HO<sup>1</sup>, T BARKHAM<sup>1</sup>**

<sup>1</sup>Pathology, Tan Tock Seng Hospital, Singapore

**Aim:** To reduce costs and turnaround time for the identification (ID) and susceptibility testing (ST) of bacteria from blood cultures.

**Methods:** For ID, we compared traditional tubes with the Microbact 12A kit. For ST, two methods, A and B, were compared with a standard, C. In method A, approximately 10 drops (0.5 mL) of each positive blood culture broth were added to 2 mL saline, Tube A. In method B, 2 drops from Tube A were transferred to a second 2 mL saline tube, Tube B. In method C, a 0.5 MacFarland suspension was prepared from an overnight culture. In all 3 methods, the relevant inoculums were used to inoculate Mueller-Hinton agar (MHA) for ST. Method C was the reference method. Methods A and B were direct methods that yielded results a day earlier.

**Results:** Traditional tubes and Microbact 12A showed 100% concordance for ID. For ST, method A showed 97% and method B 99.8% agreement with

method C, the standardised method.

**Conclusion:** Method B performed better than method A and is an acceptable alternative to the reference method for ST. It yields results 24 hours earlier. For ID, the Microbact kit workflow is simpler and faster than traditional tubes with less hands-on time. Its larger battery of tests gives a higher degree of confidence in the results and enables ID of organisms that the traditional tubes cannot. The Microbact kit also costs less than the traditional tubes

#### ALH030

##### Evaluation of the Qiagen BioRobot EZ1 for Automated Nucleic Acid Extraction

**JWY LEONG<sup>1</sup>, T BARKHAM<sup>1</sup>**

<sup>1</sup>Pathology and Laboratory Medicine, Tan Tock Seng Hospital, Singapore

**Aim:** To evaluate the workflow and performance of the BioRobot EZ1 Manual nucleic acid extraction is labour-intensive with limited throughput and operator-related variability. Automated systems have the potential of standardisation and reduced labour.

**Methods:** We used the BioRobot EZ1 to extract RNA, in parallel with our routine manual method, from 95 sera from patients with suspected dengue. The endpoint was the detection of dengue virus by a commercial RT-PCR kit. Manual RNA extraction was from a 140 µl serum aliquot using the QIAamp Viral RNA kit. The automated BioRobot EZ1 requires the Qiagen EZ1 Virus kit and 100 µl aliquots.

**Results:** Ninety-one samples gave concordant results (62 positive and 29 negative). Of the 4 discordant results, 3 positives were obtained with RNA extracted by the BioRobot EZ1 and 1 by the manual method. Supplementary tests demonstrated that all 4 were from patients with acute dengue fever. The BioRobot consumables cost marginally more. However, it is user-friendly and saves a significant amount of time. While the manual method takes about an hour for 6 samples, the hands-on time for the BioRobot is 10 min, leaving the operator free to attend to other tasks. In addition, the BioRobot requires minimal maintenance.

**Conclusion:** The BioRobot EZ1 performed as well as the manual comparator despite the smaller volume of serum. The costs of consumables are higher but the system delivers substantial labour savings.

#### ALH031

##### Quality Improvement and Cost Reduction: Using Algorithms to Direct Test Choices and Reject Unwarranted/Duplicate Requests

**SK SEET<sup>1</sup>, P KRISHNAN<sup>1</sup>, T BARKHAM<sup>1</sup>**

<sup>1</sup>Pathology and Laboratory Medicine, Tan Tock Seng Hospital, Singapore

**Aim:** To use the right dengue test at the right time and reduce duplicate requests.

**Methods:** Laboratories receive requests for dengue PCR and serology and often repeat tests a few days later. This results in requests that we can predict will be unhelpful and duplication. We disseminated educational materials. PCR is an excellent method to confirm dengue infection in the febrile stage of illness. Serology becomes more useful after 7 to 10 days. Repeat PCR is not warranted although repeat serology is, unless preceded by positive PCR or serology. Laboratory staff now check previous results before performing dengue test requests. In cases where both PCR and serology are requested together, we perform serology first (it is cheaper) and reject the PCR request if the serology is positive.

**Results:** One hundred and ninety-five specimens were rejected over 7 months with savings of \$10 to \$15,000, reducing the cost of care.

**Conclusion:** Maintaining this standard of care requires a lot of effort by laboratory staff but is merely 1 example of the 'silent' quality, largely unrecognised, that permeates our work. We hope that IT will be able to apply these rules to assist in making appropriate requests at the ward level and that similar algorithms can be applied to many other tests. This should prevent unnecessary phlebotomy and also serve to educate the ward staff.

#### ALH032

##### To Evaluate the Effectiveness of Smoking Cessation Counselling Programme (GCP)

**YM LEE<sup>1</sup>, K LIEW<sup>1</sup>, PC YONG<sup>1</sup>, G KOH<sup>1</sup>**

<sup>1</sup>Pharmacy, Alexandra Hospital, Singapore

**Aim:** The traditional way of smoking cessation counselling has focused on individualised, counsellor-to-smoker method. This study aimed to ascertain whether support group in GCP had a positive impact on the outcome and which type of GCP was more effective.

**Methods:** Five corporate companies signed their staff smokers (n = 44) up for GCP with the choice of engaging either the abridged (4 sessions) or full (7 sessions) programme. The primary outcome was the reduction rate (RR) in the number of cigarettes smoked per day (from the first to the last visit). The secondary outcome was the quit rate (QR), as defined by abstinence from smoking at the end of the programme. The type of programme, attendance rate and age of participants were also evaluated to determine if they influenced the outcome.

**Results:** The overall average RR was 56% while the QR was 18%. The type of programme did not affect the RR but QR was higher for the full (35.3%) versus abridged (7.4%) programme. The average RR was higher (59.4%) amongst staff smokers who attended more than half the sessions compared with those who attended less than half the sessions (33.3%). The age of the participants also contributed to outcomes with older smokers (30 years and above) achieving a higher average RR (63.3%) than younger smokers (49.1%).

**Conclusion:** GCP was effective in helping smokers reduce the number of cigarettes smoked. The full programme showed better QR than the abridged programme. A larger study is needed to further verify these results.

#### ALH033

##### Joint Hospital Pharmacists' Medication Intervention Study

**J LEONG<sup>1</sup>, E LIEW<sup>2</sup>, CC OH<sup>3</sup>, WH LIM<sup>4</sup>, C PUHAINDRAN<sup>4</sup>, T DHARMALINGAM<sup>4</sup>**

<sup>1</sup>Pharmacy, Alexandra Hospital, Singapore, <sup>2</sup>Pharmacy, Institute of Mental Health/Woodbridge Hospital, Singapore, <sup>3</sup>Pharmacy, KK Women's & Children's Hospital, Singapore, <sup>4</sup>Pharmacy, Changi General Hospital, Singapore

**Aim:** Many international studies have shown the beneficial impact of pharmacists' interventions. This 2-month prospective study aimed to collate pharmacists' interventions across 5 hospitals, and investigate the nature and incidence of drug-related problems encountered. The therapeutic impact will also be assessed.

**Methods:** As per normal daily workflow, pharmacists checked for drug-related problems and made appropriate interventions. These interventions were collated and categorised using a common template.

**Results:** A total of 3670 interventions were collected. Interventions involving disregard of contraindications and drug allergy made up 0.54% and 2.15%, respectively. The 2 most common interventions were the provision of information or clarification (15.07%), and inappropriate frequency or timing of drug regimen (12.43%). The least 2 interventions were related to work processes – missing duration or quantity ordered (0.27%) and prescriber's signature (0.25%). Illegible handwriting accounted for 1.77% of interventions. 83.31% of interventions were accepted, and about 5% were rejected. The majority of the interventions were graded "somewhat significant" (44%), while "very" and "extremely significant" interventions combined accounted for 8.4%. These values were significantly lower than most similar studies.

**Conclusion:** With interventions of "significant" and above making up 47.24%, pharmacists have contributed to better clinical management of patients. A panel of physicians would be preferred in judging the clinical impact of interventions. This study did not account for the potential impact on patient after the interventions, thus the benefits may not be truly captured. The differences compared to other foreign studies may stem from the different perspective of the role of pharmacists in our hospitals.



**ALH058**

**Transient Evoked Otoacoustic Emissions as a Screening Tool in the Elderly Population**

**JJBH LIM<sup>1</sup>, BH TAN<sup>2</sup>, PKS LU<sup>1</sup>, DSQ KOH<sup>3</sup>**

<sup>1</sup>ENT, Changi General Hospital, Singapore, <sup>2</sup>Hearing Aid, Coherent Instrument Pte. Ltd., Singapore, <sup>3</sup>Community, Occupational and Family Medicine, National University of Singapore

**Aim:** Transient evoked otoacoustic emissions (TEOAEs) measurement is a newly developed, objective, non-invasive test for sensorineural hearing loss. In contrast, the present routine assessment using pure-tone audiometry (PTA) requires subjects to understand and cooperate with the tester. We examined the potential of TEOAEs as a screening tool for hearing loss.

**Methods:** One hundred fifty-three persons aged between 55 and 84 years, without conductive hearing loss, had PTA, tympanometry and TEOAE tests. Presence of TEOAEs (a normal finding) was defined as overall response level  $\geq 4$  dB SPL or overall wave reproducibility of  $\geq 55\%$ . Normal hearing was defined as an average hearing threshold of  $\leq 25$  dB HL at 0.5, 1, 2, 3 and 4 kHz. Clinically significant hearing loss was defined as an average hearing threshold of  $\geq 50$  dB HL at these frequencies.

**Results:** Forty-nine of the 153 subjects had normal hearing. The sensitivity, specificity, positive predictive value (PPV) and negative predictive value (NPV) of TEOAEs for normal hearing were 64.4%, 75.5%, 84.8% and 50%, respectively. Using the cut-off point at 50 dB HL, the sensitivity, specificity, PPV and NPV of TEOAEs for clinically significant hearing loss were 95%, 54.9%, 24.1% and 98.6%, respectively.

**Conclusion:** In the elderly population, TEOAEs can potentially serve as a screening tool for clinically significant sensorineural hearing loss. In view of its low PPV, it would be better employed as a screening tool for a selected, as opposed to a general population, e.g. in clinical situation where PTA can be difficult to perform due to poor patient co-operation.

**ALH059**

**Aspiration Cytology of Cysticercosis: A Case Report**

**RAGRAWAL<sup>1</sup>, WT POH<sup>1</sup>, D CHATTERJEE<sup>1</sup>, K MANCER<sup>1</sup>, A GUPTA<sup>2</sup>**

<sup>1</sup>Laboratory Medicine Services, Changi General Hospital, Singapore, <sup>2</sup>Pathology, S N Medical College, Agra, India

**Aim:** Infection by *Taenia solium* is a common problem in developing countries, which quite often presents as soft tissue swelling. The clinical diagnosis of cysticercosis is seldom made based on symptoms. The fine needle aspiration (FNA) cytology is a valuable tool in establishing the aetiology in such lesions, as shown in this case report.

**Methods:** A middle-aged female presented with an ill-defined swelling in the right forearm of unknown duration. The swelling was not painful and not associated with any significant change in size. The lesion was aspirated with a narrow gauge needle attached to a syringe. The aspirated material was smeared on glass slide, air dried and stained with MGG stain

**Results:** Less than 1 mL of clear fluid was aspirated from the lesion and centrifuged. The smears were prepared from the centrifuge as well as from the remaining material in the needle. On microscopic examination, diagnosis of cysticercosis was made based on the presence of fragments of parasite wall and larval parts in milieu of inflammatory cells.

**Conclusion:** The lesion was excised and the histology confirmed the FNA diagnosis. The FNA is a proven, good non-invasive technique in diagnosis of parasitic soft tissue lesions.

**ALH060**

**Pancreatic Fine Needle Aspiration FNA Using Endoscopic Ultrasound — The Changi General Hospital Experience**

**D CHATTERJEE<sup>1</sup>, TS CHUA<sup>2</sup>, K MANCER<sup>1</sup>, R AGRAWAL<sup>1</sup>, WT POH<sup>1</sup>**

<sup>1</sup>Laboratory Medicine Services, <sup>2</sup>Gastroenterology, Changi General Hospital, Singapore

**Aim:** Endoscopic ultrasound guided fine needle aspiration (EUS-FNA) is a popular and new technique to sample tissue in the least invasive manner from deep-seated masses, such as the pancreas. This study is an overview of the procedure performed in our hospital, from the diagnostic view point.

**Methods:** It was carried out under mild sedation, and took approximately 1 hour for each procedure. A 22-gauge needle was passed through the stomach (for lesions in the body and tail of pancreas) or the duodenum (for lesions in the head of pancreas). On the average, 6-8 passes were done to obtain adequate material. A cytopathologist was present on-site for evaluation of cell yield. Cell blocks and smears were obtained. The smears were both air-dried, followed by Diff Quik staining, as well as alcohol-fixed, stained by Papanicolaou. The cell blocks (micro-biopsies), which are ordinarily stained by haematoxylin and eosin, were also used for additional special stains, including immunohistochemistry, as required.

**Results:** Twenty-eight cases underwent EUS-FNA of the pancreas during the period March 2004 to July 2005. Seven cases were non-diagnostic, due to sampling error. Seven cases were diagnosed as adenocarcinoma, 5 cases as suspicious of malignancy, 1 showed metastatic deposit, and 8 cases were benign, either cyst or inflammation. The diagnostic performance in this study was 75%.

**Conclusion:** For cases which are managed non-surgically, EUS-FNA of the pancreas has proved to be a very useful technique in our hospital, giving invaluable tissue diagnosis least invasively.

**ALH061**

**Evaluation of Direct Antimicrobial Susceptibility Testing and Biochemical Tube Identification Performed from Positive Blood Culture Vials**

**LL KWANG<sup>1</sup>, LSY NG<sup>1</sup>, TY TAN<sup>1</sup>**

<sup>1</sup>Laboratory Medicine Services, Changi General Hospital, Singapore

**Aim:** The prompt availability of positive blood culture results influences therapeutic choices and morbidity outcome in septicemia. This study aimed to establish the accuracy of performing direct antimicrobial susceptibility testing (AST) and biochemical tube identification of bacteria from broth dilutions of positive blood cultures.

**Methods:** Ninety-three positive blood cultures with *Staphylococcus aureus*, *Escherichia coli* and *Klebsiella* species were included in this study. Direct AST and inoculation of biochemical tubes were performed from 6-fold dilutions of fluids aspirated from positive blood culture vials. Reference AST and confirmatory bacterial identification were performed the next day from overnight colonial growth on solid media. Discrepancies between the 2 AST methods were categorised into minor, major and very major errors.

**Results:** No minor or very major AST errors were recorded. There was 100% concordance between AST methods for *S. aureus*, except for minor error rates of 13% for ciprofloxacin and 6% for gentamicin. Direct AST of *E. coli* and *Klebsiella* sp. demonstrated  $< 5\%$  minor errors for all tested antibiotics except amikacin (30%), piperacillin/tazobactam (25%) and ampicillin/clavulanic acid (13%). Bacterial identification using the study tube identification method proved as reliable as the reference method, with no discrepancies reported.

**Conclusion:** The direct AST and tube identification methods produced clinically reliable and acceptable results. The use of these methods on positive blood cultures expedites result availability by 24 hours.

**ALH062**

**Clinical and Microbiological Characteristics of *Staphylococcus lugdunensis***

**LSY NG<sup>1</sup>, WX NG<sup>1</sup>, TY TAN<sup>1</sup>**

<sup>1</sup>Laboratory Medicine Services, Changi General Hospital, Singapore

**Aim:** Coagulase-negative staphylococci (CoNS) are skin commensals generally considered to be of low pathogenicity. *Staphylococcus lugdunensis* is a CoNS that has been associated with serious bacteraemic infections in humans. The aims of this study were to determine the clinical significance,

epidemiology, microbiological characteristics and antimicrobial susceptibilities of *S. lugdunensis* when isolated from non-sterile sites.

**Methods:** CoNS isolated in pure or predominant cultures from non-sterile body sites in the absence of other known bacterial pathogens were included in the study. Isolates were initially screened by Gram-stain, catalase, coagulase production, and bacitracin susceptibility. *S. lugdunensis* was identified by testing for L-pyrrolidonyl  $\beta$ -naphthylamide hydrolysis and ornithine decarboxylase. Antimicrobial susceptibilities were determined by standardised disc susceptibility testing. The clinical significance of isolates was determined by retrospective data collection.

**Results:** One hundred and six CoNS isolates were included in the study, of which 35% were *S. lugdunensis*. Sixty-four per cent of *S. lugdunensis* tested positive for clumping-factor, based on a latex agglutination kit. Ninety-four per cent of *S. lugdunensis* isolates were associated with clinically significant infections, which were predominantly community-acquired. All clinical cases were associated with superficial soft-tissue infections, mostly from around and below the pelvic region. Eighty-five per cent of *S. lugdunensis* were susceptible to all tested anti-staphylococcal antibiotics, 17% were resistant to penicillin, and none were resistant to oxacillin.

**Conclusion:** *S. lugdunensis* presents with a spectrum of disease similar to *S. aureus*. The presence of clumping-factor, as detected by latex agglutination, is not a reliable method to differentiate *S. lugdunensis* from other CoNS. Antimicrobial resistance remains low in *S. lugdunensis*.

#### ALH063

##### Evaluation of an Abbreviated Testing Algorithm for the Identification of Enterobacteriaceae

LSY NG<sup>1</sup>, TY TAN<sup>1</sup>, CS YEOW<sup>1</sup>

Laboratory Medicine Services, Changi General Hospital, Singapore

**Aim:** Diagnostic microbiology laboratories need to accurately identify bacteria while reducing turnaround time. Species identification by commercial identification kits is costly and labour intensive. This study evaluated the accuracy of an abbreviated testing algorithm for the identification of Enterobacteriaceae.

**Methods:** Two hundred and thirty-two clinical isolates were included in the study. The study method identified bacteria to genus level based on initial use of rapid tests followed by limited use of tube biochemical tests requiring overnight incubation. The following were used for interpretation of results: lactose fermentation on MacConkey agar, indole production, beta glucuronidase production, L-pyrrolidonyl- $\beta$ -naphthylamide hydrolysis, and biochemical tube tests. Bacterial identification was confirmed by commercial identification kits. Stepwise timings for testing procedures were simultaneously recorded and cumulative workload times obtained for both study and conventional testing methods.

**Results:** Two hundred and thirty-one (99%) isolates were correctly identified to the genus level using the study method, which included *E. coli*, *Klebsiella* spp., *Enterobacter* spp., *Citrobacter* spp. and *Proteus* spp. Two hundred and five (89%) of the test strains were identified to genus level within 24 hours and 26 (11%) isolates required additional supplementary testing with results available within 48 hours. Compared to conventional identification methods, the study method required 40% less technologist time.

**Conclusion:** The study algorithm achieved high levels of accuracy comparable to identification using commercial kits and was less labour intensive. This method is an effective and labour-saving alternative for the identification of bacterial isolates from non-sterile body sites.

#### ALH064

##### Pharmaceutical Needs of the Elderly in Nursing Homes — The Role of the Pharmacist

WANG<sup>1</sup>, XL GWEE<sup>2</sup>, SY CHAN<sup>2</sup>

<sup>1</sup>Pharmacy, Changi General Hospital, Singapore, <sup>2</sup>Office of Life Sciences, Faculty of Science, National University of Singapore, Singapore

**Aim:** The aim of this study was to identify the services that pharmacists can

provide to improve pharmaceutical care delivered to elderly, nursing home residents in Singapore.

**Methods:** This study comprised 3 parts: a survey of nursing staff, analysis of the frequency of medication review, and an investigation of the continuity of drug treatment following transfer across institutions. The survey was designed to investigate basic pharmaceutical operations such as administration of medicines and basic knowledge with respect to medicine use in the elderly. The medication records and casenotes of 278 residents aged 65 years and above were used to obtain the frequency of medication review by doctors and the number of medicine changes within 6 months. The continuity of drug treatment for 16 residents who were discharged from a hospital to the home was also assessed.

**Results:** There was a wide range of responses to the survey questions, indicating little consensus on basics such as the understanding of “prn” orders. The results also showed a heavy reliance on MIMS for drug information. There was also wide variation in the knowledge of drug issues in the elderly. Changes made to drug therapy during hospital admissions were not always adhered to; up to 8 residents (50%) had prescriptions different from what was ordered at hospital discharge.

**Conclusion:** This study shows that there is a clear need for increased surveillance of various aspects of medicine use in nursing homes. Pharmacists have a role in medication review, especially of more ill residents, as well as education on drug-related issues.

#### ALH065

##### Prescribing for the Elderly in Nursing Homes

ALJEW<sup>1</sup>, W ANG<sup>1</sup>, SY CHAN<sup>2</sup>

<sup>1</sup>Pharmacy, Changi General Hospital, Singapore, <sup>2</sup>Pharmacy, National University of Singapore, Singapore

**Aim:** To assess appropriateness of prescribing amongst elderly nursing home residents in Singapore and to determine availability of information that may influence quality of prescribing.

**Methods:** This study involved 171 elderly residents from 2 nursing homes in Singapore. Medication records and casenotes were reviewed for information on prescribed medicines, clinical data, demographic information and presence of good documentation practices. The data were analysed for appropriateness of medicine prescribed based on 2 published tools and availability of information that may influence prescribing.

**Results:** Residents were prescribed an average of 6.7 medicines. Assessment using Beers Criteria and MAI identified inappropriate prescribing in 66.5% (111) and 92.2% (154) of residents, respectively. Common problems identified were inappropriate duration of therapy (28.7%), use of medicines with less expensive alternatives available (26.8%) and use of medicines without indication (23.0%). Overall, there were higher incidences of inappropriate prescribing of medicines acting on the central nervous system, cardiovascular system and gastrointestinal tract. For residents prescribed new medicines, only 62.3% (76) had complete documentation of indications. Complete documentation of reasons for changes in doses, changes in medicines and discontinuation of medicines were seen in 88.0% (44), 36.4% (4) and 47.1% (49) of residents with the respective changes.

**Conclusion:** Inappropriate prescribing and poor documentation practices were prevalent in the nursing homes studied. An improvement in accuracy and completeness of documentation in medication records and case notes is needed. Regular medication reviews by physicians and pharmacists and development of suitable prescribing guidelines to help reduce inappropriate prescribing could be considered.

#### ALH066

##### Medication Utilisation Evaluation of Low Molecular Weight Heparins

SD YEOW<sup>1</sup>, J TAN<sup>1</sup>, J SEAH<sup>1</sup>, I WEE<sup>1</sup>

<sup>1</sup>Pharmacy, Changi General Hospital, Singapore

**Aim:** To determine the prescribing pattern, drug interactions and adverse events amongst inpatients prescribed with the 2 low molecular weight

heparins (LMWH) available in CGH – nadroparin and enoxaparin. To determine the extent of adherence of clinical practice to LMWH guidelines and to recommend appropriate measures to encourage rational prescribing and monitoring of LMWH therapy.

**Methods:** A retrospective review of clinical casenotes and medication records for inpatients prescribed with LMWH during the 1-month study period was carried out.

**Results:** A total of 107 patients who received either nadroparin or enoxaparin were identified. Nadroparin was prescribed most commonly for the prevention of deep vein thrombosis after a surgical procedure. Enoxaparin was prescribed most commonly for the treatment of acute coronary syndrome. Throughout therapy, about half of the patients had their haemoglobin and platelet levels routinely monitored; however, the occult blood test was carried out in only 5.50% of the patients. Adverse events reported included thrombocytopenia, haemorrhage, haematoma, bruising and elevated ALT/AST levels. Only about half of the cases were prescribed with dosages that complied with the LMWH guidelines.

**Conclusion:** Nadroparin and enoxaparin were generally prescribed for their registered indications. LMWH was generally well-tolerated; however, it would be preferable if more routine monitoring of haemoglobin levels and occult blood was carried out. An increased awareness of the current LMWH guidelines should be advocated within the hospital. The contraindications and precautions to LMWH therapy should also be taken into consideration before therapy is initiated.

#### ALH067

##### What is Needed to Know to Understand PACS Better?

**SG FOO<sup>1</sup>**

<sup>1</sup>Radiology, Changi General Hospital, Singapore

**Aim:** The impact of picture archiving and communication system (PACS) on workflow in radiology and the rest of the healthcare enterprise are great and will be even more prominent in times to come. So what is really needed to know in order to be able to learn, engage in discussion and appreciate PACS? A review of the PACS literature so as to determine gaps, consistencies and inconsistencies in knowledge is therefore necessary.

**Method:** Literature reviews of scholarly and manufacturers' publications, print materials, journals as well as on-line searches of well-known PACS websites were carried out to extract words, subjects and topics that were frequently used but needed some references or check-back as to their meanings before one can actually fully understand what one was reading. These were then compared to the areas of study that are emphasised in PACS teaching courses as well as training centres. Correlations were formed of the findings from review of literatures and the topics covered in teaching courses.

**Results:** It was derived that in order to appreciate any literatures about PACS, an understanding of the following subjects have to be attained first: (1) image and data acquisition; (2) PACS controller and archive/storage; (3) display workstations; and (4) system interface and networking

**Conclusion:** PACS technology is expected to continue its rapid evolution. In order to have a better grasp of the issues facing PACS, an understanding of the above topics is necessary before one can fully appreciate what this marvellous technology can bring and also actively participate in PACS discussion.

#### ALH068

##### Retrospective Study to Investigate the Physiotherapy Duration Needed for Stroke Patient to Achieve a Walking Distance of 15 m During Their Inpatient Stay — Update Report

**CL LEE<sup>1</sup>, FSP WONG<sup>1</sup>, YW LEE<sup>1</sup>, HY TAN<sup>1</sup>**

<sup>1</sup>Rehabilitative Services, Changi General Hospital, Singapore

**Aim:** To determine the optimal duration of physiotherapy needed for acute un-complicated stroke patients to achieve a walking distance of 15 m during their inpatient stay.

**Methods:** Patients who underwent stroke pathway in Changi General Hospital

in year 2003 were listed and their medical records retrieved. Only patients who fulfilled the criteria and who were able to achieve standby assist to independent ambulation of 15 m were eligible. The number of physiotherapy treatment modalities was recorded and the duration of physiotherapy for each patient was calculated based on 15 minutes per modality. The optimal duration of physiotherapy was then derived from the division of total duration of physiotherapy by the duration of in-patient stay.

**Results:** There were 393 patients who underwent uncomplicated stroke pathway. Of which, 252 records were retrieved. Of the 252, only 52 patients fulfilled the criteria. The median limb muscle power on their affected side was mostly 4. Their baseline gait ranged from minimal to moderate assist. To achieve a walking distance of 15 m with standby assist to independent, these 52 patients consumed a total of 40 physiotherapy modalities consisting of exercises and neurological rehabilitation. This is equivalent to 600 minutes of physiotherapy. Their optimal duration of physiotherapy was then calculated to be 8.0 minutes per day (SD 4.3).

**Conclusion:** The results suggest that uncomplicated acute strokes patients require daily physiotherapy duration of about 8.0 minutes daily during their inpatient stay to achieve a standby assist to independent ambulation of 15 m. This update report requires continuing research.

#### ALH069

##### Comparison of Outcome of Back Exercise Class and Hydrotherapy for Patients With Non-specific Low Back Pain

**LZ YE<sup>1</sup>, YM CHOI<sup>1</sup>, ML KONG<sup>1</sup>, HY TAN<sup>1</sup>**

<sup>1</sup>Rehabilitative Services, Changi General Hospital, Singapore

**Aim:** In a randomised blinded study, we studied and compared the efficacy of back exercise class (BEC) and hydrotherapy for patients with non-specific low back pain (LBP).

**Methods:** The study initially included 28 patients, randomised to attend either BEC or hydrotherapy treatment programme. The exercise sessions were conducted once a week for 6 consecutive weeks. Eighteen patients dropped out due to personal reasons. Only 10 patients, 5 in BEC and 5 in hydrotherapy, completed the programmes. Measures included a pain visual analogue scale (VAS), the Roland-Morris Disability Questionnaire (RM-24), the Sorensen test and the modified Back Performance Scale (BPS). These were evaluated before the commencement of the exercise and 1 week after the completion of the exercise by an assessor who is blinded to the patients' treatment programmes.

**Results:** Improvements were found between pre- and post-VAS, RM-24, holding time for Sorensen test and BPS in both BEC and hydrotherapy groups. These differences, however, were not significant for both groups. There were more improvements found for VAS and RM-24 in BEC compared to hydrotherapy, and more improvements for holding time for Sorensen test and BPS in hydrotherapy compared to BEC. Both these differences were not significant.

**Conclusion:** This study showed that both BEC and hydrotherapy improved the trunk extensor endurance, the level of perceived pain and functions and reduced the disability level in patients with non-specific LBP. However, due to the small sample size, the efficacy of BEC and hydrotherapy were not significant. Further research needs to be conducted.

#### ALH070

##### The Management of Parturients With Severe Pre-eclampsia — An ICU Perspective

**HJ NEO<sup>1</sup>, W TEOH<sup>1</sup>**

<sup>1</sup>Anaesthesia, KK Women's & Children's Hospital, Singapore

**Aim:** This study aimed to profile the disease spectrum of severe pre-eclamptic (SPE) patients admitted to an Obstetric ICU.

**Methods:** We retrospectively analysed all SPEs admitted to our Women's ICU from 2002-2004 to profile their spectrum of manifestations, interventions employed and clinical outcome.

**Results:** One hundred and eleven patients with severe pre-eclampsia were



admitted, 90% post-partum. This represents 45% of all obstetric-related admissions to the ICU and 0.27% of all deliveries in our hospital, during the same period. The incidence of eclampsia was 2.4 per 10,000 births. All except 5 patients (4.5%) had received antenatal care, of whom 40.4% were known pre-eclampsia on medication. The mean gestational age at detection of severe pre-eclampsia was 32.5 (0.4) weeks, with a mean arterial pressure of 129.2 (1.7) mm Hg. Forty-seven per cent of patients received intravenous (labetalol and/or hydralazine) and oral antihypertensives, while 45% required oral antihypertensives only (nifedipine, labetalol, methyldopa). Magnesium sulphate therapy was instituted in 71% for a mean duration of 28.7 (2.6) hours. The mean ICU length of stay was 46.5 (2.0) hours. Eighty-seven per cent had Caesarean sections and 12.6% delivered vaginally. The mean gestational age at delivery was 33.2 (0.4) weeks, with birthweight 1894 (81) g. Four perinatal mortalities (0.09 per 1000 births) and 2 maternal deaths (0.04 per 1000 deliveries) occurred in our series.

**Conclusion:** SPE is still a prevalent cause of maternal-fetal morbidity.

### ALH071

#### 3D Ultrasound of the Uterus

**O PAGCO<sup>1</sup>, Y YANG<sup>1</sup>, CL ONG<sup>1</sup>, CL CHONG<sup>1</sup>**

<sup>1</sup>*Diagnostic Imaging, KK Women's & Children's Hospital, Singapore*

**Aim:** The purpose of this study was to present the usage of 3D ultrasound in imaging of the uterus

**Method:** 3D ultrasound was offered to 44 women randomly selected with different ultrasound findings. Their ultrasound images were retrospectively reviewed.

**Results:** 3D ultrasound was offered to 44 patients, of which 48% (21/44) were diagnosed with uterine congenital malformation. The rest presented with IUCD, endometrial polyp and submucosal fibroids.

**Conclusion:** Our experience showed that 3D ultrasound could add value to the diagnosis of uterine congenital anomalies, especially for differentiation between arcuate, septate and bicornuate uterus. Although there is improved presentation of some cases with IUCD, submucosal fibroid, endometrial polyp by using 3D ultrasound, large samples are needed to evaluate the usefulness of 3D ultrasound for these conditions.

### ALH072

#### Transrectal Ultrasound, A Complementary Method for Gynaecologic Imaging

**M CRUZ-DEL RIO<sup>1</sup>, J VARGAS<sup>1</sup>, O PAGCO<sup>1</sup>, C CHONG<sup>1</sup>**

<sup>1</sup>*Diagnostic Imaging, KK Women's & Children's Hospital, Singapore*

**Aim:** The aim of this study was to demonstrate the importance of transrectal ultrasound (TRUS) as a complementary method to transvaginal ultrasound (TVUS) in imaging the female pelvis.

**Methods:** Thirteen patients aged from 25 to 65 years, with absolute or relative contraindications to TVUS, were scanned transabdominally and transrectally over 3 months from September to December 2004. Using a similar technique to TVUS, TRUS was performed using a transrectal probe. The ultrasound images were retrospectively reviewed and compared for resolution and quality.

**Results:** TRUS was performed in 8 (61.5%) women who were virgo intacta while 4 (30.7%) women declined transvaginal scan for personal reasons. In 1 woman (7.8%), TRUS was done as she could not fill her bladder. In all cases, TRUS provided diagnostic-quality and clinically useful images. There were no complaints of discomfort voiced by the patients. In 8 (61.5%) women, TRUS was able to identify a normal ovary, thus differentiating uterine from ovarian masses. In 4 (30.7%) women, TRUS was better than transabdominal scans in visualising the endometrial cavity.

**Conclusion:** Transrectal ultrasound of the female pelvis is useful for problem solving in those patients for whom TVUS could not be performed. In this small series of patients, TRUS was found to be well tolerated and invaluable in guiding patient management. The images proved to be generally of better quality and resolution than transabdominal scan and were comparable to TVUS.

### ALH073

#### Acute Paediatric Pelvic Pain – A Pictorial Review

**P DEVAKIRUBAI<sup>1</sup>, ES KUSUMA<sup>1</sup>, ELH TEO<sup>1</sup>**

<sup>1</sup>*Diagnostic Imaging, KK Women's & Children's Hospital, Singapore*

**Aim:** To determine the usefulness of ultrasound in the evaluation and management of female paediatric patients with acute pelvic pain.

**Methods:** We reviewed the ultrasound database for female paediatric patients presenting with acute pelvic pain seen between January and December 2004. The ultrasound records of the patients were traced, their findings analysed and correlation with the histopathological results was performed.

**Results:** Fifty-two patients between the ages of 7 and 17 years (median, 15 years) were evaluated with ultrasound for acute pelvic pain. Thirty-four patients had normal ultrasound scans whilst 18 patients had abnormal scans. Three patients were diagnosed on ultrasound to have ruptured ovarian cysts, 4 haematocolpos, 3 acute appendicitis, 1 perforated appendicitis, 2 ovarian torsions, 1 each had ectopic pregnancy, tubo-ovarian abscess, inguinal hernia and sacrococcygeal tumour. These cases were surgically proven to correlate with the preoperative US. One patient was diagnosed to have a mass in the bladder, which was later found to be a blood clot.

**Conclusion:** Ultrasound is a useful modality in the evaluation and management of paediatric female patients with acute pelvic pain.

### ALH074

#### Sonographic Appearances of Intrauterine Contraceptive Devices on Transvaginal Scan

**AA KYAW<sup>1</sup>, SL LAM<sup>1</sup>, CCL CHONG<sup>1</sup>, CL ONG<sup>1</sup>**

<sup>1</sup>*Diagnostic Imaging, KK Women's & Children's Hospital, Singapore*

**Aim:** To create awareness of the effectiveness of transvaginal ultrasound (TVUS) in assessing location, types and complications of intrauterine contraceptive devices (IUCDs).

**Methods:** The TVUS images of patients with IUCDs were reviewed over a 6-month period in a busy tertiary women's hospital.

**Results:** Location: An IUCD is in an acceptable location when its main stem is at the upper endometrial cavity (EC). A low-lying IUCD is when its stem is in the lower endometrium. Sonographic appearances at Copper T: Strong linear echogenicity in sagittal view and central echogenic dot and two arms in coronary view. Lippes Loop: Four echogenic dots in sagittal view. Curvy spiral echogenicity in coronal view. Ring: Two echogenic hemicurves in the EC. Echogenic ring in coronal view. Complications of IUCD: Complications such as a translocated IUCD penetrating the myometrium, unexpected pregnancy, both intrauterine and extrauterine, associated pelvic inflammatory diseases, or an IUCD migrating into peritoneum can be identified or suspected on TVUS. Other investigations: If an IUCD is suspected outside the uterus, a plain KUB X-ray is necessary for further localisation. On ultrasound, the IUCDs cannot be identified in the endometrium or within the myometrium. A malpositioned IUCD is best assessed with 3-D ultrasound as it is seen in its entirety.

**Conclusion:** Transvaginal ultrasonography is readily available and inexpensive. It is also accurate in localising and assessing the type and complications associated with IUCD.

### ALH075

#### The Painful Adnexa: A Spectrum of Sonographic Abnormalities

**M ORIOSTE<sup>1</sup>, C TAN<sup>1</sup>, CL CHONG<sup>1</sup>**

<sup>1</sup>*Diagnostic Imaging, KK Women's & Children's Hospital, Singapore*

**Aim:** Pain in one or both adnexae is a common gynaecologic problem. The purpose of this study was to present a spectrum of endovaginal sonographic findings in patients presenting with painful adnexae.

**Methods:** Over a 10-month period between April 2004 and January 2005, the endovaginal sonographic images of 54 patients presenting with pain in one or both adnexa were retrospectively reviewed.

**Results:** Endovagina sonography gives excellent visualisation of the adnexa

enabling specific diagnoses to be made. The spectrum of sonographic findings was analysed and depicted in a pictorial fashion.

**Conclusion:** Endovaginal sonography is an excellent modality to assess female patients presenting with painful adnexa. It is readily available, inexpensive and provides rapid assessment. It is also a safe procedure for patients who may be pregnant.

#### ALH076

##### A Spectrum of Sonographic Appearances of Corpus Luteal Cysts

**Y YANG<sup>1</sup>, AR NAINI<sup>1</sup>, CL ONG<sup>1</sup>, CL CHONG<sup>1</sup>**

<sup>1</sup>*Diagnostic Imaging, KK Women's & Children's Hospital, Singapore*

**Aim:** Ovarian corpus luteal (CL) cysts are known to present with complex appearances that can mimic tumours. The aim of this study was to determine the spectrum of sonographic appearances of CL in order to minimise the overdiagnosis of pathological cysts.

**Methods:** A retrospective review of all cases with the diagnosis of CL on gynaecological ultrasound scans from 1 February 2004 to 31 July 2004 was carried out through a search of the Radiology Information System of the Department of Diagnostic Imaging, KKH. The ultrasonographic images were reviewed and the range of appearances were identified and categorised.

**Results:** A total of 620 patients were reported to have CL. Of these, 138 (22%) patients had follow-up ultrasound scans, and 127 (92% of 138) had resolution of the CL, confirming their functional nature. Ten different ultrasonographic features were found in these patients. The commonest appearance of CL was that of a cyst with a slightly thickened irregular wall and some low-level echoes in the centre, as seen in 60 (47%) patients. Blood flow in the cyst wall was seen in 109 (86%) patients.

**Conclusion:** Our study showed that a high level of accuracy was achievable in making a confident diagnosis of CL based on the spectrum of sonographic appearances.

#### ALH077

##### X/XY Mosaicism in Turner Syndrome and Intersex

**L KNIGHT<sup>1</sup>, MH YONG<sup>1</sup>, RTY. PHUA<sup>1</sup>, ACS LING<sup>1</sup> AHM LAI<sup>2</sup>, IS NG<sup>2</sup>**

<sup>1</sup>*Laboratory, <sup>2</sup>Genetics Services, KK Women's & Children's Hospital, Singapore*

**Aim:** We present a group of 6 patients referred for cytogenetics study because of Turner features or intersex.

**Methods:** Chromosome analysis and FISH with DNA probes specific for various regions of the Y chromosome were performed.

**Results:** All patients showed a chromosome mosaic. The per cent of cells with 45 monosomy X varied from 4.3% to 45% in the 4 male patients and 52.5% to 88.6% in the 2 female patients. In all patients, the other cell line showed 46 chromosomes with a dicentric Y chromosome containing 2 copies of the short arm of the Y chromosome. All patients had the Y centromeric sequence DYZ3. The SRY gene was present in all cases.

**Conclusion:** These 6 patients expressed a broad spectrum of sex phenotypes ranging from normal male genitalia to ambiguous genitalia to true hermaphrodite to female Turner. Development of a male phenotype is initiated early in development by action of the SRY gene product in the cells of the developing gonadal ridge. The spectrum of phenotypes ranging from male to female might depend on the degree of mosaicism and the distribution of SRY containing cells. In the female patients, no or insufficient SRY transcript was present in this tissue at the appropriate time. The presence of Y in female patients is significant because they have an increased risk of developing gonadoblastoma. Once there is a 45,X cell line, there is an increased chance for that individual to be female with Turner manifestations or have ambiguous external genitalia.

#### ALH078

##### Cryptic Rearrangements of Telomeric Regions by Multisubtelomeric FISH

**MH YONG<sup>1</sup>, LA KNIGHT<sup>1</sup>, S LING<sup>1</sup>, A LAP, I NG<sup>2</sup>**

<sup>1</sup>*Laboratory, <sup>2</sup>Paediatrics - Genetics, KK Women's & Children's Hospital, Singapore*

**Aim:** Small rearrangements of telomeric regions generally containing a high density of genes are often difficult, if not impossible, to be elucidated by conventional G-banded chromosome analysis. We report 3 cases of cryptic chromosomal rearrangements involving telomeric regions detected by multisubtelomeric fluorescence in situ hybridisation (FISH).

**Methods:** Chromosome analysis using GTG-banding and multisubtelomeric FISH analysis were performed using the ToTelVysion Probe Panel (Vysis).

**Results:** **Case 1:** A 4-year-old boy was diagnosed with mild developmental delay. Chromosome analysis showed 46,XY,add(4)(p16). FISH analysis suggested a duplication of 4p16.2 - p15.2 with a terminal deletion including locus D4S3359, D4S166 and D4S3327. **Case 2:** A 16-year-old boy presented with learning disability and mild dysmorphism. Chromosomal analysis showed additional material on the 3q. FISH analysis showed a duplication of the terminal long arm of chromosome 3 including the subtelomeric locus D3S4560. **Case 3:** A 7-year-old boy presented with mental retardation, dysmorphism and developmental delay. Chromosome analysis showed a normal karyotype with no apparent abnormalities. However, FISH analysis showed a subtelomeric deletion of chromosome 18q including locus D18S1390.

**Conclusion:** Subtelomere FISH analysis is therefore informative in cases of apparently terminal duplication as more complex rearrangements may be uncovered. Multisubtelomere FISH analysis is also important in searching for cryptic subtelomeric rearrangements in idiopathic mentally retarded patients.

#### ALH079

##### Extent of Dietary Supplement Usage During Pregnancy

**WM HAN<sup>1</sup>, KY PHUAH<sup>1</sup>, C ONG<sup>1</sup>**

<sup>1</sup>*Nutrition and Dietetics, KK Women's & Children's Hospital, Singapore*

**Aim:** To evaluate the usage patterns and rationale for use of dietary supplements during pregnancy.

**Methods:** Information was collected over a 5-week period from a random sample of women at varying stages of pregnancy who attended the antenatal clinic at KK Women's and Children's Hospital, using an interviewer-administered questionnaire in early 2004.

**Results:** Three hundred and twenty-three women were interviewed. Use of vitamin/mineral, herbal and non-herbal supplements were 95.7%, 13.9% and 34.9% respectively. Complete multivitamin was the most commonly used dietary supplement (265/323, 82.0%), followed by folic acid (236/323, 73.1%), calcium (109/323, 33.7%) and bird's nest (95/323, 29.7%). Supplements were typically started during the first trimester of pregnancy and continued throughout the pregnancy. The majority of women were taking vitamin/mineral supplements at the doctor's advice, while herbal and non-herbal supplements were taken for their perceived benefit to the foetus and/or the mother.

**Conclusion:** While supplementation during pregnancy may be beneficial, much caution needs to be exercised, particularly to prevent overdose, since pregnancy is a complex interaction of 2 lives.

#### ALH081

##### Outcome of Dietary Treatment of Overweight Women Seen in a Dietetics Outpatient Clinic

**S KHOR<sup>1</sup>, C ONG<sup>1</sup>, ML TAN<sup>1</sup>, YY CHUA<sup>2</sup>, C LIM<sup>3</sup>**

<sup>1</sup>*Nutrition and Dietetics, KK Women's and Children's Hospital, Singapore, <sup>2</sup>Student, Dietetics, McGill University, Montreal, Canada, <sup>3</sup>Student, Applied Food Science and Nutrition, Temasek Polytechnic, Singapore*

**Aim:** To access the outcome of dietary treatment of overweight women, seen in Dietetics outpatient clinic of KK Women's and Children's Hospital for weight management in 2002 and 2004.

**Methods:** Case records were studied retrospectively to determine the amount of weight loss on follow-up. Forty-six patients seen in 2004 were randomly selected to participate in an interviewer-administered telephone survey on the effectiveness of the sessions.

**Results:** 87/180 women (48%) had at least 1 follow-up visit and were included in the analysis. The initial mean weight and body mass index (BMI) of the patients were 84 kg (SD 15.83) and 32.86 kg (SD 5.63), respectively. Fifty-four (62%) of patients enrolled in a structured programme and the remainder opted for ad-hoc sessions. At the first follow-up, mean weight loss was 1.71% (range, 0.23%-4.96%) for those on the programme vs 3.27% (range, 0.37%-31.12%) for those on ad-hoc sessions. Mean weight loss was highest in those who had 3 follow-ups with the dietitian, 3.6% (programme) and 7.4% (ad-hoc) respectively. Overall, 76% of those in the programme and 91% on ad-hoc sessions lose weight. 68% of those surveyed (n = 28) indicated that the dietary counselling sessions were beneficial, including 55% of those who defaulted their first follow-up (n = 11).

**Conclusion:** Dietary treatment can result in short-term weight loss. However, its effectiveness long-term is difficult to ascertain due to high default rate. It is heartening that the majority of patients find dietary intervention beneficial, even though they may not come for follow-ups.

## ALH082

### Stress and Adaptation of Siblings of Children with Childhood Cancer

AM TAN<sup>1</sup>, V TAN<sup>2</sup>, NA ABDUL LATIFF<sup>3</sup>, JM CHOO<sup>2</sup>

<sup>1</sup>Paediatrics-Haematology/Oncology, KK Women's and Children's Hospital, Singapore, <sup>2</sup>Psychology, National University of Singapore, Singapore, <sup>3</sup>Children's Cancer Foundation, Singapore

**Aim:** This study aimed to examine the stress experienced by healthy siblings of children with cancer and the role of parent-child communication in the healthy siblings' adjustment.

**Methods:** Participants were 21 siblings of children with cancer, comprising 15 girls and 6 boys, aged 9 - 16 years, whose siblings are clients of the Children's Cancer Foundation (CCF). Participants completed a questionnaire that measured sibling perception, parent-sibling communication and family member well-being. Individual face-to-face interviews explored some of these issues in detail.

**Results:** The more positive the sibling perception of the cancer experience, the more positive was the sibling adaptation. When the style of parent-sibling communication was more open, the sibling perception of the cancer experience was more positive. The less negative the sibling perceptions, the less worried the sibling was about his/her own health. Healthy siblings reported that they experienced an increase in negative feelings during their sibling's diagnosis. Some healthy siblings perceived their family to have drifted further apart after the diagnosis. Positive aspects of the siblings' illness included participation in CCF organised activities, seeing the family becoming closer, and siblings becoming more supportive of each other.

**Conclusion:** Channels of communication between family members should be open where siblings are given age appropriate details about their siblings' illness. Family and health professionals can minimise siblings' negative feelings by exploring alternative perspectives about the illness and related issues. Findings serve as reference for social workers and other health professionals in providing more holistic services to families living with childhood cancer.

## ALH083

### A Drug Utilisation Evaluation of Meropenem in KK Women's and Children's Hospital

A NG<sup>1</sup>, CC OH<sup>1</sup>, WC HING<sup>1</sup>, CY CHONG<sup>2</sup>

<sup>1</sup>Pharmacy, <sup>2</sup>Paediatrics - Infectious Diseases, KK Women's & Children's Hospital, Singapore

**Aim:** To evaluate the appropriateness of meropenem usage in KKH prior to and after implementation of the following measures by the Hospital Infection Control Committee; a memorandum to doctors, a meropenem monitoring form and a talk given to doctors on the prescribing pattern of meropenem in KKH.

**Methods:** A retrospective review of patient's casenotes was carried out in the control (September 2003 to March 2004) and study groups (June 2004 to December 2004). Predetermined criteria were used to evaluate the appropriateness of meropenem usage. Data were analysed using the chi-square test.

**Result:** There were 45 and 51 cases of meropenem use in the control and study groups, respectively. Based on the predetermined evaluation criteria, meropenem usage was considered appropriate in 66.7% and 86.3% cases respectively ( $P = 0.023$ ). Meropenem was efficacious for 64.4% of cases in the control and 64.7% of cases in the study group. A total of 7 cases were documented to have meropenem-resistant cultures; mainly *Pseudomonas aeruginosa* and *Acinetobacter baumannii*. *Stenotrophomonas maltophilia* (which is intrinsically resistant to meropenem) was isolated in 3 patients upon completion of meropenem therapy.

**Conclusion:** The implementation of measures to raise awareness as well as monitor meropenem usage have significantly improved the appropriateness of meropenem usage in KKH.

## ALH084

### Outcomes of Bladder Training in the Management of Vesicoureteric Reflux: A Case Report

J CHEW<sup>1</sup>

<sup>1</sup>Rehabilitation, KK Women's and Children's Hospital, Singapore

**Aim:** This is a case report on the outcomes of conservative management of vesicoureteric reflux (VUR) with prophylaxis antibiotic and bladder training.

**Methods:** A 10-year-old girl initially presented with urinary tract infection at age 1 year and was diagnosed to have pyelonephritis with Grade II left VUR. She also complained of nocturnal enuresis, frequency of voiding and wet underpants 2 years ago. She was found to have constipation and dysfunctional voiding. Dimercaptosuccinic acid (DMSA) scan was normal. Micturating cystourethrography (MCU) showed Grade II left VUR and ultrasound showed normal kidneys. Uroflow showed post-void residual. The constipation was treated with medication and dietary advice by the dietitian and was resolved but the urinary symptoms persisted. She was also on prophylaxis antibiotics and subsequently referred to physiotherapy for bladder training. Physiotherapy assessment found decreased fluid intake, small functional bladder capacity and long interval between each void. Bladder training consisting of education, timed voiding and fluid adjustment over a period of 1.5 years.

**Results:** Post-treatment, there was significant improvement of all the parameters. Functional bladder capacity improved by 90%, the fluid intake was normalised and interval between void was maintained at not more than 3 to 4 hourly. Serial uroflow demonstrated gradual improvement of bladder capacity and flow pattern with reduction of post void residual. Repeat MCU showed improvement of VUR from Grade II to Grade I. However, she still requires further training to resolve the problem of nocturnal enuresis.

**Conclusion:** Conservative management using bladder training is effective in the management of VUR.

## ALH085

### Therapeutic Role of Play in Enabling Children Cope with the Stresses of Hospitalisation

CL LING<sup>1</sup>

<sup>1</sup>Rehabilitation, KK Women's & Children's Hospital, Singapore

**Aim:** To demonstrate how play was used to reduce emotional stresses and to improve coping with hospitalisation.

**Methods:** Through 2 individual case illustrations, this review explained the rationale for the types of play applied and described the emotional and



behavioural changes noted in the patients. In case study 1, play was used for relaxation and distraction to reduce the patient's anxiety and resistance during finger prick. The patient's self-report on pain and fear levels was used to assess the outcome of the play intervention. In case study 2, play objectives focused on restoring self-confidence to a long-term patient with psychosocial problems. Discussion on the patient's artwork demonstrated the role of play in a multi-disciplinary setting in providing the emotional support required by the patient.

**Results:** In case study 1, the patient's self-report documented a progressive decrease in pain and fear levels. In case study 2, the discussion supported play as a means to foster the patient's self-esteem and to enhance the working relationships between the patient and healthcare professionals. The positive emotional shift and behavioural changes noted in the patient suggested improved self-confidence and social functioning.

**Conclusion:** The review demonstrated play, in both independent and multi-disciplinary settings, as a tool to improve the patient's coping with hospitalisation stresses. Play provided a form of relaxation and distraction to cope with stressful procedures. It also facilitated a safe avenue for the patient to express and process difficult feelings, both of which contributed to emotional and psychological welfare.

#### ALH086

##### A Randomised Controlled Trial to Compare the Effectiveness of Ice Packs with Cooling Maternity Gel Pads in Postpartum Women with Perineal Oedema

CM REMEDIOS<sup>1</sup>, SH NG<sup>1</sup>, WH SEE<sup>1</sup>

<sup>1</sup>Rehabilitation, KK Women's and Children's Hospital, Singapore

**Aim:** To compare the effectiveness of ice packs versus cooling maternity gel pads in postpartum women with perineal oedema and to discover women's preference between the modes of application of ice treatment.

**Methods:** Sixty women with oedema post normal or assisted vaginal delivery were recruited. Patients were randomly assigned into the gel pad (n = 20) or ice pack (n = 20) groups. Each patient was given up to 4 treatments. Another group of 20 subjects were given the ice pack and gel pad in an ABAB design to ascertain their preference of mode of ice application. The REEDA scale by Davidson (1974) was used to assess perineal oedema. Pain was measured using a visual analogue scale.

**Results:** The groups were homogenous and there was no significant difference in the REEDA and pain scores in both groups prior to treatment. The data were analysed using paired *t*-tests and it was found that both the ice packs and gel pads were effective in significantly reducing oedema and pain post delivery (*P* < 0.05).

**Conclusion:** Ice in the form of a gel pad or ice pack has been found to be effective in significantly reducing both oedema and pain in women post delivery. The gel pad provides more women with the option of using ice treatment as it can be obtained conveniently off the shelf. The ice pack is less convenient in that it requires more manpower in its preparation before use.

#### ALH087

##### Literature Review on Chest Physiotherapy Indication in the Paediatric and Neonatal Population

LF TIAN<sup>1</sup>, CL LUAH<sup>1</sup>, P KAUR<sup>1</sup>

Rehabilitation, KK Women's & Children's Hospital, Singapore

**Aim:** The aims of this literature review were: 1) and to increase the awareness of chest physiotherapy indication among physicians and health care professionals; and 2) to provide up-to-date evidence based chest physiotherapy practices.

**Methods:** Search strategies: Electronic search was performed in the following databases: 1) PubMed; 2) CINAHL (1982-2005); 3) OVID MEDLINE (1996-2005); 4) Cochrane Database of Systematic Review (2004-2005) using the keywords "chest physiotherapy in children/paediatrics/neonates"; limitations of "RCT & English language"; 5) Reviews of cross references, abstracts and journal hand searching in the English language. Selection criteria: All randomised-controlled trials and systematic literature reviews

involving chest physiotherapy in the paediatric and neonate population. Data collection and analysis: The authors undertook assessment of methodological quality and extraction of data for each included trial or review. Data were extracted for the outcomes and effectiveness of chest physiotherapy in the paediatric and neonatal population.

**Results:** A majority of the articles reviewed supported chest physiotherapy in improving atelectasis associated with secretion retention or mucus plugging in the paediatric and neonatal population, either mechanically ventilated or non-mechanically ventilated. Chest physiotherapy is also effective in the control of rising PCO<sub>2</sub>, in the maintenance and improvement of blood PO<sub>2</sub> and matching of ventilation-perfusion.

**Conclusion:** The results provided some basic guidelines for the use of chest physiotherapy in the paediatric and neonatal population. Due to the relatively insufficient number of studies in this population, more randomised-controlled trials will need to be conducted to address the suitability of chest physiotherapy in various conditions.

#### ALH088

##### Rehabilitation Post Selective Dorsal Rhizotomy: A KK Hospital Case Study

S WONG<sup>1</sup>, WT SEOW<sup>2</sup>

<sup>1</sup>Rehabilitation, <sup>2</sup>Neurosurgery, KK Women's & Children's Hospital, Singapore

**Aim:** Selective dorsal rhizotomy (SDR) is a recent advance treatment option for lower extremity spasticity. This paper aims to describe the patient selection process, rehabilitation methods and techniques used to assess and treat a paediatric patient pre- and post-SDR.

**Methods:** In July 2004, a 13-year-old female patient (AJ) with cerebral palsy was referred to the KKH neurosurgery clinic. AJ was evaluated by a specialist physiotherapist trained in spasticity management. After extensive interview with caregivers, review of medical records, video analysis of her motor skills and physiotherapy assessment, AJ was determined to be a suitable candidate for SDR. AJ underwent SDR at KKH in September 2004. Intensive rehabilitation started at day 14 post-SDR. AJ participated in thrice weekly physiotherapy, weekly hydrotherapy and daily home physiotherapy exercises. Videos of gait and functional activities were made pre-SDR and at week 8 and 11 post-SDR.

**Results:** There was significant reduction in spasticity after SDR. By week 6 post-SDR, there were improvements in gait pattern, walking speed and standing posture. At week 11, AJ was walking independently for short distances and only needed a walking frame for longer distance walking.

**Conclusion:** AJ's positive outcomes suggest that our SDR patient selection and rehabilitation methods were appropriate. This case study illustrates that SDR is a treatment option that requires significant healthcare resources and caregiver commitment. Hence, SDR should only be offered to patients after careful selection and only after more conventional spasticity treatments have failed.

#### ALH089

##### Influence of Embryo Scoring on Clinical Pregnancy Outcomes in Intracytoplasmic Sperm Injection Cycles

C LIM<sup>1</sup>, EB PRASATH<sup>1</sup>, SKE LOH<sup>1</sup>

<sup>1</sup>Reproductive Medicine, KK Women's and Children's Hospital, Singapore

**Aim:** To evaluate the influence of embryo scoring, a determinant of embryo quality, on pregnancy rate in intracytoplasmic sperm injection (ICSI) cycles.

**Methods:** This retrospective study of day 2 fresh triple embryo transfers (ETs) from January 2002 to November 2004 included patients undergoing 1st attempt of ICSI cycles with long protocol of ovarian stimulation using husband's fresh ejaculate. Patients with no surplus embryos were excluded. At KKIVF, embryo quality is assessed from grade 1 (poor) to 5 (excellent); embryos with grade >3 rendered usable for ET. Patients were divided into group 1 (patients receiving at least 1 grade 3 embryo for ET; n = 58) and group 2 (patients receiving all embryos with grade >4 for ET; n = 136). Clinical pregnancy was confirmed by ultrasound scan for fetal sac at 4 weeks after ET.

Data were analysed using the chi-square test.

**Results:** Overall, patients in group 1, yielded similar pregnancy rate (PR) to those in group 2 [41.4% (24/58) vs 43.4% (59/136),  $P = 0.46$ , not significant], with a gradual decline due to increased age. However, if the older women had 3 good quality embryos transferred, the decreased PR due to age, was ameliorated [group 1 vs group 2; 18.2% (4/22) vs 37.05% (20/54);  $P = 0.08$ ]. This was not statistically significant due to the small sample size studied.

**Conclusion:** Increased age has negative effect on PR but this may be compensated by having good quality embryos for transfer.

#### ALH090

##### Number of Embryos Transferred Affects Pregnancy Rates in Frozen-thawed Embryo Transfers

**EB PRASATH<sup>1</sup>, SKE LOH<sup>1</sup>**

<sup>1</sup>Reproductive Medicine, KK Women's and Children's Hospital, Singapore

**Aim:** Pregnancy rate increases when multiple embryos are transferred in human in-vitro fertilisation (IVF). A maximum of 3 embryos may be transferred per attempt according to the guidelines of the Ministry of Health in Singapore. However, in frozen-thawed embryo transfers (FETs) patients may receive 1, 2 or 3 embryos as availability of embryos depends on survival of frozen-thawed embryos. This retrospective paper studies clinical pregnancy rate (CPR) and multiple pregnancy rate (MPR) in relation to the number of embryos transferred in FET at KKIVF.

**Methods:** FETs from January 2003 to December 2004 were included in this study. Embryos, frozen by slow-freezing, were thawed by rapid-thawing method. Embryos surviving with  $\geq 50\%$  of cells were considered transferable. Clinical pregnancy was confirmed with ultrasound scan at 4 weeks post-FET. Patients were compared for the CPR per FET and MPR per pregnancy, based on 1 (group 1), 2 (group 2) or 3 (group 3) embryos transferred. Data were analysed by Fisher's exact test for significance.

**Results:** Group 3 exhibited significantly higher CPR (52 CPR/176 FET; 29.5%;  $P < 0.002$ ) than groups 1 (2/30; 6.7%) and 2 (17/94; 18.1%). Twin pregnancies occurred in group 2 (2/17; 11.8%) and group 3 (10/52; 19.2%) whereas triplet pregnancies occurred in group 3 (4/52; 7.7%) only. Nonetheless, MPR between groups was not significantly different.

**Conclusion:** This study shows that CPR increases significantly when more number of frozen-thawed embryos transferred. Triplet pregnancy rate also increases when 3 embryos were transferred, which alarms to reduce number of embryos for FET. Transferring 2 embryos may be considered to avoid triplet pregnancies.

#### ALH091

##### Embryo Fragmentation and Outcome of In-vitro Fertilisation/Intracytoplasmic Sperm Injection Cycles

**MLH CHAN<sup>1</sup>, EB PRASATH<sup>1</sup>, HTT THAO<sup>2</sup>, SKE LOH<sup>1</sup>**

<sup>1</sup>Reproductive Medicine, KK Women's and Children's Hospital, Singapore, <sup>2</sup>O & G, Hung Vuong Hospital, Vietnam

**Aim:** Fragmentation is one of the morphological criteria considered for embryo selection. Embryos with  $\leq 25\%$  fragmentation are considered transferable. Embryos with  $\leq 5\%$  fragmentation are considered top quality. This paper retrospectively studies the effects of mild ( $\leq 5\%$ ) and moderate ( $> 5$  to  $\leq 25\%$ ) fragmentation of embryos, on clinical pregnancy rate (CPR) and implantation rate (IR) in in-vitro fertilisation (IVF) and intracytoplasmic sperm injection (ICSI) patients of KKIVF.

**Methods:** This study includes patients undergoing 1st IVF/ICSI cycle, standard stimulation regime with 3 embryos transferred on day 2, between January 2002 and December 2004. Patients satisfying the above criteria ( $n = 210$ ) were divided into groups A ( $n = 63$ ), B ( $n = 52$ ), C ( $n = 50$ ) and D ( $n = 45$ ) with 3, 2, 1 or 0 embryos having  $< 5\%$  fragmentation, respectively, for ET. Group A was subdivided into A1, with all 3 embryos having no fragmentation and A2, with at least 1 embryo having  $< 5\%$  fragmentation. CPR and IR were measured. Data were subjected to chi-square with significance at  $P < 0.05$ .

**Results:** Insignificant decrease was observed in CPR [47.62% (30/63), 46.15% (24/52), 42.00% (21/50) and 35.56% (16/45)] and IR [23.28% (44/

189), 22.44% (35/156), 17.33% (26/150) and 16.30% (22/135)] with increasing number of fragmented embryos transferred in groups A, B, C and D respectively. Subgroup A1 exhibited higher CPR (52.00%; 13/25) and IR (26.67%; 20/75) than those of subgroup A2 (44.74%; 17/38) (21.05%; 24/114) without any statistical significance.

**Conclusion:** Mild or moderate fragmentation may only have an insignificant effect on CPR and IR at KKIVF. Also,  $\leq 25\%$  embryo fragmentation is an adequate criterion for embryo selection.

#### ALH092

##### More Usable Embryos Obtained by Using Thermocoin for Culture Dishes

**EB PRASATH<sup>1</sup>, MLH CHAN<sup>1</sup>, SKE LOH<sup>1</sup>**

<sup>1</sup>Reproductive Medicine, KK Women's and Children's Hospital, Singapore

**Aim:** Loss of temperature occurs due to the gap beneath embryo culture dishes during handling of dishes. Thermocoin, a metal piece, fills the gap between dish and incubator tray, transfers heat by direct contact and is expected to recover faster in temperature changes. This retrospective paper elucidates effect of Thermocoin on proportion of usable embryos.

**Methods:** Patients (age  $\leq 35$ ) in first in-vitro fertilisation/intracytoplasmic sperm injection (IVF/ICSI) attempt between June 2004 and May 2005 and culture dishes kept with or without Thermocoin in the same incubator were considered in this analysis. Fertilisation, cleavage, usable embryos and clinical pregnancy were measured as outcomes. Data were subjected to Fisher's exact test for statistical significance.

**Results:** Patients in the Thermocoin group (age  $32.7 \pm 2.2$ ) had a significant increase ( $P = 0.005$ ) in proportion of usable embryos [134 usable embryos/144 cleaved (93.1%)] than those without Thermocoin (age  $32.2 \pm 2.1$ ) [132/159 (83%)]. Non-significant increase ( $P = 0.1$ ) was observed between "with Thermocoin" and "without Thermocoin" groups with respect to fertilisation [156 2PN/194 injected (80.4%) vs 178/238 (74.8%)], cleavage [144 cleaved/156 2PN (92.3%) vs 159/178 (89.3%)] and clinical pregnancy per patient [10 pregnancies/18 patients (55.6%) vs 8/26 (30.8%)] rates.

**Conclusion:** At our centre, more usable embryos were obtained using Thermocoin although other outcomes improved insignificantly. A larger prospective study may shed more light on this aspect.

#### ALH093

##### Correlation of Embryo Grading to the Survival Rate of Frozen-thawed Human Intracytoplasmic Sperm Injection Embryos

**WHW WONG<sup>1</sup>, EB PRASATH<sup>1</sup>, SKE LOH<sup>1</sup>**

<sup>1</sup>Reproductive Medicine, KK Women's and Children's Hospital, Singapore

**Aim:** At KKIVF, human embryos are scored with a 5-point grading system, grade-5 being the best. Only embryos with grade-3 and above are considered transferable and freezable. This paper aims to study the relationship between embryo grading and thaw-survival rate of frozen day 2 intracytoplasmic sperm injection (ICSI) embryos.

**Methods:** Supernumerary embryos are frozen using slow cooling and thawed by rapid thawing methods. This retrospective study included frozen-thawed day 2 ICSI embryos (from January 2002 to March 2005) of grades 3 ( $n = 549$ ), 4 ( $n = 593$ ) and 5 ( $n = 53$ ). Outcome measures were percentage of embryos with partial ( $\geq 50\%$  cells survival) or full survival (100% cells survival) and overall frozen-thawed survival rate. Data were subjected to Fisher's exact test.

**Results:** Grade-5 embryos had significantly higher overall frozen-thawed survival rate (92.5%) as compared with grade-3 (75.8%) but not grade-4 (87.5%). Grade-5 embryos also had significantly higher percentage of fully surviving embryos (77.4%) as compared to grade-3 (47.7%) and 4 (63.6%). Grade-4 and 5 had similar overall frozen-thawed survival rate but grade-4 had significantly fewer partially surviving embryos as compared with grade-3 [23.9% (grade-4); 28.1% (grade-3); 15.1% (grade-5)].

**Conclusion:** The grade of the embryos appears to have a significant correlation to the frozen-thawed survival rate. However, the overall survival rate is still acceptable for all 3 grades. KKIVF will continue with this embryos selection system for cryopreservation.

**ALH094**

**An Overview of Interventional Breast Biopsy in the National Cancer Centre**

**YF LIEW<sup>1</sup>, CKK SOR<sup>2</sup>, JBK KHOO<sup>3</sup>**

<sup>1</sup>Clinical Departments - Radiation Oncology, <sup>2</sup>Diagnostic Radiology, National Cancer Centre, Singapore, <sup>3</sup>Diagnostic Imaging, Singapore

**Aim:** With the introduction of screening mammography, breast abnormalities are presented in earlier stage as non-palpable breast lesions. Breast biopsy is usually performed to distinguished benign lesions from malignancy as well as to determine the exact nature of these abnormalities. In the past, this was mainly done by surgical biopsies. In the recent year, less invasive percutaneous image-guided breast biopsies either using stereotactic or ultrasound guidance have been increasing used as an alternative technique for the assessment of these non-palpable breast lesions. The choice of either stereotactic or ultrasound guidance depends on the visibility of the lesion on mammography or ultrasound, the facilities available and the ease and comfort of the technique for the patient.

**Results:** In the National Cancer Centre, the procedures performed most commonly are vacuum-assisted biopsy (mammotome), large core needle biopsy, presurgical hook wire localisation and fine needle aspiration of the breast.

**Conclusion:** Through this poster, an overview of the different types of interventional breast biopsies and their comparison will be discussed.

**ALH095**

**To Improve the Prescription Process at the National Heart Centre Pharmacy**

**GN MANICKASWAMI<sup>1</sup>, ME HWA<sup>2</sup>, SG HO<sup>2</sup>, EH OR<sup>2</sup>, SP SEE<sup>2</sup>, SF LIM<sup>3</sup>**

<sup>1</sup>Pharmacy, National Heart Centre, Singapore, <sup>2</sup>Pharmacy, Singapore General Hospital, Singapore, <sup>3</sup>Nursing, National Heart Centre, Singapore

**Aim:** Our aim is to improve the service to our patients at the NHC Pharmacy. Being attuned to the needs of our patients, our project aims to improve our patients' involvement in the management of their medications, reducing their healthcare costs and improve waiting times at the pharmacy.

**Methods:** Part of the problem posing obstacles to the abovementioned aims not being fulfilled before was the large number of amendments upon dispensing of prescribed medications. We conducted a survey to determine the causes for these amendments. Being a QI project, QI tools, like the Cause and Effect Diagram (to identify causes) and the Tree Diagram (to select ideas for implementation), were used. Data to determine the number of amendments were collected. A target of 80% reduction in the number of amendments was set.

**Results:** We achieved the set target of 80% reduction in the number of amendments. A total cost savings of \$24,726 per year was achieved. There was an improvement in the waiting times, especially during peak periods. Other intangible gains were getting patients to be more involved in managing their own medication and reducing their healthcare costs.

**Conclusion:** This study being a joint project involving cross-campus staff of SGH and NHC proves that with concerted effort we can achieve improvement in work processes leading to benefits for all parties concerned.

**ALH096**

**Clinical Diagnosis in Image Quality of Ultra-fast T2 Weighted Sensitivity Encoding (SENSE) Technique Compared to Standard T2 FSE Sequence**

**VGE CHUA<sup>1</sup>, M MOHIT<sup>1</sup>, T LIM<sup>1</sup>**

<sup>1</sup>Neuroradiology, National Neuroscience Institute, Singapore

**Aim:** To evaluate imaging quality and lesion conspicuity using ultra-fast sensitivity encoding technique compared to standard fast spin echo sequence.

**Methods:** Two hundred and fifty patients were enrolled in the study. All

studies were done on 3.0 T Philips Intera MR scanner using the following protocols: T2 FSE (3000/100) and ultra-fast T2 SENSE sequence (10015/80) with sense factor of 2.5 & 4. One hundred and eighty out of 250 (72%) patients were studied for suspected stroke. Seventy (28%) patients for tumour and other pathology. Two radiologists assessed the image quality, lesion conspicuity and presence of artifacts (motion, susceptibility, and SENSE artifact), comparing standard T2 FSE to T2 SENSE images.

**Result:** Average imaging time for ultra-fast sense encoding imaging was 10 s, compared to 122 s for standard T2 FSE: a reduction of 92% of scan time. Image quality with T2 FSE was better than T2 sense imaging. However, for restless/uncooperative patients where motion artifact compromised the quality of T2 FSE, the very fast acquisition time meant that T2 SENSE images were superior. Aliasing artifacts more apparent when using high sense factor of 4 compared with 2.5. Lesion conspicuity and detectability on T2 SENSE sequence were comparable to standard T2 FSE.

**Conclusion:** Ultra-fast T2 weighted sense technique may be useful to replace T2 FSE in emergency stroke and uncooperative patients, by reducing the imaging time without loss of diagnostic information. The sense factor of 2.5 showed the best result without the fold-over artifact as compared to higher sense factor.

**ALH097**

**Sensitivities and Specificities of Various Cut-off Points for Myopia**

**A CHENG<sup>1</sup>, HD LUO<sup>1</sup>, G GAZZARD<sup>2</sup>, P FOSTER<sup>2</sup>, A SHANKAR<sup>3</sup>, D TAN<sup>1</sup>, SM SAW<sup>3</sup>**

<sup>1</sup>Singapore Eye Research Institute, Singapore, <sup>2</sup>Institute of Ophthalmology, United Kingdom, <sup>3</sup>COFM, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** To determine the association of spherical equivalent (SE) with uncorrected visual acuity (VA) impairment and the optimal cut-off for defining myopia.

**Methods:** A cross-sectional study of 1334 Chinese schoolchildren without astigmatism or hyperopia (aged 7-9 years) were recruited in the Singapore Cohort study Of the Risk factors for Myopia (SCORM). Uncorrected logMAR VA was measured for both eyes. Cycloplegia autorefraction was performed. SE cut-off points [-0.25 Diopters (D), -0.5D, -0.75D, -1.0D] were evaluated.

**Results:** Using different SE cut-off points, the prevalence rates of myopia varied from 45.8% (SE at least -0.25 D) to 30.7% (SE at least -1.0 D). The cut-off of at least -0.75 D had a sensitivity and specificity of 90.2% (95% CI, 87.4 to 92.9) and 94.7% (95% CI, 93.2 to 96.2), respectively, to predict visual impairment defined as uncorrected logMAR VA >0.3 (either eye). The next best cut-off of -0.5 D had a higher sensitivity (90.2%), but lower specificity (88.8%). The highest area under the receiver operator curve was found with -0.75D (0.924). The criteria of -0.25 D and -1.0 D have unacceptably low specificities (81.2%) and sensitivities (83.7%), respectively.

**Conclusion:** The cut-off points of -0.5 D and -0.75D in SE refraction are appropriate for the prediction of uncorrected VA worse than 0.3.

**ALH098**

**A Reminder Surveillance System for Patients with Adenomatous Colorectal Polyps**

**TT LOI<sup>1</sup>, HM QUAH<sup>1</sup>, P KAVEETHA<sup>1</sup>, S CHUNG<sup>1</sup>, CL TANG<sup>1</sup>**

<sup>1</sup>Colorectal Surgery, Singapore General Hospital, Singapore

**Aim:** This study is to access the reasons why patient who had previous polyps did not continue their regular surveillance.

**Methods:** Reminder letters were sent out in April to June 2005 for all patients who had colonoscopy done showing one or more polyps since 1992 to 1996. All returned mails were gathered, data entered and analysed.

**Results:** Four hundred and ninety-one reminder letters were sent out, of which only 138 (28%) replied and 31 were undelivered. Out of the 138 patients, 58 (42%) patients requested for follow-up appointments, 31 (22%) patients claimed that they were not aware of the need for surveillance and 20



(14%) forgot their appointment date. Also, 8 (6%) patients felt that it was too troublesome for bowel preparation, 6 (4%) patients worried about pain/discomfort. Surprisingly, only 5 (3.6%) mentioned that they were not free to continue surveillance and 6 (4%) who said that it was too expensive.

**Conclusion:** Sending reminder letters is only partly effective as the degree of awareness is low. Patient counselling is important to increase awareness and educate them on the importance of regular surveillance.

#### ALH099

##### Alternative Foam Aeroplane Splint for Burns Patients

**HS CHIA<sup>1</sup>, GA CHOWN<sup>1</sup>, N ANG<sup>1</sup>, CN TAN<sup>1</sup>, KC LAI<sup>1</sup>, XY LIM<sup>1</sup>, FW HEE<sup>1</sup>**

<sup>1</sup>Occupational Therapy, Singapore General Hospital, Singapore

**Aim:** To design a new shoulder abduction splint, also known as aeroplane splint (AS), for burns patients that would be: 1) easier to fabricate, 2) less time consuming, and 3) requires less manpower.

**Methods:** A team of occupational therapists (OT), therapy assistants and rehabilitation technician was formed. Through task analysis, material handling was identified as the root problem. The team decided to use a new design of AS with use of high-density foam. Subjective and objective results were measured against the aims by using questionnaires developed by the team. Data and feedback were gathered from OTs and the burn nurse specialists.

**Results:** All the objectives were met. Fabrication of the new AS was found to be easier, requiring one person compared to the previous of 2, and taking significantly shorter time of ~50 minutes compared to the previous of ~100 minutes. Results on feedback from nurse specialists included simplicity and significantly shorter time in application. The new AS was also cheaper by \$77.39 based on the calculation of an adult size splint.

**Conclusion:** The new AS was currently used in the Singapore General Hospital burn unit. Three sizes (baby, adult and extra large) have been fabricated. No feedback was gathered from the patients, but as the new AS was fabricated off the patient, it caused no pain compared to the conventional one which was fabricated on the patient. In conclusion, the use of high-density foam with new design of AS was considered to be better than the conventional one.

#### ALH100

##### Atypical Squamous Cells, Cannot Exclude a High-grade Intraepithelial Lesion (ASC-H) – A Retrospective Review to Evaluate Diagnostic Features and Accuracy

**ST GOH<sup>1</sup>, SK LIM-TAN<sup>1</sup>, SH CHEW<sup>1</sup>**

<sup>1</sup>Pathology, Singapore General Hospital, Singapore

**Aim:** To evaluate the accuracy and cytomorphologic characteristics of ASC-H cases diagnosed in the cytology laboratory, SGH with subsequent abnormal histological biopsy to improve diagnostic quality.

**Methods:** Computer extraction was performed to retrieve ASC-H cases from 2002 to 2004. 86,333 Pap smears were screened during this period. 0.17% (n = 146) of our smears were reported as ASC-H. 113 cases were available for the study. Histological and cytological slides were reviewed.

**Result:** Of the 113 cases, 30% (n = 34) have histological follow up. 82.4% (n = 28) revealed HSIL or worse. 2.9% (n = 1) revealed LSIL. 14.7% (n = 5) revealed no histologic abnormalities. Retrospective review was performed for the 29 cases with subsequent abnormal histology. 55.2% (n = 16) showed presence of scattered syncytial aggregates/small sheets of cells with high N/C ratio, nuclear crowding, nuclear hyperchromasia and irregular nuclear membrane. 24.1% (n = 7) showed presence of single cells with high N/C ratio, irregular nuclear membrane and pale chromatin staining. 17.2% (n = 5) showed presence of atypical parakeratotic cells with marked cellular pleomorphism. 3.5% (n = 1) showed abundant cells with enlarged prominent nucleoli and abundant basophilic cytoplasm.

**Conclusion:** Our study shows that 82.4% of our ASC-H cases had subsequent histology of HSIL or worse. Our diagnostic rate of ASC-H is 0.17% which is comparable with the rates reported elsewhere. Squamous cells with high N/

C ratio, nuclear membrane irregularity, nuclear hyperchromasia and cellular pleomorphism should be reported as ASC-H when an outright diagnosis of HSIL or carcinoma is hampered for various reasons. Our results emphasise the importance that patients with ASC-H be followed up with colposcopy.

#### ALH101

##### Employment of Tacrolimus-sparing Regimen in Clinical Renal Transplantation

**HX LOU<sup>1</sup>, TS LIM<sup>2</sup>, A VATHSALA<sup>2</sup>**

<sup>1</sup>Pharmacy, <sup>2</sup>Renal Medicine, Singapore General Hospital, Singapore

**Aim:** This study was performed to document the effects following the addition of diltiazem (DTZ) (Hebressor<sup>®</sup>) to the tacrolimus (FK)-dosage requirements of renal transplant recipients (RTX) receiving FK-based immunosuppression in clinical practice.

**Methods:** Twelve stable FK-treated RTXs, without liver dysfunction, were reviewed. After being maintained on a stable FK dose, DTZ SR 90 mg daily was initiated. FK dose adjustment was performed to achieve the same target FK trough levels before and after initiation of DTZ; no FK dose changes were performed prior to initiation of DTZ. FK doses required to achieve similar troughs before and after DTZ were compared.

**Results:** Median and (range) are reported. Following initiation of DTZ SR 90 mg daily, FK dose requirement was significantly reduced [0.17 (0.11-0.26) vs 0.09 (0.04-0.20) mg/kg/day, pre vs post DTZ,  $P = 0.00005$ ]. Despite a large inter-patient FK-sparing effect (range, 5.0% to 76.9%), a reduction of 42.7% in FK dose was achieved. By study design, trough FK levels were unchanged before and after addition of DTZ [9.7 (6.0-13.6) vs 10.4 (5.6-15.5) ng/mL, pre vs post,  $P = ns$ ]. This interaction translated into cost savings of S\$8,669 (867-13,870) per FK-treated RTX each year. Following the addition of DTZ, no patient developed adverse event attributable to DTZ.

**Conclusion:** This analysis demonstrates that addition of DTZ 90 mg daily resulted in significant reduction in FK dose requirement regardless of initial dose requirement to maintain the same troughs. However, there is considerable inter-patient variation in reduction in FK dose and dosing needs individualisation. This pharmacokinetic interaction translates into cost saving without additional adverse events.

#### ALH102

##### Evaluating the Baseline Drug-related Knowledge of Patients on Oral Hypoglycaemic Agents

**AL TOH<sup>1</sup>, CL QUEK<sup>1</sup>**

<sup>1</sup>Pharmacy, Singapore General Hospital, Singapore

**Aim:** Diabetic patients with increased knowledge of self-management have lower HbA1c. However, a large proportion of diabetics have difficulties in managing their medicines. Therefore, this project sought to illustrate the knowledge gaps outpatients had about their oral hypoglycaemic agents (OHA). The secondary objectives of this project were to identify the predictors for drug-related knowledge. Patients' knowledge of hypoglycaemic and hyperglycaemic events was also audited.

**Methods:** A survey was conducted on a convenient sample of outpatients receiving OHA from Singapore General Hospital (SGH) Specialist Outpatient Clinic pharmacies from October to December 2004.

**Results:** A total of 103 subjects were interviewed. The mean age, duration of diabetes and HbA1c of study subjects were 53 years, 12 years and 7.9%, respectively. Their mean drug-related knowledge score was 3.4 out of a total score of 6. More than 80% of the study subjects knew the indication and the dosing instructions for their OHA. However, less than 30% of them knew a side effect of their OHA. Half of the subjects on sulphonyureas would take their medicines even if a meal was missed. About a quarter (24%) of the subjects could not identify a sign of hypoglycaemia and 25% of them did not know how to manage a hypoglycaemic episode. Age was identified as a negative predictor for drug-related knowledge.

**Conclusion:** In view of the knowledge gaps identified in this project, pharmacists can contribute towards the team management of diabetes mellitus

through education on hypoglycaemia and the safe use of OHA among the diabetics.

#### ALH103

### Efficacy of a Short 18-Session Inpatient Rehabilitation Programme for Chronic Respiratory Diseases

C NG<sup>1</sup>

<sup>1</sup>Physiotherapy, Singapore General Hospital, Singapore

**Aim:** Pulmonary rehabilitation programmes are well-established for improving exercise capacity and quality of life in patients with chronic lung diseases. However, our patients find travelling three times a week to an outpatient facility logistically difficult, especially when assistance of a caregiver is required, and even exhausting as many depend on expensive public transportation. A short intensive inpatient programme was hence started to help these patients, and this study examines its efficacy.

**Methods:** Fourteen male patients (10 with COPD, 2 with bronchiectasis, 2 with interstitial fibrosis) aged  $64.9 \pm 9.7$  years were recruited over an 11-month period. All patients underwent lung function tests (as tolerated), 6-minute walk test, as well as quality of life questionnaires on admission – these were repeated on completion of the programme. Each patient underwent 2 sessions of physical therapy daily, for a total of 18 sessions over the 10 to 14 days of hospital stay. Each session consisted of a 5-minute warm-up, 30 to 40 minutes of aerobic exercises, and strengthening exercises using elastic, graduated Theraband and free weights.

**Results:** Paired analysis, with  $P < 0.05$  considered significant. Six-minute walk test and quality of life variables showed significant improvement from admission to discharge.

**Conclusion:** We hence conclude that a short 18-session intensive inpatient pulmonary rehabilitation programme is able to improve 6-minute walk test distance and quality of life for patients with chronic respiratory diseases.

#### AMB104

### Sigmoid Volvulus: Diagnostic Twists and Turns

L TIAH<sup>1</sup>, SH GOH<sup>1</sup>

<sup>1</sup>Accident and Emergency, Changi General Hospital, Singapore

**Aim:** To describe the clinical profile of patients with sigmoid volvulus and highlight the diagnostic difficulties and pitfalls.

**Methods:** A retrospective descriptive study of patients with sigmoid volvulus seen in Changi General Hospital over a 5-year period from July 1999 to July 2004.

**Results:** A total of 28 cases of sigmoid volvulus were identified, of which 16 were male and 12 female. The median age was 74 years. Twenty-seven were Chinese and 1 was Malay. Only 7 out of 28 patients were from nursing institutes, while the rest were from their own homes. Eleven were bedridden and chronic constipation was a problem for 17 patients. Co-existing medical illnesses, including neuropsychiatric conditions, were common. Abdominal distension and pain were the most frequent presentations (26 and 21 patients, respectively). There were 12 patients with constipation and 11 with diarrhoea. Only 9 had the complete typical triad of abdominal distension, pain and constipation. The classical coffee-bean sign was identified in 9 out of 26 initial plain abdominal radiographs done at the emergency department and a further 11 were diagnosed only after review by the surgical team in the ward. Another 4 were identified only after computed tomography scan of the abdomen and pelvis. The remaining 2 cases were diagnosed intraoperatively after undergoing emergency laparotomy.

**Conclusion:** As our aged population continues to grow, sigmoid volvulus may be more commonly encountered. A high index of suspicion should be maintained and pitfalls avoided so as to prevent delay in diagnosis and treatment.

#### AMB105

### Histological Findings in Women with Atypical Endometrial Cells Detected on Cervical Smear

SH CHEW<sup>1</sup>

<sup>1</sup>Laboratory, KK Women's & Children's Hospital, Singapore

**Aim:** To determine if the finding of atypical endometrial cells in a cervical smear predicts a significant lesion in the uterus.

**Methods:** Eighty-seven cervical smears diagnosed as atypical endometrial cells were identified from January 2002 to December 2004. Twenty-six cases had no follow-up histology of endometrium and were excluded from further review. Histological findings subsequent to the index smear were tabulated.

**Results:** Sixty-one cases were included. Thirty women (49%) had a malignancy: endometrial adenocarcinoma (25), malignant mixed Müllerian tumour (3), cervical adenocarcinoma (1) and poorly differentiated carcinoma in the pelvis (1). Nineteen cases (31%) had normal histology. The remainder had the following findings: complex atypical endometrial hyperplasia (1), benign endometrial polyp (5), disordered proliferative endometrium (1), chronic endometritis (1), pyometra (1), hormonal effect (2) and insufficient endometrium for evaluation (1). Twenty-two of 39 (56%) women  $\geq 50$  years old had a malignancy. Eight of 22 (36%) women  $\leq 49$  years old had a malignancy; all 8 were over age 40. Twenty-five cases were reported as "atypical endometrial cells, favour neoplasia". Twenty-one (84%) were found to have malignant disease. Among 20 women aged 50 years or older, 16 (80%) had malignant disease. The remaining 5 smears were in women 49 years or younger, and all (100%) had a malignancy.

**Conclusion:** About half the women with atypical endometrial cells detected on cervical smear harboured a uterine malignancy. A further 15% had benign endometrial pathology. The subset of "atypical endometrial cells, favour neoplasia" is predictive of malignancy, especially in women under 50 years old.

#### AMB106

### Imaging of Osteo-odonto-keratoprosthesis Surgery: Stages 1 and 2

K SHEAH<sup>1</sup>, LL CHAN<sup>2</sup>, J THENG<sup>3</sup>, A TAY<sup>4</sup>, W LIM<sup>2</sup>, D TAN<sup>3</sup>

<sup>1</sup>Oncologic Imaging, National Cancer Centre, Singapore, <sup>2</sup>Diagnostic Radiology, Singapore General Hospital, Singapore, <sup>3</sup>Cataract and Comprehensive Ophthalmology Service, Singapore National Eye Centre, Singapore, <sup>4</sup>Oral and Maxillofacial Surgery, National Dental Centre, Singapore

**Aim:** To demonstrate the radiological assessment of osteo-odonto-keratoprosthesis surgery.

**Methods:** Osteo-odonto-keratoprosthesis surgery is a sight-restoration procedure undertaken for patients with refractory corneal blindness. It is a relatively new procedure in Asia and was first performed at our institution in July 2004. The operation was divided into 2 stages spaced about 4 months apart. Stage 1 involved the harvesting of a suitable tooth for prosthesis formation, preparation of an implant mucosal pocket and ocular resurfacing with buccal mucosa. Stage 2 involved the implantation of the keratoprosthesis onto the neo-ocular surface. Using a 16-slice multidetector computed tomography (MDCT) (Somatom Sensation 16, Siemens, Forchheim, Germany), we evaluated the face for complications from stage 1, specifically for the formation of abscess collections at the operative sites of the maxilla/mandible, ocular surface and mucosal implant pocket. Stage 2 MDCT evaluation was essential to obtain baseline dimensions of the implanted keratoprosthesis. This was required because of the potential for keratoprosthesis resorption over time, leading to tilting and loss of vision. The 3-dimensional measurements are also augmented with a optical cylinder/optic nerve angle. We used a single reader at fixed window widths and levels from the baseline.

**Results:** Measurement of the osteo-odonto lamina on CT in axial plane and with 3-dimensional reconstruction is important as a baseline for subsequent follow-up to look for prosthesis resorption. This will be demonstrated in the pictorial review. There was no significant postoperative collection identified.

**Conclusion:** The pictorial review will demonstrate the use of CT in the evaluation of a novel sight restoration procedure.

## AMB107

**N-terminal Pro-brain Natriuretic Peptide—Is the Recommended Cutoff Value Relevant for Local Population?****B KWOK<sup>1</sup>, CP YEO<sup>2</sup>, SF LIANG<sup>3</sup>, ZL LIN<sup>3</sup>, E JACOB<sup>2</sup>**<sup>1</sup>Cardiology, National Heart Centre, Singapore, <sup>2</sup>Pathology, Singapore General Hospital, Singapore, <sup>3</sup>Cardiac Laboratory, National Heart Centre, Singapore

**Aim:** The N-terminal pro-brain natriuretic peptide (NT-proBNP) cutoff value of 125 µg/mL has been recommended for use in detecting left ventricular dysfunction (LVD). This study aims to verify this cutoff value in our local Singaporean population.

**Methods:** Stable outpatients presenting for echocardiography at the National Heart Centre were invited to participate if their echocardiographic images were optimal. Exclusion criteria included chronic renal failure, atrial fibrillation, recent myocardial infarction, previous cardiac surgery, bradycardia (<60 beats per minute) and tachycardia (>100 beats per minute). Echocardiography were performed in the usual manner and a sample of blood is obtained immediately after the echocardiographic study. Quantitation of NT-proBNP in serum was performed by the Elecsys NT-proBNP electrochemiluminescence immunoassay.

**Results:** Seventy-five patients were enrolled in the study, of which 50 were males. Mean age was 48 ± 30 years. Eighteen patients (24%) had left ventricular dysfunction (LVEF 41 ± 16 %). Using the cutoff value of 125 µg/mL, the area under the receiver operating characteristic curve was 0.85. The corresponding sensitivity was 72%, specificity 91%, with positive predictive value of 72% and negative predictive value of 91%.

**Conclusion:** NT-proBNP has similar predictive values in our local outpatient population as compared to published studies in Western countries. Therefore this test, using the recommended cutoff at 125 µg/mL, may be useful in the management of patients with suspected heart failure in a non-emergency clinical setting.

## AMB108

**Ultrafast High Field Contrast Enhanced Magnetic Resonance Angiography Assessment of Cerebral Arteriovenous Malformations****YY SITO<sup>1</sup>, W LEE<sup>1</sup>, V CHUA<sup>1</sup>, SM CHNG<sup>1</sup>, F HUI<sup>1</sup>**<sup>1</sup>Neuroradiology, National Neuroscience Institute, Singapore

**Aim:** High field 3 tesla (3T) magnetic resonance (MR) scanners have superior signal-to-noise ratio and better resolution compared to lower field strength systems. Our aim was to evaluate the clinical utility of ultrafast keyhole contrast-enhanced (CE) MR angiography (MRA) at 3T for the morphologic evaluation of cerebral arteriovenous malformations (AVMs).

**Methods:** Six patients with cerebral AVMs had ultrafast keyhole CE-MRA performed as part of their MR imaging workup. All had catheter digital subtraction angiography (DSA) as the gold standard for evaluation of the AVM angioarchitecture. Two experienced neuroradiologists independently assessed both techniques with attention to the feeding arteries, nidus and venous drainage patterns.

**Results:** Ultrafast keyhole CE-MRA detected all AVMs seen on DSA. The main feeding arteries and venous drainage patterns were clearly discerned in CE-MRA while nidus delineation was superior at DSA. Anatomic information from volumetric high-resolution MR sequences provided complementary data to the dynamic flow information on CE-MRA, especially for nidus evaluation.

**Conclusion:** Ultrafast keyhole CE-MRA is a promising emerging technique for the non-invasive clinical evaluation of AVMs, especially for treatment planning and follow-up. The main limitation is that of low spatial resolution at the used time resolution compared to DSA.

## AMB109

**Renal Artery Stenting Using the Express SD Stent****BC CHING<sup>1</sup>, KH TAY<sup>2</sup>, BS TAN<sup>1</sup>, A HTOO<sup>1</sup>, RHG LO<sup>1</sup>, A SIKANDER<sup>1</sup>, S BANGOY<sup>1</sup>**<sup>1</sup>Diagnostic Radiology, Singapore General Hospital, Singapore, <sup>2</sup>Dietetics and Nutrition Services, Singapore General Hospital, Singapore

**Aim:** To report our early experience of renal artery stenting using the Boston Scientific Express SD stent.

**Methods:** We retrospectively reviewed 15 patients (7 males, 8 females; mean age: 65 years) who underwent renal artery stenting using the Express SD stent. All patients had documented renal artery stenoses based on noninvasive imaging prior to stenting. Indications for stenting included uncontrolled hypertension (n = 3), renal preservation (n = 2), or both (n = 10). In all patients, the femoral approach through a 7F guiding catheter over a 0.018 Thruway guidewire. Predilatation was routinely performed with a Gazelle balloon. The patients were followed up clinically and with renal doppler scans (mean follow-up period 3.2 months; range, 1 week to 9 months).

**Results:** The renal artery stenoses were successfully crossed and stented in all patients. One patient had acute thrombosis of the renal artery immediately post-stenting and went into acute renal failure. He also had trash feet from cholesterol embolisation. Another patient developed pseudoaneurysm at the groin puncture site 1 week post-procedure which was successfully treated with ultrasound-guided thrombin injection. Thirteen patients had improved or stable blood pressure (BP) control or serum creatinine. One patient had worsened BP control and serum creatinine level, while another had worsened BP control but improved serum creatinine level. All stents were patent on follow-up renal doppler studies.

**Conclusion:** Renal artery stenting with the Express SD stent system is safe and technically straight forward. The majority of patients had improved or stable BP control and serum creatinine levels post-stenting.

## AMB110

**Transcatheter Embolisation of Renal Angiomyolipomas Using Absolute Alcohol—The Singapore General Hospital Experience****LR CHONG<sup>1</sup>, KH TAY<sup>1</sup>, A HTOO<sup>1</sup>, R LO<sup>1</sup>, BK NG<sup>1</sup>, BS TAN<sup>1</sup>, KT FOO<sup>2</sup>**<sup>1</sup>Diagnostic Radiology, <sup>2</sup>Urology, Singapore General Hospital, Singapore

**Aim:** Renal angiomyolipomas are rare benign hamartomatous lesions. Fifteen per cent of tumours bleed spontaneously, of which up to 30% present in shock. This study aims to establish the efficacy and safety of transcatheter embolisation using absolute alcohol in controlling acute haemorrhage, preventing recurrent haemorrhage, reducing tumour size and preserving normal renal parenchyma.

**Methods:** Fourteen patients were treated over an 11-year period, with mean tumour size of 9.6 cm (range, 3 to 22 cm). Indications include acute/recent haemorrhage in 6 patients, flank pain in 2 patient and prophylaxis (size greater than 4 cm) in 5 patients. Preliminary computed tomography and renal angiogram were performed, followed by selective catheterisation and injection with absolute alcohol mixed with lipiodol. All patients received prophylactic antibiotics.

**Results:** There was 100% technical success, with total volume of alcohol injected between 0.5 and 9 ml (mean: 5 ml). Total eradication of tumour vascularity was achieved in 13 patients, with 1 patient requiring repeat embolisation during same admission due to large tumour size. No procedural complications were encountered. Post-embolisation syndrome was found in 7 patients, manifesting as fever lasting 2 to 7 days. Follow-up period ranged from 2 to 64 months (mean: 23 months). No further episodes of haemorrhage were documented in any patient. One patient underwent nephrectomy due to concern for underlying malignancy.

**Conclusion:** Transcatheter embolisation of renal angiomyolipomas with absolute alcohol is safe, well tolerated, effective in controlling acute haemorrhage, preventing recurrent haemorrhage and reducing tumour size. Elective/prophylactic embolisation should be considered for tumours greater than 4 cm.



**AMB111**

**Dynamic Computed Tomography Angiogram in the Diagnosis of Popliteal Artery Entrapment Syndrome**

**KH TAY<sup>1</sup>, TC HOWE<sup>1</sup>, BS TAN<sup>1</sup>, SG TAN<sup>2</sup>, M SEBASTIAN<sup>2</sup>**

<sup>1</sup>Diagnostic Radiology, <sup>2</sup>General Surgery, Singapore General Hospital, Singapore

**Aim:** To describe the imaging protocol and findings of dynamic computed tomography (CT) angiogram (CTA) in the evaluation of popliteal artery entrapment syndrome (PAES).

**Methods:** Eleven patients (8M:3F, mean age of 37 years) were referred for dynamic CTA to exclude PAES. CTAs of the popliteal arteries were obtained twice with the same IV contrast bolus, once with the patient's feet in the neutral position and the other with the patient's feet in active plantar flexion. PAES is diagnosed when the popliteal artery is more than 75% stenosed on the plantar flexed images but non stenosed on the neutral images.

**Results:** There were 7 patients with positive scans. Five patients had bilateral PAES; 2 patients had unilateral PAES, 1 of whom had thrombosis of the contralateral popliteal artery. Three of the 7 patients underwent surgery in which PAES was confirmed; 1 patient had a repeat CTA post-surgery showing resolution of PAES.

**Conclusion:** Dynamic CT angiogram of the popliteal arteries is a safe and non-invasive test which can potentially replace dynamic catheter angiography for the evaluation of PAES. The non-invasive nature of the test makes it an ideal screening tool for the condition.

**AMB112**

**The Use of Cardiac Markers in Emergency Department 6 Hour Chest Pain Evaluation (ACTION) Protocol**

**SH LIM<sup>1</sup>, V ANANTHARAMAN<sup>1</sup>, SL YO<sup>2</sup>, T CHUA<sup>2</sup>, MEH ONG<sup>1</sup>, C RABIND<sup>1</sup>, E JACOB<sup>3</sup>**

<sup>1</sup>Emergency Medicine, Singapore General Hospital, Singapore, <sup>2</sup>Cardiology, National Heart Centre, Singapore, <sup>3</sup>Pathology, Singapore General Hospital, Singapore

**Aim:** To study the sensitivity and specificity of the various cardiac markers in predicting adverse cardiac events (ACE).

**Methods:** Patients aged  $\geq 25$  years, presenting to the Emergency Department with chest pain suggestive of acute coronary syndrome (ACS) with a 12-lead ECG non-diagnostic for myocardial ischemia or infarction. Intervention: ECG and blood test for myoglobin, creatinine kinase (CK)-MB mass and troponin T (TnT) were done at 0, 3 and 6 hours after arrival. If the patient was not admitted after 6 hours of negative evaluation and in the study group, he underwent a stress tetrofosmin scan. If the stress tetrofosmin scan was positive, the patient was admitted. In the control group, patients with high or moderate risk for coronary artery disease were admitted. Patients were followed up at 1 year for cardiac death, ventricular fibrillation and myocardial infarction.

**Results:** The optimal cutoff values of TnT or CK-MB for detecting 1 year ACE were 0.02  $\mu\text{g/L}$  and 6  $\mu\text{g/L}$ , respectively. Patients who had 6 hours TnT  $>0.02$  or CK-MB  $>6$  were 188.84 times (OR = 188.84; 95% CI, 46.60 to 765.80) or 112.32 times (OR = 112.3; 95% CI, 32.24 to 368.52) more likely to experience 1 year ACE. Forty-one per cent of patients with positive TnT but negative CK-MB had ACE within 1 year compared with only 6.7% of those who had negative TnT but positive CKMB.

**Conclusion:** TnT is the most important marker to predict ACE. The additional of CKMB to TnT did not improve diagnostic accuracy.

**AMB113**

**Nephrotoxicity Associated with Acute Paracetamol Overdose: A Case Report and Review of the Literature**

**CS LOH<sup>1</sup>, PONAMPALAM R<sup>1</sup>**

<sup>1</sup>Emergency Medicine, Singapore General Hospital, Singapore

**Aim:** To describe the clinical presentation of nephrotoxicity with acute

paracetamol overdose in a low-risk patient, and to discuss the literature on paracetamol-induced nephrotoxicity.

**Case Report:** A 29-year-old Chinese man weighing 65 kg presented to hospital 10 hours after ingesting 30 g of paracetamol (462 mg/kg body weight). He had no known risk factors for hepatotoxicity and was started on intravenous N-acetylcysteine (NAC) empirically. The blood paracetamol level was 145  $\mu\text{g/mL}$  at 10 hours post-ingestion, which was above the treatment line on the Rumack nomogram. Hence, the NAC regime was continued till completion. Aspartate aminotransferase and alanine aminotransferase levels rose to a maximum of 6278 U/L and  $>12,000$  U/L, respectively, 4 days post-ingestion. Liver function subsequently improved, but the patient's renal function deteriorated. Serum creatinine level was normal on day 3, but rose to a maximum of 455 mmol/L on day 8; it gradually declined without the need for dialysis. The patient was lost to follow-up subsequently.

**Discussion:** Factors known to predispose to hepatotoxicity include alcoholism, malnourishment, and use of liver enzyme-inducing medications. Little is known of the risk factors for nephrotoxicity, which may occur with or without concurrent liver damage suggesting possible primary toxic effects on the kidney. NAC is known to decrease hepatotoxicity. The usefulness of NAC to reduce nephrotoxicity has not been investigated. However, the use of NAC in this case may have prevented the progression to liver failure and reduced the severity of the nephrotoxic effects.

**Conclusion:** In addition to hepatotoxicity, the clinical significance of nephrotoxicity in paracetamol overdose, and the importance of monitoring renal function while caring for such patients, must be recognised.

**AMB114**

**A Case of Severe Adverse Reaction to Nif-Ten (Atenolol 50 mg and Nifedipine SR 20 mg) and a Review of the Literature**

**CS LOH<sup>1</sup>, PONAMPALAM R<sup>1</sup>**

<sup>1</sup>Emergency Medicine, Singapore General Hospital, Singapore

**Aim:** To describe a serious adverse reaction after a single first dose of Nif-Ten (combination of atenolol 50 mg and nifedipine 20 mg sustained-release formulation).

**Case Report:** A 41-year-old Chinese man with a history of Ebstein anomaly was given Nif-Ten for hypertension. After taking 1 dose, he became dizzy and near syncope within 30 minutes. He presented to hospital with a pulse of 42 beats/minute and blood pressure of 78/48 mm Hg. Treatment with intravenous atropine and dopamine normalised his pulse and blood pressure to 87 beats/minute and 121/54 mm Hg, respectively. Laboratory investigations including full blood counts, electrolytes and cardiac enzymes were noted to be normal. He was admitted to a high dependency ward for monitoring and discharged well 1 day later.

**Discussion:** When nifedipine and atenolol are used in combination, greater antihypertensive efficacy is achieved with fewer side effects as lower dosages are used. Common adverse reactions to nifedipine result from its vasodilating action on vascular smooth muscle and include dizziness, flushing, and headache. Dose-related hypotension is usually mild to moderate and well tolerated. Bradycardia and hypotension occurs in up to 10% of patients on atenolol. A combination of these 2 drugs can increase the risk of severe hypotension. To the best of our knowledge, this is the first case report of profound hypotension and bradycardia after a first dose of Nif-Ten.

**Conclusion:** A combination of atenolol and nifedipine can cause profound hypotension and bradycardia. Physicians and pharmacists are advised to be aware that this adverse reaction can be seen after the first dose and hence should take the necessary precautions in informing their patients.

**AMB115**

**Comparison of Full Blood Count Parameters Using Capillary and Venous Samples in Patients Presenting to the Emergency Department**

**PONAMPALAM R<sup>1</sup>, SCMC FOOK<sup>2</sup>, C RABIND<sup>1</sup>, JMH LEE<sup>1</sup>, SCTAN<sup>1</sup>**

<sup>1</sup>Emergency Medicine, <sup>2</sup>Clinical Research, Singapore General Hospital, Singapore

**Aim:** The aim of this study is to determine the accuracy and speed of full blood count analysis using capillary blood from a finger prick analysed at point of care compared to a conventional venous blood sample analysed in the hospital laboratory.

**Methods:** Patients presenting to the Emergency Department requiring a full blood count analysis were eligible. Attending physicians obtained a venous and capillary sample of the patient's blood simultaneously after obtaining consent. Analysis of the capillary sample was carried out immediately at point of care (C parameters). The venous blood sample was, as in everyday practice, dispatched to the hospital laboratory for analysis (V parameters). Data Analysis: The following outcome measures were analysed: 1) accuracy of blood parameters white cell count (WBC), haemoglobin (Hb), platelets (Plt) comparing C against V; 2) turnaround times for results from capillary versus conventional laboratory analysis.

**Results:** A total of 378 patients were recruited. Significantly larger deviation from V parameters as compared to C parameters was found for Plt (range, -84 to +76 thousand, SD 31.3 thousand,  $P < 0.0005$ ) and Hb (range, -1.9 to 0.9 grams, SD 0.5 grams,  $P < 0.0005$ ). The deviations for WBC were not significant. The mean (SD) turnaround time for the laboratory samples was 70.2 (SD 33.6) minutes compared to 4.5 (SD 0.7) minutes for the capillary samples ( $P < 0.0005$ ).

**Conclusion:** Analysis of capillary blood samples for full blood count parameters is a fairly reliable screening test with the following benefits: 1) it is a convenient, technically simple and minimally invasive testing method with fast turnaround times; 2) it assists the physician in making a rapid assessment and diagnosis at point of care.

#### AMB116

##### Hypoglycaemia and Acute Abdomen Associated with Ginseng — A Case Report

**CEM TEE<sup>1</sup>, PONAMPALAM R<sup>1</sup>**

<sup>1</sup>Emergency Medicine, Singapore General Hospital, Singapore

**Aim:** We report a patient with hypoglycaemia and acute abdomen associated with the use of ginseng.

**Case Report:** A 66-year-old Chinese female was admitted via our hospital's emergency department for hypoglycaemia. She had been lethargic for a day prior to admission and diaphoretic since that afternoon, complaining of vague chest and abdominal discomfort. She was noted to be afebrile with stable vital signs. She had depressed consciousness (Glasgow Coma Scale 9), pupils were equal and reactive, and she was moving all 4 limbs equally. She was hypoglycaemic (random blood sugar 0.7 mmol/L, confirmed with laboratory level 0.4 mmol/L). Treatment with bolus intravenous dextrose 50% led to full recovery of consciousness. The patient had a history of diabetes mellitus, hypertension, hyperlipidaemia, ischaemic heart disease, laparotomy for diverticular disease 2 years ago, and appendectomy 20 years ago. She had no recent changes in medications, doses or diet except for recent ingestion of ginseng root the afternoon prior to hospital admission. The exact preparation and amount ingested was unknown. The patient's abdominal pain persisted, resulting in a laparotomy; no significant pathology was found. Unfortunately, her condition deteriorated, resulting in multi-organ failure and death 6 days later.

**Conclusion:** Ginseng may have contributed to this patient's hypoglycaemia and acute abdominal distress, taking into consideration the temporal relation. A review of the literature showed no reports of ginseng-induced hypoglycaemia. However, research has shown the glucose-lowering properties of ginseng, suggesting a possible aetiology for the hypoglycaemia in this patient. Gastrointestinal symptoms associated with ginseng have been reported sporadically, manifesting as diarrhoea, epigastralgia and digestion problems. However, there were no reports of acute abdominal findings requiring a laparotomy associated with its use.

#### AMB117

##### [188Re(CO)3]-Lipophilic Chelates for Internal Radiation Therapy of Hepatocellular Carcinoma

**MM SAW<sup>1</sup>, FX SUNDRAM<sup>1</sup>, TSA HOR<sup>2</sup>, R ALBERTO<sup>3</sup>**

<sup>1</sup>Nuclear Medicine, Singapore General Hospital, Singapore, <sup>2</sup>Chemistry Department, National University of Singapore, Singapore, <sup>3</sup>Institute Of Inorganic Chemistry, University of Zurich, Switzerland

**Aim:** Hepatocellular carcinoma (HCC) is one of the 10 most common tumours in the world. Internal radiation therapy has been used extensively in the management of HCC. Lipiodol, a radiographic contrast medium, when injected through hepatic artery, accumulates in liver cancer cells. The Lipiodol analogue, octadecane, could be regarded as a Lipiodol-mimic bioactive molecule. 186/188Rhenium is gaining prominence as the main therapeutic radionuclide by virtue of distinctive radio-physical properties and easy availability. Recently, a water- and air-stable organometallic aqua complex  $[Re(OH)_2(CO)_3]^+$  has proven to be a versatile synthon.

**Methods:** Different bidentate and tridentate ligands containing long chain hydrocarbon in a side chain were synthesised and coordinated to fac-[M(CO)3]+ core (M = 99mTc, 186Re or 188Re) with different labelling approaches. A new "[2+1B] mixed-ligand approach" was also used to synthesise  $[Re(CO)_3(2+1B)]$  complexes. There is only 1 example in direct labelling of Lipiodol with 188Re. We have highlighted the simple, feasible and efficient methods for direct covalent bonding of  $[Re(CO)_3]$  complex with Lipiodol. Biodistribution of fac-[188Re(OH)2(CO)3]+ and biodistribution of Re analogue  $[99mTc(CO)_3]$ -lipophilic chelates in Sprague-Dawley rats were studied as prerequisites for future clinical application.

**Results:** Biodistribution studies of  $[99mTc(CO)_3]$ -lipophilic chelates showed that complexes are well retained in the liver and the biodistribution patterns are comparable to other reported radiolabelled Lipiodol complexes.

**Conclusion:** We have developed a new class of  $[188Re(CO)_3]$ -based radiopharmaceuticals for internal radiation therapy of hepatocellular carcinoma. An efficient method for direct labelling of cytotoxic agents (radioisotopes or chemotherapeutic agents) has also been developed.

#### AMB118

##### Role of Beta-Catenin and p27 in Colorectal Cancer: Correlation with Pathologic Parameters

**CYP CHAU<sup>1</sup>, WM YAP<sup>1</sup>, PH TAN<sup>1</sup>, PY CHEAH<sup>2</sup>, KW EU<sup>2</sup>, BH BAY<sup>3</sup>**

<sup>1</sup>Pathology, <sup>2</sup>Colorectal Surgery, Singapore General Hospital, Singapore, <sup>3</sup>Anatomy, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** p27 is a cell cycle inhibitor whose expression is shown to be a predictor of poor prognosis in cancers, while beta-catenin is a proto-oncogene believed to be involved in colorectal carcinogenesis. We aim to study protein expression of p27 and beta-catenin in a local series of colorectal cancers, and correlate the findings with conventional pathologic parameters.

**Methods:** Three hundred and thirty-four patients with colorectal cancer diagnosed at the Department of Pathology, Singapore General Hospital were reviewed histologically and immunohistochemistry for p27 and beta-catenin using the streptavidin-biotin method was performed. Scoring was accomplished by a summation of both the intensity score (0, 1, 2 and 3 for nil, weak, moderate and strong staining, respectively) of staining, and proportion (1, 2 and 3 for  $\leq 1/3$ ,  $1/3$  to  $2/3$ , and  $> 2/3$ , respectively) of cells stained. Scores above 4 and 5 are considered high expression for p27 and beta-catenin, respectively. Statistical analysis utilised the student's chi-square test, with a  $P$  value of  $< 0.05$  indicating a statistically significant result.

**Results:** One hundred and fifty-six women and 175 men were included (unknown in 3 individuals), with ages ranging from 30 years to 92 years. There was no statistically significant correlation of p27 and beta-catenin with age and conventional pathologic parameters. p27 and beta-catenin immunostaining results were associated with each other; while low protein expression of p27 was correlated with a higher likelihood of nodal metastases. No association of either marker was discovered with recurrence.

**Conclusion:** There may be a relationship between p27 and beta-catenin

protein expression in colorectal cancer in Singapore patients. The presence of nodal metastases in cases with diminished p27 immunostaining suggests a potential role in tumour progression and vascular invasion.

#### AMB119

##### Uncommon Elevated Zinc Levels in Cases for Investigation

**CW LAM<sup>1</sup>, D MENON<sup>1</sup>**

<sup>1</sup>Pathology, Singapore General Hospital, Singapore

**Aim:** A series of abnormally high levels of zinc were obtained particularly from 1 general hospital. No symptoms or signs were elicited from the patients, thereby prompting the Department to investigate the cause.

**Methods:** Requests for serum zinc analysis are received in the form of separator gel tubes. Because of the infrequent requests, zinc analysis is done as batch testing once a week. We designed a study to look into the possibility of the separator gel tube or the stopper as potential sources of contamination and, if true, the amount and rate of zinc leaching over a period of time. The study consists of 2 pooled serums and de-ionised water as control in the separator gel tubes, non-gel plain tubes and specially treated trace metal-free tubes. The tubes with different contents were prepared together and run on consecutive days. The analysis was performed using the atomic absorption spectrophotometry.

**Results:** All the tubes with pooled serum showed elevated zinc levels with the separator gel tubes having the highest level, followed by non-gel plain tubes and trace metal-free tubes. The result took into account that our pooled serum was collected from separator gel tubes. Analysis with de-ionised water showed that separator gel tubes have significantly higher zinc levels compared to non-gel plain tubes and trace metal-free tubes. In addition, zinc levels are noted to be higher in tubes that were inverted, suggesting the stopper also contribute to the contamination.

**Conclusion:** Separator gel tubes are not suitable for zinc analysis and should be replaced with trace metal-free tubes immediately.

#### AMB120

##### Evaluation of the Beckman Coulter UniCel DxI 800 Access Immunoassay System

**CW LAM<sup>1</sup>, KP SOH<sup>1</sup>, SF LIM<sup>1</sup>**

<sup>1</sup>Pathology, Singapore General Hospital, Singapore

**Aim:** The purpose of this study was to evaluate the Beckman Coulter UniCel DxI 800 for linearity, analytical sensitivity and imprecision for selected chemistries under routine laboratory conditions. We also compared the DxI 800 against another immunoassay analyser, the Roche Elecsys 2010.

**Methods:** The chemistries of ferritin, folate and vitamin B12 are evaluated. The within-run (n = 21) and between-day (n = 10) imprecision was determined by the use of 3 levels of independent commercial control material (Biorad Lymphochek). Between-day imprecision study was performed over 21 days. The analytical sensitivity was established using the (Beckman Coulter) QMIT Method. Linearity was determined by the appropriate dilution of calibrators.

**Results:** The within-run and between-day imprecision was good for all tested parameters. The obtained values of % CV in sequence for levels 1 to 3 are (4.28, 2.89, 3.33), (10.71, 3.98, 2.56) and (4.65, 4.97, 8.63) for ferritin, folate and vitamin B12, respectively. The between-day % CV are (5.33, 4.18, 4.52), (7.30, 8.32, 4.54) and (4.10, 3.38, 2.99) likewise. The analytical sensitivities are 0.07 ng/mL, 1.66 nmol/L and 4.5 pmol/L. The % recovery averaged at 97, 104 and 105 correspondingly. Comparison analysis revealed an agreeable correlation between the DxI 800 and the Elecsys 2010 (n = 50) with no significant deviation from linearity. The obtained slopes are 0.878, 0.912, 0.745 with R<sup>2</sup> values of 0.87, 0.88 and 0.87 in the order above.

**Conclusion:** The Beckman Coulter UniCel DxI 800 is a precise, fast and user-friendly analyser and was shown to have acceptable performance for the evaluated assays. The DxI 800 also compared well to the Elecsys 2010, a commonly used immunoassay analyser worldwide.

#### AMB121

##### Trisomy 8 Demonstrated in a Case of Chronic Lymphocytic Leukaemia

**LC LAU<sup>1</sup>, SK KEE<sup>1</sup>, SL TIEN<sup>2</sup>, MBC KOH<sup>2</sup>**

<sup>1</sup>Pathology, <sup>2</sup>Haematology, Singapore General Hospital, Singapore

**Aim:** A rare cytogenetic finding was demonstrated in a case of chronic lymphocytic leukaemia (CLL).

**Methods:** 1) Flow cytometry was done on bone marrow and blood specimen. 2) Cytogenetic analysis was carried out on bone marrow and lymphoid cells from peripheral blood using standard G-banding technique.

**Results:** Bone marrow flow cytometry carried out 3 year ago expressed CD19, CD20, CD5, CD23 and SMIG with clonality in the kappa chain. CD5 and CD19 co-expression was demonstrated. A diagnosis of chronic lymphocytic leukaemia was made. Cytogenetic analysis carried out on overnight and direct cultures that were set up without stimulation showed a normal karyotype. The patient was recently re-admitted and flow cytometry on blood detected 26% of clonal B cells. They expressed CD5 and CD19 and weak CD23+ with kappa chain restriction. CD79b and FMC-7 were both negative. This was consistent with the continued presence of circulation clonal B-lymphocytes. Cytogenetic analysis done on peripheral blood stimulated with B cell mitogen demonstrated two cells with trisomy 8.

**Conclusion:** The most frequent abnormality in B-CLL, found in 1/3 of the abnormal cases, is trisomy 12. Deletion of 13q14 is the most frequent structural aberration found in B-CLL, followed by 14q32 band rearrangements. Alterations of chromosomes 11, 6, 18, 3, 17 and 8 were less frequently observed. Trisomy 8 is the most frequent isolated abnormality found in acute myeloid leukaemia and myelodysplastic syndrome, but trisomy 8 as the sole abnormality in CLL is a very rare finding. The significance of trisomy 8 in CLL remains to be seen.

#### AMB122

##### Multicolour Fluorescence In Situ Hybridisation (M-FISH): A Useful Tool in Defining Complex Chromosomal Rearrangement in a Case of Acute Promyelocytic Leukaemia

**TH LIM<sup>1</sup>, A LIM<sup>1</sup>, F LIAW<sup>1</sup>, SL TIEN<sup>2</sup>**

<sup>1</sup>Pathology, <sup>2</sup>Haematology, Singapore General Hospital, Singapore

**Aim:** To elucidate and define an acute promyelocytic leukaemia (APL) case with complex karyotype using multicolour fluorescence in situ hybridisation (M-FISH).

**Methods:** A 63-year-old Chinese male had a total white cell count of 1.43 x 10<sup>9</sup>/L and platelet count of 15 x 10<sup>9</sup>/L. Bone marrow aspirate was hypercellular with 2% blast and 89% promyelocytes. A diagnosis of APL was made. Conventional karyotyping, FISH using PML/RARA dual fusion probes and M-FISH were performed on bone marrow cells.

**Results:** Cytogenetics revealed a 46, XY, add(3)(q11.2), add(10)(q11.2), der(15)t(15;17) (q22;q21),-17, add(17)(q21), +mar[10]/ 46, XY[10] karyotype. Interphase FISH using PML/RARA probes showed 62% of 200 nuclei with a 3 fusion, 1 red and 1 green signal pattern (3F1R1G), while 25% had a 2F1R1G pattern. Metaphase FISH showed that one PML/RARA fusion signal was on the der(15) and the other two fusion signals were on the marker chromosome. M-FISH analysis revealed that the marker chromosome was an ider(17)(q10)t(15;17)(q22;q21). Additional structural rearrangements include a reciprocal translocation between chromosomes 10 and 17, and an interstitial deletion of chromosome 3. A metaphase with t(15;17) as the sole abnormality was also detected with M-FISH. This minor cell line is conceivably the stemline from which the major cell line with the complex chromosomal rearrangements evolved.

**Conclusion:** M-FISH is useful in defining and elucidating complex karyotypes in neoplastic disorders by unveiling significant chromosomal abnormalities that contribute to disease progression that might otherwise be missed. The presence of complex rearrangements indicates secondary genomic changes that are pathogenetically important in disease development. Nevertheless, the establishment of PML/RARA fusion gene is also important as the fusion transcript mediates positive response to all-trans retinoic acid.



## AMB123

**Detection of Urothelial Carcinoma by Fluorescence In Situ Hybridisation**AST LIM<sup>1</sup>, TH LIM<sup>1</sup>, KO LAU<sup>2</sup>, PH TAN<sup>1</sup>, SL TIEN<sup>3</sup><sup>1</sup>Pathology, <sup>2</sup>Urology, <sup>3</sup>Haematology, Singapore General Hospital, Singapore**Aim:** To study the feasibility of employing fluorescence in situ hybridisation (FISH) assays in the detection of urothelial carcinoma (UC).**Methods:** Sixteen voided urine samples were assayed from 15 patients from the Urology Centre, Singapore General Hospital. The samples were split for cytology and FISH assays. The patients also underwent cystoscopy for histology studies. A FISH assay using the Vysis® UroVysion Bladder Recurrence Kit, comprising a panel of  $\alpha$ -satellite probes for chromosomes 3, 7, and 17, and a locus specific identifier for 9p21, was performed on each sample. Each probe was labelled with a different fluorophore. Assessments were made under fluorescence microscopy. Test results were considered positive if  $\geq 4$  cells had gains of  $\geq 2$  chromosomes, or there was homozygous loss of 9p21 in  $\geq 12$  cells. Samples with  $\geq 10$  tetraploid cells were also considered positive.**Results:** FISH had a sensitivity of 72.7% when compared to cytology, and a specificity of 40%. The overall test agreement was 62.7%. When compared to cytology, the sensitivity of the FISH result was 77.8% and the specificity was 66.7%.**Conclusion:** While there was a high degree of correlation in the sensitivity between cytology, cytology and FISH, the false positive rate obtained was quite high with FISH (60%). The disparity may be the result of a combination of inexperience on the part of the assessors and the assay limitations. Certainly, this preliminary study highlights the need for further comparative studies with cystoscopy and cytology before this test can be considered a viable routine screening assay for UC.

## AMB124

**Acute Lymphoblastic Leukaemia with a Cryptic T(6;14) Rearrangement: A Case Report**LE LOO<sup>1</sup>, YW YEE<sup>1</sup>, SL TIEN<sup>2</sup><sup>1</sup>Pathology, <sup>2</sup>Haematology, Singapore General Hospital, Singapore**Aim:** To present a rare case of acute lymphoblastic leukaemia (ALL) with a cryptic t(6;14) rearrangement.**Methods:** Cytogenetic studies were performed on bone marrow cells using G-banding technique. Adjunct fluorescence in situ hybridisation (FISH) using dual-color IGH breakapart probe, 6q telomeric probe (green), and a centromeric probe (red) for chromosome 6 were also performed to confirm the suspected translocation pattern.**Results:** The karyotype was initially interpreted as 46,XY,?del(6)(q25),add(14)(q32). Metaphase FISH showed that the IGH gene was not disrupted, so the translocation breakpoint was centromeric to the IGH gene but within the same chromosome band. DAPI banding showed that an intact IGH gene had translocated to 6q. The result showed that the telomere of 6q had been translocated to a D-group chromosome, shown by reverse DAPI to be chromosome 14.**Conclusion:** The t(6;14) was previously reported in multiple myeloma but not in ALL. Breakpoints on chromosome 6 commonly associated with ALL and non-Hodgkin's lymphoma are different from this case, being from 6q15 to 6q24. This translocation may have activated an oncogene at the breakpoint. As with patients with 6q- rearrangements in subsets of leukaemia and lymphoma, the patient was identified with an adverse prognosis. However, more cases need to be reported to obtain a clearer picture. The use of FISH in our laboratory has greatly improved our ability to provide accurate diagnosis. Most importantly, FISH allows us to confirm and rule out subtle chromosome rearrangements. This is an important consideration in the assignment of treatment to ALL patients. The karyotype was redesignated as 46,XY,?del(6)(q25),add(14)(q32).ish t(6;14)(IGH+;IGH-).

## AMB125

**Immunoassay for Sirolimus Evaluated on the IMx Analyzer**WY NG<sup>1</sup>, YL CHEN<sup>1</sup>, WY YIH<sup>1</sup>, HX LOU<sup>2</sup>, A VATHSALA<sup>2</sup>, E JACOB<sup>1</sup><sup>1</sup>Pathology, <sup>2</sup>Renal Medicine, Singapore General Hospital, Singapore**Aim:** Sirolimus is a new immunosuppressant used in prophylaxis of rejection following renal transplantation. As therapeutic monitoring of sirolimus levels is necessary to optimise outcomes, we carried out a performance evaluation of a new immunoassay for sirolimus.**Methods:** The assay on the Abbott IMx analyzer was evaluated for linearity, precision and recovery. Whole EDTA-blood was assayed with 150  $\mu$ L added to 300  $\mu$ L precipitation reagent, mixed followed with centrifugation. Further comparison with high-performance liquid chromatography (HPLC) was carried out.**Results:** The calibration curve showed a linear dynamic range of 0 to 30  $\mu$ g/L and an assay sensitivity of 0.049  $\mu$ g/L. Imprecision studies showed the following within-assay CVs at low to high levels: 12.0% (4.4  $\mu$ g/L), 4.4% (13.1  $\mu$ g/L) and 7.3% (22.7  $\mu$ g/L). Between-assay CVs from 9 assay runs were 9% (4.7  $\mu$ g/L), 11.4% (11.4  $\mu$ g/L) and 12.4% (23.4  $\mu$ g/L). Recoveries of 80% to 110% were obtained with sirolimus (2.0 to 22.0  $\mu$ g/L) added to sirolimus-free blood. Its measurement on the IMx analyzer showed no carryover effect (23.4, 1.5  $\mu$ g/L) or significant cross-reactivity with moderate levels of tacrolimus FK-506-treated specimens (10.6 to 14.6  $\mu$ g/L). Spilt samples (n = 56) comparison showed that IMx values correlated well with values obtained by HPLC over the range 0 to 50  $\mu$ g/L. The regression obtained was  $y$  (IMx) = 0.82x (HPLC) + 1.69,  $r$  = 0.941. Tests with external quality assurance samples confirmed the accuracy and good recoveries of sirolimus.**Conclusion:** Sirolimus determinations were precise and accurate. Compared to HPLC methods, immunoassays are rapid, easily adaptable on clinical analysers and yield shorter turnaround times.

## AMB126

**Stability of Therapeutic Drugs in Vacutainer SST Blood Collection Tubes**WY NG<sup>1</sup>, NM WONG<sup>1</sup>, IK TAN<sup>1</sup><sup>1</sup>Pathology, Singapore General Hospital, Singapore**Aim:** Therapeutic drug levels not immediately determined may be affected on storage in their blood collection tubes. We evaluated the stability of some drugs on blood specimens collected and stored in BD Vacutainer SST Plus Plastic (#367986; gel and clot activator) collection tubes.**Methods:** Eight therapeutic drugs frequently encountered in a clinical laboratory were studied. Blood specimens (n = 40) were processed (time for clotting, centrifugation), tested and then kept in their collection tubes at 4°C for re-testing over a 4-day period every 24 hours. Tests were performed on the Abbott AxSYM analyser utilising fluorescence polarisation except for digoxin measured by microparticle enzyme immunoassay.**Results:** The following analyte levels were studied: carbamazepine (1.4 to 11.2 mg/L), digoxin (0.4 to 2.9  $\mu$ g/L), gentamicin (0.9 to 5.2 mg/L), phenobarbitone (17.3 to 28.6 mg/L), phenytoin (1.1 to 40.3 mg/L), theophylline (1.5 to 23.7 mg/L), valproic acid (4.2 to 106 mg/L) and vancomycin (3.9 to 50.2 mg/L). Most samples kept for 24 hours (39/40) did not show significant (>20%) differences in the analyte levels compared to day 0, an observation also shown for the 48-hour, 72-hour and 96-hour measurements. Low levels of drugs presented more variable results, e.g., theophylline 1.5 mg/L (26.7% at 24 hour to 20.0% at 96 hour), digoxin 0.4 to 0.6  $\mu$ g/L (25.0% at 72 hour and 33.3% at 96 hour). Analytical variability for the analytes over the 4 days ranged from 0% to 17.4% with higher CVs (above 7.0%) at the low analyte levels.**Conclusion:** Sera kept at 4°C in their collection tubes (with gel barrier) over a 4-day period gave the same or similar concentration as on day 0, for an array of common therapeutic drugs.

**AMB127**

**Presence of Myoglobin in the Urine Related to Muscle Creatine Kinase and Creatinine Levels**

**WY NG<sup>1</sup>, SC CHONG<sup>1</sup>, IK TAN<sup>1</sup>**

<sup>1</sup>Pathology, Singapore General Hospital, Singapore

**Aim:** An average of 200 tests annually were requested from hospital inpatients for myoglobin in urine. Qualitative urine myoglobin was previously determined and then semi-quantitatively in August 2003. Quantitative levels may better predict the development of renal failure on massive muscle breakdown, e.g., rhabdomyolysis or drug-induced myoglobinuria. Since June 2004, a quantitative chemiluminescent immunoassay for urinary myoglobin has been available. We reviewed urinary myoglobin tests from various wards and its relation with other muscle and renal function indicators.

**Methods:** A patient data set (n = 73) comprising demographics and location of wards was collected from consecutive reports for urinary myoglobin. Urinary myoglobin was correlated with serum creatinine (sCr), serum creatine kinase (CK), CK-mass and aldolase levels determined on the same day or up to 3 days before the test for urine myoglobin.

**Results:** Of the 73 patients (mean: 57 years; range, 14 to 84 years; 50 males) from 18 wards, there were 49 occasions (67.1%) where urinary myoglobin (mean: 4274 µg/L; range, 25 to 60,000 µg/L) was detected. The mean CK level was 4209 U/L and on 1 occasion, a level of 36,000 U/L was measured. Urine myoglobin levels tend to increase with sCr, CK, CK-mass and aldolase levels. Significant myoglobin levels were associated with impaired renal function (sCr >141 µmol/L) and elevated CK (>2000 U/L; 10x upper normal limit). There were 4 occasions where urinary myoglobin exceeded 60,000 µg/L.

**Conclusion:** Presence of myoglobin in the urine is related to high levels of CK and renal impairment. Quantitative urinary myoglobin would be of help in determining myoglobin effects on renal function.

**AMB128**

**Interlaboratory Variation of Haemoglobin A1c in SingHealth Laboratories over a 3-Year Period**

**WY NG<sup>1</sup>, CP YEO<sup>1</sup>, J LOH<sup>1</sup>, AH GOH<sup>1</sup>, E JACOB<sup>1</sup>**

<sup>1</sup>Pathology, Singapore General Hospital, Singapore

**Aim:** As part of a quality assessment programme for SingHealth laboratories (polyclinics and specialist centre) managed by the Singapore General Hospital's Pathology Department, testing for haemoglobin (Hb)A1c was implemented in July 2002. This study reports the extent of interlaboratory variation of HbA1c measurements (on the Bayer DCA2000) since implementation.

**Methods:** Two specimens of pooled EDTA-blood—S1 (good glycaemic control; low HbA1c) and S2 (poor glycaemic control; high HbA1c)—were distributed to the 9 laboratories bimonthly. Results exceeding a bias of ±10% or an absolute difference of ±1.0% HbA1c from the clinical laboratory were considered significant.

**Results:** Over the 3-year period, July 2002 to June 2005, 22 distributions were carried out. From 33 instruments initially, 55 units participated in the 2005 programme. Between July 2003 and January 2004, an average of 10 instruments (range, 4 to 16) gave results exceeding 1% HbA1c from the reference values for S2 specimens (#8 to #13 distributions). Acceptable results were obtained for S1 specimens. From February 2004, all results showed no significant bias. On average, 3.96% imprecision (CV) base for S1 specimens (mean: 5.3% HbA1c) and 3.15% for S2 specimens (mean: 10.2% HbA1c) were obtained by all laboratories, equivalent to method-specific laboratories in the College of American Pathologists (CAP) 2005 Survey. This is also within the maximum allowable CV (<5%) specified by the National Academy of Clinical Biochemistry 2002 guidelines.

**Conclusion:** With regular participation and awareness of performance, interlaboratory analytical variation for HbA1c had remained fairly constant and below 5%. Laboratories should continue to assess their performance in line with standards practised by larger clinical laboratories.

**AMB129**

**Performance of Point-of-Care Testing for Blood Glucose as Assessed by Split-sample Testing**

**WY NG<sup>1</sup>, SK NG<sup>2</sup>, M CHOW<sup>3</sup>, HH PNG<sup>2</sup>, E JACOB<sup>1</sup>**

<sup>1</sup>Pathology, <sup>2</sup>Nursing, <sup>3</sup>Emergency Medicine, Singapore General Hospital, Singapore

**Aim:** Point-of-care testing (POCT) for blood glucose is an essential feature in the management of diabetes mellitus. In the Singapore General Hospital, handheld glucometers (Roche Accu-Chek Advantage) are found in most wards, specialist outpatient clinics and specialist centres. With the implementation of a campus-wide POCT policy, blood glucose measurements are required to be assessed for accuracy. The results of the first external quality assessment (EQA) exercise are reported.

**Methods:** Each meter in active use first tested a blood sample before the specimen was dispatched to the main clinical laboratory. Test locations submit the results with meter, operator and specimen details to the Pathology coordinator for a comparison. Test locations with results exceeding the acceptable error (±15%) are required to re-test and re-submit after checks for probable causes, e.g. quality controls, test-strip storage or operator technique.

**Results:** A total of 165 meters, spread over 47 locations and 89 operators, were involved in the exercise. Blood glucose levels from 2.6 to 19.8 mmol/L (median: 7.0 mmol/L) were submitted. Eighty-seven per cent (143/165) of the submissions passed the acceptance criterion. Of these results, the difference from the main laboratory results ranged from -13.6% to 15.0% (glucose 2.6 to 6.0 mmol/L; n = 43), -13.8% to 15.0% (6.1 to 10.0 mmol/L; n = 58), -9.8% to 5.7% (10.1 to 15.0 mmol/L; n = 27) and -8.6% to 4.3% (15.1 to 19.8 mmol/L; n = 15). Twenty-two meters from 14 test locations required re-tests, subsequently meeting the acceptance criterion on re-submissions.

**Conclusion:** Most test locations and the operators were competent in performing blood glucose determinations. Factors other than instrument-related appear to be contributory causes for unacceptable results.

**AMB130**

**Multiplex Polymerase Chain Reaction Assay for Diagnosis of Infections in Eye and Cerebrospinal Fluid Samples**

**SY SE THOE<sup>1</sup>, L OON<sup>1</sup>, KP CHAN<sup>1</sup>, SP CHEE<sup>2</sup>, AE LING<sup>1</sup>**

<sup>1</sup>Pathology, Singapore General Hospital, Singapore, <sup>2</sup>Ocular Inflammation and Immunology Service, Singapore National Eye Centre, Singapore

**Aim:** The diagnosis of eye and central nervous system infections pose a challenge to the diagnostic microbiology laboratory due to the difficulty in obtaining sufficient amount of eye and cerebrospinal fluid (CSF) samples. To address this problem, a multiplex polymerase chain reaction (PCR) test was developed.

**Methods:** An in-house developed multiplex PCR assay that could simultaneously detects cytomegalovirus (CMV), herpes simplex virus (HSV), varicella-zoster virus (VZV) and *Toxoplasma gondii* (TG).

**Results:** Over an 18-month period, a total of 160 eye and 114 CSF samples were tested using this PCR assay. Fifty-four (20%) samples were positive for at least 1 pathogen. CMV was the commonest pathogen, being detected in 15.6% and 7.9% of eye and CSF samples, respectively. HSV, VZV and TG were detected in 2.5%, 1.25% and 1.25% of eye samples respectively, while VZV, HSV and TG were detected in 5.3%, 1.25% and 1.25% of CSF samples, respectively. Dual infection was seen in 2 (1.8%) CSF specimens from immunocompromised patients; 1 with CMV and HSV, and the other with CMV and VZV.

**Conclusion:** In summary, this multiplex PCR assay was found to be particularly useful for samples of low volumes that require testing for multiple pathogens. The other advantage of this assay was savings in reagents and labour as only a single PCR assay was needed for the diagnosis of 4 pathogens. Its drawback was the reduction in the sensitivity (1 log) of the assay to detect HSV and VZV as compared to the corresponding uniplex PCR.

## AMB107

**N-terminal Pro-brain Natriuretic Peptide — Is the Recommended Cutoff Value Relevant for Local Population?****B KWOK<sup>1</sup>, CP YEO<sup>2</sup>, SF LIANG<sup>3</sup>, ZL LIN<sup>3</sup>, E JACOB<sup>2</sup>**<sup>1</sup>Cardiology, National Heart Centre, Singapore, <sup>2</sup>Pathology, Singapore General Hospital, Singapore, <sup>3</sup>Cardiac Laboratory, National Heart Centre, Singapore

**Aim:** The N-terminal pro-brain natriuretic peptide (NT-proBNP) cutoff value of 125 µg/mL has been recommended for use in detecting left ventricular dysfunction (LVD). This study aims to verify this cutoff value in our local Singaporean population.

**Methods:** Stable outpatients presenting for echocardiography at the National Heart Centre were invited to participate if their echocardiographic images were optimal. Exclusion criteria included chronic renal failure, atrial fibrillation, recent myocardial infarction, previous cardiac surgery, bradycardia (<60 beats per minute) and tachycardia (>100 beats per minute). Echocardiography were performed in the usual manner and a sample of blood is obtained immediately after the echocardiographic study. Quantitation of NT-proBNP in serum was performed by the Elecsys NT-proBNP electrochemiluminescence immunoassay.

**Results:** Seventy-five patients were enrolled in the study, of which 50 were males. Mean age was 48 ± 30 years. Eighteen patients (24%) had left ventricular dysfunction (LVEF 41 ± 16 %). Using the cutoff value of 125 µg/mL, the area under the receiver operating characteristic curve was 0.85. The corresponding sensitivity was 72%, specificity 91%, with positive predictive value of 72% and negative predictive value of 91%.

**Conclusion:** NT-proBNP has similar predictive values in our local outpatient population as compared to published studies in Western countries. Therefore this test, using the recommended cutoff at 125 µg/mL, may be useful in the management of patients with suspected heart failure in a non-emergency clinical setting.

## AMB108

**Ultrafast High Field Contrast Enhanced Magnetic Resonance Angiography Assessment of Cerebral Arteriovenous Malformations****YY SITO<sup>1</sup>, W LEE<sup>1</sup>, V CHUA<sup>1</sup>, SM CHNG<sup>1</sup>, F HUI<sup>1</sup>**<sup>1</sup>Neuroradiology, National Neuroscience Institute, Singapore

**Aim:** High field 3 tesla (3T) magnetic resonance (MR) scanners have superior signal-to-noise ratio and better resolution compared to lower field strength systems. Our aim was to evaluate the clinical utility of ultrafast keyhole contrast-enhanced (CE) MR angiography (MRA) at 3T for the morphologic evaluation of cerebral arteriovenous malformations (AVMs).

**Methods:** Six patients with cerebral AVMs had ultrafast keyhole CE-MRA performed as part of their MR imaging workup. All had catheter digital subtraction angiography (DSA) as the gold standard for evaluation of the AVM angioarchitecture. Two experienced neuroradiologists independently assessed both techniques with attention to the feeding arteries, nidus and venous drainage patterns.

**Results:** Ultrafast keyhole CE-MRA detected all AVMs seen on DSA. The main feeding arteries and venous drainage patterns were clearly discerned in CE-MRA while nidus delineation was superior at DSA. Anatomic information from volumetric high-resolution MR sequences provided complementary data to the dynamic flow information on CE-MRA, especially for nidus evaluation.

**Conclusion:** Ultrafast keyhole CE-MRA is a promising emerging technique for the non-invasive clinical evaluation of AVMs, especially for treatment planning and follow-up. The main limitation is that of low spatial resolution at the used time resolution compared to DSA.

## AMB109

**Renal Artery Stenting Using the Express SD Stent****BC CHING<sup>1</sup>, KH TAY<sup>2</sup>, BS TAN<sup>1</sup>, A HTOO<sup>1</sup>, RHG LO<sup>1</sup>, A SIKANDER<sup>1</sup>, S BANGOY<sup>1</sup>**<sup>1</sup>Diagnostic Radiology, Singapore General Hospital, Singapore, <sup>2</sup>Dietetics and Nutrition Services, Singapore General Hospital, Singapore

**Aim:** To report our early experience of renal artery stenting using the Boston Scientific Express SD stent.

**Methods:** We retrospectively reviewed 15 patients (7 males, 8 females; mean age: 65 years) who underwent renal artery stenting using the Express SD stent. All patients had documented renal artery stenoses based on noninvasive imaging prior to stenting. Indications for stenting included uncontrolled hypertension (n = 3), renal preservation (n = 2), or both (n = 10). In all patients, the femoral approach through a 7F guiding catheter over a 0.018 Thruway guidewire. Predilatation was routinely performed with a Gazelle balloon. The patients were followed up clinically and with renal doppler scans (mean follow-up period 3.2 months; range, 1 week to 9 months).

**Results:** The renal artery stenoses were successfully crossed and stented in all patients. One patient had acute thrombosis of the renal artery immediately post-stenting and went into acute renal failure. He also had trash feet from cholesterol embolisation. Another patient developed pseudoaneurysm at the groin puncture site 1 week post-procedure which was successfully treated with ultrasound-guided thrombin injection. Thirteen patients had improved or stable blood pressure (BP) control or serum creatinine. One patient had worsened BP control and serum creatinine level, while another had worsened BP control but improved serum creatinine level. All stents were patent on follow-up renal doppler studies.

**Conclusion:** Renal artery stenting with the Express SD stent system is safe and technically straight forward. The majority of patients had improved or stable BP control and serum creatinine levels post-stenting.

## AMB110

**Transcatheter Embolisation of Renal Angiomyolipomas Using Absolute Alcohol — The Singapore General Hospital Experience****LR CHONG<sup>1</sup>, KH TAY<sup>1</sup>, A HTOO<sup>1</sup>, R LO<sup>1</sup>, BK NG<sup>1</sup>, BS TAN<sup>1</sup>, KT FOO<sup>2</sup>**<sup>1</sup>Diagnostic Radiology, <sup>2</sup>Urology, Singapore General Hospital, Singapore

**Aim:** Renal angiomyolipomas are rare benign hamartomatous lesions. Fifteen per cent of tumours bleed spontaneously, of which up to 30% present in shock. This study aims to establish the efficacy and safety of transcatheter embolisation using absolute alcohol in controlling acute haemorrhage, preventing recurrent haemorrhage, reducing tumour size and preserving normal renal parenchyma.

**Methods:** Fourteen patients were treated over an 11-year period, with mean tumour size of 9.6 cm (range, 3 to 22 cm). Indications include acute/recent haemorrhage in 6 patients, flank pain in 2 patient and prophylaxis (size greater than 4 cm) in 5 patients. Preliminary computed tomography and renal angiogram were performed, followed by selective catheterisation and injection with absolute alcohol mixed with lipiodol. All patients received prophylactic antibiotics.

**Results:** There was 100% technical success, with total volume of alcohol injected between 0.5 and 9 ml (mean: 5 ml). Total eradication of tumour vascularity was achieved in 13 patients, with 1 patient requiring repeat embolisation during same admission due to large tumour size. No procedural complications were encountered. Post-embolisation syndrome was found in 7 patients, manifesting as fever lasting 2 to 7 days. Follow-up period ranged from 2 to 64 months (mean: 23 months). No further episodes of haemorrhage were documented in any patient. One patient underwent nephrectomy due to concern for underlying malignancy.

**Conclusion:** Transcatheter embolisation of renal angiomyolipomas with absolute alcohol is safe, well tolerated, effective in controlling acute haemorrhage, preventing recurrent haemorrhage and reducing tumour size. Elective/prophylactic embolisation should be considered for tumours greater than 4 cm.



**AMB111**

**Dynamic Computed Tomography Angiogram in the Diagnosis of Popliteal Artery Entrapment Syndrome**

**KH TAY<sup>1</sup>, TC HOWE<sup>1</sup>, BS TAN<sup>1</sup>, SG TAN<sup>2</sup>, M SEBASTIAN<sup>2</sup>**

<sup>1</sup>Diagnostic Radiology, <sup>2</sup>General Surgery, Singapore General Hospital, Singapore

**Aim:** To describe the imaging protocol and findings of dynamic computed tomography (CT) angiogram (CTA) in the evaluation of popliteal artery entrapment syndrome (PAES).

**Methods:** Eleven patients (8M:3F, mean age of 37 years) were referred for dynamic CTA to exclude PAES. CTAs of the popliteal arteries were obtained twice with the same IV contrast bolus, once with the patient's feet in the neutral position and the other with the patient's feet in active plantar flexion. PAES is diagnosed when the popliteal artery is more than 75% stenosed on the plantar flexed images but non stenosed on the neutral images.

**Results:** There were 7 patients with positive scans. Five patients had bilateral PAES; 2 patients had unilateral PAES, 1 of whom had thrombosis of the contralateral popliteal artery. Three of the 7 patients underwent surgery in which PAES was confirmed; 1 patient had a repeat CTA post-surgery showing resolution of PAES.

**Conclusion:** Dynamic CT angiogram of the popliteal arteries is a safe and non-invasive test which can potentially replace dynamic catheter angiography for the evaluation of PAES. The non-invasive nature of the test makes it an ideal screening tool for the condition.

**AMB112**

**The Use of Cardiac Markers in Emergency Department 6 Hour Chest Pain Evaluation (ACTION) Protocol**

**SH LIM<sup>1</sup>, V ANANTHARAMAN<sup>1</sup>, SL YO<sup>2</sup>, T CHUA<sup>2</sup>, MEH ONG<sup>1</sup>, C RABIND<sup>1</sup>, E JACOB<sup>3</sup>**

<sup>1</sup>Emergency Medicine, Singapore General Hospital, Singapore, <sup>2</sup>Cardiology, National Heart Centre, Singapore, <sup>3</sup>Pathology, Singapore General Hospital, Singapore

**Aim:** To study the sensitivity and specificity of the various cardiac markers in predicting adverse cardiac events (ACE).

**Methods:** Patients aged  $\geq 25$  years, presenting to the Emergency Department with chest pain suggestive of acute coronary syndrome (ACS) with a 12-lead ECG non-diagnostic for myocardial ischemia or infarction. Intervention: ECG and blood test for myoglobin, creatinine kinase (CK)-MB mass and troponin T (TnT) were done at 0, 3 and 6 hours after arrival. If the patient was not admitted after 6 hours of negative evaluation and in the study group, he underwent a stress tetrofosmin scan. If the stress tetrofosmin scan was positive, the patient was admitted. In the control group, patients with high or moderate risk for coronary artery disease were admitted. Patients were followed up at 1 year for cardiac death, ventricular fibrillation and myocardial infarction.

**Results:** The optimal cutoff values of TnT or CK-MB for detecting 1 year ACE were 0.02  $\mu\text{g/L}$  and 6  $\mu\text{g/L}$ , respectively. Patients who had 6 hours TnT  $>0.02$  or CK-MB  $>6$  were 188.84 times (OR = 188.84; 95% CI, 46.60 to 765.80) or 112.32 times (OR = 112.3; 95% CI, 32.24 to 368.52) more likely to experience 1 year ACE. Forty-one per cent of patients with positive TnT but negative CK-MB had ACE within 1 year compared with only 6.7% of those who had negative TnT but positive CKMB.

**Conclusion:** TnT is the most important marker to predict ACE. The additional of CKMB to TnT did not improve diagnostic accuracy.

**AMB113**

**Nephrotoxicity Associated with Acute Paracetamol Overdose: A Case Report and Review of the Literature**

**CS LOH<sup>1</sup>, PONAMPALAM R<sup>1</sup>**

<sup>1</sup>Emergency Medicine, Singapore General Hospital, Singapore

**Aim:** To describe the clinical presentation of nephrotoxicity with acute

paracetamol overdose in a low-risk patient, and to discuss the literature on paracetamol-induced nephrotoxicity.

**Case Report:** A 29-year-old Chinese man weighing 65 kg presented to hospital 10 hours after ingesting 30 g of paracetamol (462 mg/kg body weight). He had no known risk factors for hepatotoxicity and was started on intravenous N-acetylcysteine (NAC) empirically. The blood paracetamol level was 145  $\mu\text{g/mL}$  at 10 hours post-ingestion, which was above the treatment line on the Rumack nomogram. Hence, the NAC regime was continued till completion. Aspartate aminotransferase and alanine aminotransferase levels rose to a maximum of 6278 U/L and  $>12,000$  U/L, respectively, 4 days post-ingestion. Liver function subsequently improved, but the patient's renal function deteriorated. Serum creatinine level was normal on day 3, but rose to a maximum of 455 mmol/L on day 8; it gradually declined without the need for dialysis. The patient was lost to follow-up subsequently.

**Discussion:** Factors known to predispose to hepatotoxicity include alcoholism, malnourishment, and use of liver enzyme-inducing medications. Little is known of the risk factors for nephrotoxicity, which may occur with or without concurrent liver damage suggesting possible primary toxic effects on the kidney. NAC is known to decrease hepatotoxicity. The usefulness of NAC to reduce nephrotoxicity has not been investigated. However, the use of NAC in this case may have prevented the progression to liver failure and reduced the severity of the nephrotoxic effects.

**Conclusion:** In addition to hepatotoxicity, the clinical significance of nephrotoxicity in paracetamol overdose, and the importance of monitoring renal function while caring for such patients, must be recognised.

**AMB114**

**A Case of Severe Adverse Reaction to Nif-Ten (Atenolol 50 mg and Nifedipine SR 20 mg) and a Review of the Literature**

**CS LOH<sup>1</sup>, PONAMPALAM R<sup>1</sup>**

<sup>1</sup>Emergency Medicine, Singapore General Hospital, Singapore

**Aim:** To describe a serious adverse reaction after a single first dose of Nif-Ten (combination of atenolol 50 mg and nifedipine 20 mg sustained-release formulation).

**Case Report:** A 41-year-old Chinese man with a history of Ebstein anomaly was given Nif-Ten for hypertension. After taking 1 dose, he became dizzy and near syncope within 30 minutes. He presented to hospital with a pulse of 42 beats/minute and blood pressure of 78/48 mm Hg. Treatment with intravenous atropine and dopamine normalised his pulse and blood pressure to 87 beats/minute and 121/54 mm Hg, respectively. Laboratory investigations including full blood counts, electrolytes and cardiac enzymes were noted to be normal. He was admitted to a high dependency ward for monitoring and discharged well 1 day later.

**Discussion:** When nifedipine and atenolol are used in combination, greater antihypertensive efficacy is achieved with fewer side effects as lower dosages are used. Common adverse reactions to nifedipine result from its vasodilating action on vascular smooth muscle and include dizziness, flushing, and headache. Dose-related hypotension is usually mild to moderate and well tolerated. Bradycardia and hypotension occurs in up to 10% of patients on atenolol. A combination of these 2 drugs can increase the risk of severe hypotension. To the best of our knowledge, this is the first case report of profound hypotension and bradycardia after a first dose of Nif-Ten.

**Conclusion:** A combination of atenolol and nifedipine can cause profound hypotension and bradycardia. Physicians and pharmacists are advised to be aware that this adverse reaction can be seen after the first dose and hence should take the necessary precautions in informing their patients.

**AMB115**

**Comparison of Full Blood Count Parameters Using Capillary and Venous Samples in Patients Presenting to the Emergency Department**

**PONAMPALAM R<sup>1</sup>, SCMC FOOK<sup>2</sup>, C RABIND<sup>1</sup>, JMH LEE<sup>1</sup>, SCTAN<sup>1</sup>**

<sup>1</sup>Emergency Medicine, <sup>2</sup>Clinical Research, Singapore General Hospital, Singapore

**Aim:** The aim of this study is to determine the accuracy and speed of full blood count analysis using capillary blood from a finger prick analysed at point of care compared to a conventional venous blood sample analysed in the hospital laboratory.

**Methods:** Patients presenting to the Emergency Department requiring a full blood count analysis were eligible. Attending physicians obtained a venous and capillary sample of the patient's blood simultaneously after obtaining consent. Analysis of the capillary sample was carried out immediately at point of care (C parameters). The venous blood sample was, as in everyday practice, dispatched to the hospital laboratory for analysis (V parameters). Data Analysis: The following outcome measures were analysed: 1) accuracy of blood parameters white cell count (WBC), haemoglobin (Hb), platelets (Plt) comparing C against V; 2) turnaround times for results from capillary versus conventional laboratory analysis.

**Results:** A total of 378 patients were recruited. Significantly larger deviation from V parameters as compared to C parameters was found for Plt (range, -84 to +76 thousand, SD 31.3 thousand,  $P < 0.0005$ ) and Hb (range, -1.9 to 0.9 grams, SD 0.5 grams,  $P < 0.0005$ ). The deviations for WBC were not significant. The mean (SD) turnaround time for the laboratory samples was 70.2 (SD 33.6) minutes compared to 4.5 (SD 0.7) minutes for the capillary samples ( $P < 0.0005$ ).

**Conclusion:** Analysis of capillary blood samples for full blood count parameters is a fairly reliable screening test with the following benefits: 1) it is a convenient, technically simple and minimally invasive testing method with fast turnaround times; 2) it assists the physician in making a rapid assessment and diagnosis at point of care.

#### AMB116

##### Hypoglycaemia and Acute Abdomen Associated with Ginseng — A Case Report

**CEM TEE<sup>1</sup>, PONAMPALAM R<sup>1</sup>**

<sup>1</sup>Emergency Medicine, Singapore General Hospital, Singapore

**Aim:** We report a patient with hypoglycaemia and acute abdomen associated with the use of ginseng.

**Case Report:** A 66-year-old Chinese female was admitted via our hospital's emergency department for hypoglycaemia. She had been lethargic for a day prior to admission and diaphoretic since that afternoon, complaining of vague chest and abdominal discomfort. She was noted to be afebrile with stable vital signs. She had depressed consciousness (Glasgow Coma Scale 9), pupils were equal and reactive, and she was moving all 4 limbs equally. She was hypoglycaemic (random blood sugar 0.7 mmol/L, confirmed with laboratory level 0.4 mmol/L). Treatment with bolus intravenous dextrose 50% led to full recovery of consciousness. The patient had a history of diabetes mellitus, hypertension, hyperlipidaemia, ischaemic heart disease, laparotomy for diverticular disease 2 years ago, and appendectomy 20 years ago. She had no recent changes in medications, doses or diet except for recent ingestion of ginseng root the afternoon prior to hospital admission. The exact preparation and amount ingested was unknown. The patient's abdominal pain persisted, resulting in a laparotomy; no significant pathology was found. Unfortunately, her condition deteriorated, resulting in multi-organ failure and death 6 days later.

**Conclusion:** Ginseng may have contributed to this patient's hypoglycaemia and acute abdominal distress, taking into consideration the temporal relation. A review of the literature showed no reports of ginseng-induced hypoglycaemia. However, research has shown the glucose-lowering properties of ginseng, suggesting a possible aetiology for the hypoglycaemia in this patient. Gastrointestinal symptoms associated with ginseng have been reported sporadically, manifesting as diarrhoea, epigastralgia and digestion problems. However, there were no reports of acute abdominal findings requiring a laparotomy associated with its use.

#### AMB117

##### [188Re(CO)3]-Lipophilic Chelates for Internal Radiation Therapy of Hepatocellular Carcinoma

**MM SAW<sup>1</sup>, FX SUNDRAM<sup>1</sup>, TSA HOR<sup>2</sup>, R ALBERTO<sup>3</sup>**

<sup>1</sup>Nuclear Medicine, Singapore General Hospital, Singapore, <sup>2</sup>Chemistry Department, National University of Singapore, Singapore, <sup>3</sup>Institute Of Inorganic Chemistry, University of Zurich, Switzerland

**Aim:** Hepatocellular carcinoma (HCC) is one of the 10 most common tumours in the world. Internal radiation therapy has been used extensively in the management of HCC. Lipiodol, a radiographic contrast medium, when injected through hepatic artery, accumulates in liver cancer cells. The Lipiodol analogue, octadecane, could be regarded as a Lipiodol-mimic bioactive molecule. 186/188Rhenium is gaining prominence as the main therapeutic radionuclide by virtue of distinctive radio-physical properties and easy availability. Recently, a water- and air-stable organometallic aqua complex  $[Re(OH)_2(CO)_3]^+$  has proven to be a versatile synthon.

**Methods:** Different bidentate and tridentate ligands containing long chain hydrocarbon in a side chain were synthesised and coordinated to fac-[M(CO)3]+ core (M = 99mTc, 186Re or 188Re) with different labelling approaches. A new "[2+1B] mixed-ligand approach" was also used to synthesise  $[Re(CO)_3(2+1B)]$  complexes. There is only 1 example in direct labelling of Lipiodol with 188Re. We have highlighted the simple, feasible and efficient methods for direct covalent bonding of  $[Re(CO)_3]$  complex with Lipiodol. Biodistribution of fac-[188Re(OH)2(CO)3]+ and biodistribution of Re analogue  $[99mTc(CO)_3]$ -lipophilic chelates in Sprague-Dawley rats were studied as prerequisites for future clinical application.

**Results:** Biodistribution studies of  $[99mTc(CO)_3]$ -lipophilic chelates showed that complexes are well retained in the liver and the biodistribution patterns are comparable to other reported radiolabelled Lipiodol complexes.

**Conclusion:** We have developed a new class of  $[188Re(CO)_3]$ -based radiopharmaceuticals for internal radiation therapy of hepatocellular carcinoma. An efficient method for direct labelling of cytotoxic agents (radioisotopes or chemotherapeutic agents) has also been developed.

#### AMB118

##### Role of Beta-Catenin and p27 in Colorectal Cancer: Correlation with Pathologic Parameters

**CYP CHAU<sup>1</sup>, WM YAP<sup>1</sup>, PH TAN<sup>1</sup>, PY CHEAH<sup>2</sup>, KW EU<sup>2</sup>, BH BAY<sup>3</sup>**

<sup>1</sup>Pathology, <sup>2</sup>Colorectal Surgery, Singapore General Hospital, Singapore, <sup>3</sup>Anatomy, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** p27 is a cell cycle inhibitor whose expression is shown to be a predictor of poor prognosis in cancers, while beta-catenin is a proto-oncogene believed to be involved in colorectal carcinogenesis. We aim to study protein expression of p27 and beta-catenin in a local series of colorectal cancers, and correlate the findings with conventional pathologic parameters.

**Methods:** Three hundred and thirty-four patients with colorectal cancer diagnosed at the Department of Pathology, Singapore General Hospital were reviewed histologically and immunohistochemistry for p27 and beta-catenin using the streptavidin-biotin method was performed. Scoring was accomplished by a summation of both the intensity score (0, 1, 2 and 3 for nil, weak, moderate and strong staining, respectively) of staining, and proportion (1, 2 and 3 for  $\leq 1/3$ ,  $1/3$  to  $2/3$ , and  $> 2/3$ , respectively) of cells stained. Scores above 4 and 5 are considered high expression for p27 and beta-catenin, respectively. Statistical analysis utilised the student's chi-square test, with a  $P$  value of  $< 0.05$  indicating a statistically significant result.

**Results:** One hundred and fifty-six women and 175 men were included (unknown in 3 individuals), with ages ranging from 30 years to 92 years. There was no statistically significant correlation of p27 and beta-catenin with age and conventional pathologic parameters. p27 and beta-catenin immunostaining results were associated with each other; while low protein expression of p27 was correlated with a higher likelihood of nodal metastases. No association of either marker was discovered with recurrence.

**Conclusion:** There may be a relationship between p27 and beta-catenin

protein expression in colorectal cancer in Singapore patients. The presence of nodal metastases in cases with diminished p27 immunostaining suggests a potential role in tumour progression and vascular invasion.

#### AMB119

##### Uncommon Elevated Zinc Levels in Cases for Investigation

**CW LAM<sup>1</sup>, D MENON<sup>1</sup>**

<sup>1</sup>Pathology, Singapore General Hospital, Singapore

**Aim:** A series of abnormally high levels of zinc were obtained particularly from 1 general hospital. No symptoms or signs were elicited from the patients, thereby prompting the Department to investigate the cause.

**Methods:** Requests for serum zinc analysis are received in the form of separator gel tubes. Because of the infrequent requests, zinc analysis is done as batch testing once a week. We designed a study to look into the possibility of the separator gel tube or the stopper as potential sources of contamination and, if true, the amount and rate of zinc leaching over a period of time. The study consists of 2 pooled serums and de-ionised water as control in the separator gel tubes, non-gel plain tubes and specially treated trace metal-free tubes. The tubes with different contents were prepared together and run on consecutive days. The analysis was performed using the atomic absorption spectrophotometry.

**Results:** All the tubes with pooled serum showed elevated zinc levels with the separator gel tubes having the highest level, followed by non-gel plain tubes and trace metal-free tubes. The result took into account that our pooled serum was collected from separator gel tubes. Analysis with de-ionised water showed that separator gel tubes have significantly higher zinc levels compared to non-gel plain tubes and trace metal-free tubes. In addition, zinc levels are noted to be higher in tubes that were inverted, suggesting the stopper also contribute to the contamination.

**Conclusion:** Separator gel tubes are not suitable for zinc analysis and should be replaced with trace metal-free tubes immediately.

#### AMB120

##### Evaluation of the Beckman Coulter UniCel DxI 800 Access Immunoassay System

**CW LAM<sup>1</sup>, KP SOH<sup>1</sup>, SF LIM<sup>1</sup>**

<sup>1</sup>Pathology, Singapore General Hospital, Singapore

**Aim:** The purpose of this study was to evaluate the Beckman Coulter UniCel DxI 800 for linearity, analytical sensitivity and imprecision for selected chemistries under routine laboratory conditions. We also compared the DxI 800 against another immunoassay analyser, the Roche Elecsys 2010.

**Methods:** The chemistries of ferritin, folate and vitamin B12 are evaluated. The within-run (n = 21) and between-day (n = 10) imprecision was determined by the use of 3 levels of independent commercial control material (Biorad Lyphochek). Between-day imprecision study was performed over 21 days. The analytical sensitivity was established using the (Beckman Coulter) QMIT Method. Linearity was determined by the appropriate dilution of calibrators.

**Results:** The within-run and between-day imprecision was good for all tested parameters. The obtained values of % CV in sequence for levels 1 to 3 are (4.28, 2.89, 3.33), (10.71, 3.98, 2.56) and (4.65, 4.97, 8.63) for ferritin, folate and vitamin B12, respectively. The between-day % CV are (5.33, 4.18, 4.52), (7.30, 8.32, 4.54) and (4.10, 3.38, 2.99) likewise. The analytical sensitivities are 0.07 ng/mL, 1.66 nmol/L and 4.5 pmol/L. The % recovery averaged at 97, 104 and 105 correspondingly. Comparison analysis revealed an agreeable correlation between the DxI 800 and the Elecsys 2010 (n = 50) with no significant deviation from linearity. The obtained slopes are 0.878, 0.912, 0.745 with R<sup>2</sup> values of 0.87, 0.88 and 0.87 in the order above.

**Conclusion:** The Beckman Coulter UniCel DxI 800 is a precise, fast and user-friendly analyser and was shown to have acceptable performance for the evaluated assays. The DxI 800 also compared well to the Elecsys 2010, a commonly used immunoassay analyser worldwide.

#### AMB121

##### Trisomy 8 Demonstrated in a Case of Chronic Lymphocytic Leukaemia

**LC LAU<sup>1</sup>, SK KEE<sup>1</sup>, SL TIEN<sup>2</sup>, MBC KOH<sup>2</sup>**

<sup>1</sup>Pathology, <sup>2</sup>Haematology, Singapore General Hospital, Singapore

**Aim:** A rare cytogenetic finding was demonstrated in a case of chronic lymphocytic leukaemia (CLL).

**Methods:** 1) Flow cytometry was done on bone marrow and blood specimen. 2) Cytogenetic analysis was carried out on bone marrow and lymphoid cells from peripheral blood using standard G-banding technique.

**Results:** Bone marrow flow cytometry carried out 3 year ago expressed CD19, CD20, CD5, CD23 and SMIG with clonality in the kappa chain. CD5 and CD19 co-expression was demonstrated. A diagnosis of chronic lymphocytic leukaemia was made. Cytogenetic analysis carried out on overnight and direct cultures that were set up without stimulation showed a normal karyotype. The patient was recently re-admitted and flow cytometry on blood detected 26% of clonal B cells. They expressed CD5 and CD19 and weak CD23+ with kappa chain restriction. CD79b and FMC-7 were both negative. This was consistent with the continued presence of circulation clonal B-lymphocytes. Cytogenetic analysis done on peripheral blood stimulated with B cell mitogen demonstrated two cells with trisomy 8.

**Conclusion:** The most frequent abnormality in B-CLL, found in 1/3 of the abnormal cases, is trisomy 12. Deletion of 13q14 is the most frequent structural aberration found in B-CLL, followed by 14q32 band rearrangements. Alterations of chromosomes 11, 6, 18, 3, 17 and 8 were less frequently observed. Trisomy 8 is the most frequent isolated abnormality found in acute myeloid leukaemia and myelodysplastic syndrome, but trisomy 8 as the sole abnormality in CLL is a very rare finding. The significance of trisomy 8 in CLL remains to be seen.

#### AMB122

##### Multicolour Fluorescence In Situ Hybridisation (M-FISH): A Useful Tool in Defining Complex Chromosomal Rearrangement in a Case of Acute Promyelocytic Leukaemia

**TH LIM<sup>1</sup>, A LIM<sup>1</sup>, F LIAW<sup>1</sup>, SL TIEN<sup>2</sup>**

<sup>1</sup>Pathology, <sup>2</sup>Haematology, Singapore General Hospital, Singapore

**Aim:** To elucidate and define an acute promyelocytic leukaemia (APL) case with complex karyotype using multicolour fluorescence in situ hybridisation (M-FISH).

**Methods:** A 63-year-old Chinese male had a total white cell count of 1.43 x 10<sup>9</sup>/L and platelet count of 15 x 10<sup>9</sup>/L. Bone marrow aspirate was hypercellular with 2% blast and 89% promyelocytes. A diagnosis of APL was made. Conventional karyotyping, FISH using PML/RARA dual fusion probes and M-FISH were performed on bone marrow cells.

**Results:** Cytogenetics revealed a 46, XY, add(3)(q11.2), add(10)(q11.2), der(15)t(15;17)(q22;q21),-17, add(17)(q21), +mar[10]/ 46, XY[10] karyotype. Interphase FISH using PML/RARA probes showed 62% of 200 nuclei with a 3 fusion, 1 red and 1 green signal pattern (3F1R1G), while 25% had a 2F1R1G pattern. Metaphase FISH showed that one PML/RARA fusion signal was on the der(15) and the other two fusion signals were on the marker chromosome. M-FISH analysis revealed that the marker chromosome was an ider(17)(q10)t(15;17)(q22;q21). Additional structural rearrangements include a reciprocal translocation between chromosomes 10 and 17, and an interstitial deletion of chromosome 3. A metaphase with t(15;17) as the sole abnormality was also detected with M-FISH. This minor cell line is conceivably the stemline from which the major cell line with the complex chromosomal rearrangements evolved.

**Conclusion:** M-FISH is useful in defining and elucidating complex karyotypes in neoplastic disorders by unveiling significant chromosomal abnormalities that contribute to disease progression that might otherwise be missed. The presence of complex rearrangements indicates secondary genomic changes that are pathogenetically important in disease development. Nevertheless, the establishment of PML/RARA fusion gene is also important as the fusion transcript mediates positive response to all-trans retinoic acid.



## AMB123

**Detection of Urothelial Carcinoma by Fluorescence In Situ Hybridisation****AST LIM<sup>1</sup>, TH LIM<sup>1</sup>, KO LAU<sup>2</sup>, PH TAN<sup>1</sup>, SL TIEN<sup>3</sup>**<sup>1</sup>Pathology, <sup>2</sup>Urology, <sup>3</sup>Haematology, Singapore General Hospital, Singapore**Aim:** To study the feasibility of employing fluorescence in situ hybridisation (FISH) assays in the detection of urothelial carcinoma (UC).**Methods:** Sixteen voided urine samples were assayed from 15 patients from the Urology Centre, Singapore General Hospital. The samples were split for cytology and FISH assays. The patients also underwent cystoscopy for histology studies. A FISH assay using the Vysis® UroVysion Bladder Recurrence Kit, comprising a panel of  $\alpha$ -satellite probes for chromosomes 3, 7, and 17, and a locus specific identifier for 9p21, was performed on each sample. Each probe was labelled with a different fluorophore. Assessments were made under fluorescence microscopy. Test results were considered positive if  $\geq 4$  cells had gains of  $\geq 2$  chromosomes, or there was homozygous loss of 9p21 in  $\geq 12$  cells. Samples with  $\geq 10$  tetraploid cells were also considered positive.**Results:** FISH had a sensitivity of 72.7% when compared to cytology, and a specificity of 40%. The overall test agreement was 62.7%. When compared to cytology, the sensitivity of the FISH result was 77.8% and the specificity was 66.7%.**Conclusion:** While there was a high degree of correlation in the sensitivity between cytology, cytology and FISH, the false positive rate obtained was quite high with FISH (60%). The disparity may be the result of a combination of inexperience on the part of the assessors and the assay limitations. Certainly, this preliminary study highlights the need for further comparative studies with cystoscopy and cytology before this test can be considered a viable routine screening assay for UC.

## AMB124

**Acute Lymphoblastic Leukaemia with a Cryptic T(6;14) Rearrangement: A Case Report****LE LOO<sup>1</sup>, YW YEE<sup>1</sup>, SL TIEN<sup>2</sup>**<sup>1</sup>Pathology, <sup>2</sup>Haematology, Singapore General Hospital, Singapore**Aim:** To present a rare case of acute lymphoblastic leukaemia (ALL) with a cryptic t(6;14) rearrangement.**Methods:** Cytogenetic studies were performed on bone marrow cells using G-banding technique. Adjunct fluorescence in situ hybridisation (FISH) using dual-color IGH breakapart probe, 6q telomeric probe (green), and a centromeric probe (red) for chromosome 6 were also performed to confirm the suspected translocation pattern.**Results:** The karyotype was initially interpreted as 46,XY,?del(6)(q25),add(14)(q32). Metaphase FISH showed that the IGH gene was not disrupted, so the translocation breakpoint was centromeric to the IGH gene but within the same chromosome band. DAPI banding showed that an intact IGH gene had translocated to 6q. The result showed that the telomere of 6q had been translocated to a D-group chromosome, shown by reverse DAPI to be chromosome 14.**Conclusion:** The t(6;14) was previously reported in multiple myeloma but not in ALL. Breakpoints on chromosome 6 commonly associated with ALL and non-Hodgkin's lymphoma are different from this case, being from 6q15 to 6q24. This translocation may have activated an oncogene at the breakpoint. As with patients with 6q- rearrangements in subsets of leukaemia and lymphoma, the patient was identified with an adverse prognosis. However, more cases need to be reported to obtain a clearer picture. The use of FISH in our laboratory has greatly improved our ability to provide accurate diagnosis. Most importantly, FISH allows us to confirm and rule out subtle chromosome rearrangements. This is an important consideration in the assignment of treatment to ALL patients. The karyotype was redesignated as 46,XY,?del(6)(q25),add(14)(q32).ish t(6;14)(IGH+;IGH-).

## AMB125

**Immunoassay for Sirolimus Evaluated on the IMx Analyzer****WY NG<sup>1</sup>, YL CHEN<sup>1</sup>, WY YII<sup>1</sup>, HX LOU<sup>2</sup>, A VATHSALA<sup>2</sup>, E JACOB<sup>1</sup>**<sup>1</sup>Pathology, <sup>2</sup>Renal Medicine, Singapore General Hospital, Singapore**Aim:** Sirolimus is a new immunosuppressant used in prophylaxis of rejection following renal transplantation. As therapeutic monitoring of sirolimus levels is necessary to optimise outcomes, we carried out a performance evaluation of a new immunoassay for sirolimus.**Methods:** The assay on the Abbott IMx analyzer was evaluated for linearity, precision and recovery. Whole EDTA-blood was assayed with 150  $\mu$ L added to 300  $\mu$ L precipitation reagent, mixed followed with centrifugation. Further comparison with high-performance liquid chromatography (HPLC) was carried out.**Results:** The calibration curve showed a linear dynamic range of 0 to 30  $\mu$ g/L and an assay sensitivity of 0.049  $\mu$ g/L. Imprecision studies showed the following within-assay CVs at low to high levels: 12.0% (4.4  $\mu$ g/L), 4.4% (13.1  $\mu$ g/L) and 7.3% (22.7  $\mu$ g/L). Between-assay CVs from 9 assay runs were 9% (4.7  $\mu$ g/L), 11.4% (11.4  $\mu$ g/L) and 12.4% (23.4  $\mu$ g/L). Recoveries of 80% to 110% were obtained with sirolimus (2.0 to 22.0  $\mu$ g/L) added to sirolimus-free blood. Its measurement on the IMx analyzer showed no carryover effect (23.4, 1.5  $\mu$ g/L) or significant cross-reactivity with moderate levels of tacrolimus FK-506-treated specimens (10.6 to 14.6  $\mu$ g/L). Spilt samples (n = 56) comparison showed that IMx values correlated well with values obtained by HPLC over the range 0 to 50  $\mu$ g/L. The regression obtained was  $y$  (IMx) = 0.82x (HPLC) + 1.69,  $r$  = 0.941. Tests with external quality assurance samples confirmed the accuracy and good recoveries of sirolimus.**Conclusion:** Sirolimus determinations were precise and accurate. Compared to HPLC methods, immunoassays are rapid, easily adaptable on clinical analysers and yield shorter turnaround times.

## AMB126

**Stability of Therapeutic Drugs in Vacutainer SST Blood Collection Tubes****WY NG<sup>1</sup>, NM WONG<sup>1</sup>, IK TAN<sup>1</sup>**<sup>1</sup>Pathology, Singapore General Hospital, Singapore**Aim:** Therapeutic drug levels not immediately determined may be affected on storage in their blood collection tubes. We evaluated the stability of some drugs on blood specimens collected and stored in BD Vacutainer SST Plus Plastic (#367986; gel and clot activator) collection tubes.**Methods:** Eight therapeutic drugs frequently encountered in a clinical laboratory were studied. Blood specimens (n = 40) were processed (time for clotting, centrifugation), tested and then kept in their collection tubes at 4°C for re-testing over a 4-day period every 24 hours. Tests were performed on the Abbott AxSYM analyser utilising fluorescence polarisation except for digoxin measured by microparticle enzyme immunoassay.**Results:** The following analyte levels were studied: carbamazepine (1.4 to 11.2 mg/L), digoxin (0.4 to 2.9  $\mu$ g/L), gentamicin (0.9 to 5.2 mg/L), phenobarbitone (17.3 to 28.6 mg/L), phenytoin (1.1 to 40.3 mg/L), theophylline (1.5 to 23.7 mg/L), valproic acid (4.2 to 106 mg/L) and vancomycin (3.9 to 50.2 mg/L). Most samples kept for 24 hours (39/40) did not show significant (>20%) differences in the analyte levels compared to day 0, an observation also shown for the 48-hour, 72-hour and 96-hour measurements. Low levels of drugs presented more variable results, e.g., theophylline 1.5 mg/L (26.7% at 24 hour to 20.0% at 96 hour), digoxin 0.4 to 0.6  $\mu$ g/L (25.0% at 72 hour and 33.3% at 96 hour). Analytical variability for the analytes over the 4 days ranged from 0% to 17.4% with higher CVs (above 7.0%) at the low analyte levels.**Conclusion:** Sera kept at 4°C in their collection tubes (with gel barrier) over a 4-day period gave the same or similar concentration as on day 0, for an array of common therapeutic drugs.

**AMB127**

**Presence of Myoglobin in the Urine Related to Muscle Creatine Kinase and Creatinine Levels**

**WY NG<sup>1</sup>, SC CHONG<sup>1</sup>, IK TAN<sup>1</sup>**

<sup>1</sup>Pathology, Singapore General Hospital, Singapore

**Aim:** An average of 200 tests annually were requested from hospital inpatients for myoglobin in urine. Qualitative urine myoglobin was previously determined and then semi-quantitatively in August 2003. Quantitative levels may better predict the development of renal failure on massive muscle breakdown, e.g., rhabdomyolysis or drug-induced myoglobinuria. Since June 2004, a quantitative chemiluminescent immunoassay for urinary myoglobin has been available. We reviewed urinary myoglobin tests from various wards and its relation with other muscle and renal function indicators.

**Methods:** A patient data set (n = 73) comprising demographics and location of wards was collected from consecutive reports for urinary myoglobin. Urinary myoglobin was correlated with serum creatinine (sCr), serum creatine kinase (CK), CK-mass and aldolase levels determined on the same day or up to 3 days before the test for urine myoglobin.

**Results:** Of the 73 patients (mean: 57 years; range, 14 to 84 years; 50 males) from 18 wards, there were 49 occasions (67.1%) where urinary myoglobin (mean: 4274 µg/L; range, 25 to 60,000 µg/L) was detected. The mean CK level was 4209 U/L and on 1 occasion, a level of 36,000 U/L was measured. Urine myoglobin levels tend to increase with sCr, CK, CK-mass and aldolase levels. Significant myoglobin levels were associated with impaired renal function (sCr >141 µmol/L) and elevated CK (>2000 U/L; 10x upper normal limit). There were 4 occasions where urinary myoglobin exceeded 60,000 µg/L.

**Conclusion:** Presence of myoglobin in the urine is related to high levels of CK and renal impairment. Quantitative urinary myoglobin would be of help in determining myoglobin effects on renal function.

**AMB128**

**Interlaboratory Variation of Haemoglobin A1c in SingHealth Laboratories over a 3-Year Period**

**WY NG<sup>1</sup>, CP YEO<sup>1</sup>, J LOH<sup>1</sup>, AH GOH<sup>1</sup>, E JACOB<sup>1</sup>**

<sup>1</sup>Pathology, Singapore General Hospital, Singapore

**Aim:** As part of a quality assessment programme for SingHealth laboratories (polyclinics and specialist centre) managed by the Singapore General Hospital's Pathology Department, testing for haemoglobin (Hb)A1c was implemented in July 2002. This study reports the extent of interlaboratory variation of HbA1c measurements (on the Bayer DCA2000) since implementation.

**Methods:** Two specimens of pooled EDTA-blood—S1 (good glycaemic control; low HbA1c) and S2 (poor glycaemic control; high HbA1c)—were distributed to the 9 laboratories bimonthly. Results exceeding a bias of ±10% or an absolute difference of ±1.0% HbA1c from the clinical laboratory were considered significant.

**Results:** Over the 3-year period, July 2002 to June 2005, 22 distributions were carried out. From 33 instruments initially, 55 units participated in the 2005 programme. Between July 2003 and January 2004, an average of 10 instruments (range, 4 to 16) gave results exceeding 1% HbA1c from the reference values for S2 specimens (#8 to #13 distributions). Acceptable results were obtained for S1 specimens. From February 2004, all results showed no significant bias. On average, 3.96% imprecision (CV) base for S1 specimens (mean: 5.3% HbA1c) and 3.15% for S2 specimens (mean: 10.2% HbA1c) were obtained by all laboratories, equivalent to method-specific laboratories in the College of American Pathologists (CAP) 2005 Survey. This is also within the maximum allowable CV (<5%) specified by the National Academy of Clinical Biochemistry 2002 guidelines.

**Conclusion:** With regular participation and awareness of performance, interlaboratory analytical variation for HbA1c had remained fairly constant and below 5%. Laboratories should continue to assess their performance in line with standards practised by larger clinical laboratories.

**AMB129**

**Performance of Point-of-Care Testing for Blood Glucose as Assessed by Split-sample Testing**

**WY NG<sup>1</sup>, SK NG<sup>2</sup>, M CHOW<sup>3</sup>, HH PNG<sup>2</sup>, E JACOB<sup>1</sup>**

<sup>1</sup>Pathology, <sup>2</sup>Nursing, <sup>3</sup>Emergency Medicine, Singapore General Hospital, Singapore

**Aim:** Point-of-care testing (POCT) for blood glucose is an essential feature in the management of diabetes mellitus. In the Singapore General Hospital, handheld glucometers (Roche Accu-Chek Advantage) are found in most wards, specialist outpatient clinics and specialist centres. With the implementation of a campus-wide POCT policy, blood glucose measurements are required to be assessed for accuracy. The results of the first external quality assessment (EQA) exercise are reported.

**Methods:** Each meter in active use first tested a blood sample before the specimen was dispatched to the main clinical laboratory. Test locations submit the results with meter, operator and specimen details to the Pathology coordinator for a comparison. Test locations with results exceeding the acceptable error (±15%) are required to re-test and re-submit after checks for probable causes, e.g. quality controls, test-strip storage or operator technique.

**Results:** A total of 165 meters, spread over 47 locations and 89 operators, were involved in the exercise. Blood glucose levels from 2.6 to 19.8 mmol/L (median: 7.0 mmol/L) were submitted. Eighty-seven per cent (143/165) of the submissions passed the acceptance criterion. Of these results, the difference from the main laboratory results ranged from -13.6% to 15.0% (glucose 2.6 to 6.0 mmol/L; n = 43), -13.8% to 15.0% (6.1 to 10.0 mmol/L; n = 58), -9.8% to 5.7% (10.1 to 15.0 mmol/L; n = 27) and -8.6% to 4.3% (15.1 to 19.8 mmol/L; n = 15). Twenty-two meters from 14 test locations required re-tests, subsequently meeting the acceptance criterion on re-submissions.

**Conclusion:** Most test locations and the operators were competent in performing blood glucose determinations. Factors other than instrument-related appear to be contributory causes for unacceptable results.

**AMB130**

**Multiplex Polymerase Chain Reaction Assay for Diagnosis of Infections in Eye and Cerebrospinal Fluid Samples**

**SY SE THOE<sup>1</sup>, L OON<sup>1</sup>, KP CHAN<sup>1</sup>, SP CHEE<sup>2</sup>, AE LING<sup>1</sup>**

<sup>1</sup>Pathology, Singapore General Hospital, Singapore, <sup>2</sup>Ocular Inflammation and Immunology Service, Singapore National Eye Centre, Singapore

**Aim:** The diagnosis of eye and central nervous system infections pose a challenge to the diagnostic microbiology laboratory due to the difficulty in obtaining sufficient amount of eye and cerebrospinal fluid (CSF) samples. To address this problem, a multiplex polymerase chain reaction (PCR) test was developed.

**Methods:** An in-house developed multiplex PCR assay that could simultaneously detects cytomegalovirus (CMV), herpes simplex virus (HSV), varicella-zoster virus (VZV) and *Toxoplasma gondii* (TG).

**Results:** Over an 18-month period, a total of 160 eye and 114 CSF samples were tested using this PCR assay. Fifty-four (20%) samples were positive for at least 1 pathogen. CMV was the commonest pathogen, being detected in 15.6% and 7.9% of eye and CSF samples, respectively. HSV, VZV and TG were detected in 2.5%, 1.25% and 1.25% of eye samples respectively, while VZV, HSV and TG were detected in 5.3%, 1.25% and 1.25% of CSF samples, respectively. Dual infection was seen in 2 (1.8%) CSF specimens from immunocompromised patients; 1 with CMV and HSV, and the other with CMV and VZV.

**Conclusion:** In summary, this multiplex PCR assay was found to be particularly useful for samples of low volumes that require testing for multiple pathogens. The other advantage of this assay was savings in reagents and labour as only a single PCR assay was needed for the diagnosis of 4 pathogens. Its drawback was the reduction in the sensitivity (1 log) of the assay to detect HSV and VZV as compared to the corresponding uniplex PCR.

**BAS131****Genetic Variations in Alcohol Metabolising Enzymes and Alcoholism of Chinese and Indians****JY LEONG<sup>1</sup>, EC TAN<sup>2</sup>, L LIM<sup>3</sup>, M WINSLOW<sup>1</sup>, A LEE<sup>1</sup>, CH TAN<sup>4</sup>**<sup>1</sup>Addiction Medicine, Institute of Mental Health/Woodbridge Hospital, Singapore, <sup>2</sup>Center for Biomedical Science, DMERI@DSO, Singapore, <sup>3</sup>Behavioural Medicine, Singapore General Hospital, Singapore, <sup>4</sup>Psychological Medicine, National University Hospital, Singapore

**Aim:** It is well established that the kinetics of ethanol absorption and elimination are influenced by genetic factors. Polymorphisms have been identified in the alcohol dehydrogenase and aldehyde dehydrogenase genes which encode enzymes that mediate ethanol metabolism. We hypothesise that there could be a reduced frequency of the ALDH2\*2 allele for Chinese and Indian alcoholics and a corresponding increase in the ALDH2\*2 allele in Indian and Chinese controls.

**Methods:** Chinese and Indian alcoholic subjects meeting DSM IV criteria for alcohol dependence were recruited from the Woodbridge Hospital and the Alexandra Hospital. Severity of alcohol dependence was assessed by the Severity of Alcohol Dependence Questionnaire (SADQ) and the Alcohol Use Disorders Identification Test (AUDIT). Genomic DNA was extracted from peripheral blood. Controls with no history of alcohol abuse were recruited from Chinese and Indian staff of Woodbridge Hospital. Duplex polymerase chain reaction with confronting 2-pair primers (PCR CTPP) was carried out to genotype ADH2 and ALDH2. Some genotypes were also confirmed by PCR-RFLP and DNA sequencing.

**Results:** Our data revealed statistically significant difference in genotype and allele frequencies of the 2 at-risk gene variants between Chinese alcoholics and Chinese controls (ADH2:  $\chi^2 = 7.59$ ,  $P = 0.0059$ ; ALDH2:  $\chi^2 = 16.4$ ,  $P = 0.0001$ ). The trend was similar for Indian alcoholics and Indian controls, but it did not reach statistical significance. Indians have lower frequencies of the protective ADH His allele. Chinese had higher frequency of the ALDH Null allele which seems to protect against alcoholism.

**Conclusion:** These results confirm the hypotheses that certain ethnic groups maybe more vulnerable to the pathogenesis of alcoholism.

**BAS132****Variables Predicting Deaths Due to Cardiac Causes in Heart Failure Patients Enrolled in the National Healthcare Group Heart Failure Disease Management Programme****HN TAN<sup>1</sup>, XH HUANG<sup>2</sup>, JS WONG<sup>3</sup>, MPHS TOH<sup>4</sup>, BH HENG<sup>3</sup>, KC NG<sup>4</sup>, TS CHEAH<sup>5</sup>**<sup>1</sup>Disease Management, National Healthcare Group HQ, Singapore, <sup>2</sup>Professional Planning and Policy, <sup>3</sup>Health Services & Outcome Research, National Healthcare Group, Singapore, <sup>4</sup>Cardiology, Tan Tock Seng Hospital, Singapore, <sup>5</sup>Clinical Project Management and Planning, National Healthcare Group, Singapore

**Aim:** To determine the predictors of mortality due to cardiac causes, in patients enrolled in the National Healthcare Group (NHG) Heart Failure Disease Management Programme.

**Methods:** All patients enrolled in the NHG Heart Failure Disease Management Programme from October 2002 to June 2005 were included in the study. Baseline demographics, co-morbid medical conditions and NYHA Class Status were collected as cofounders. Statistical analysis was conducted with SPSS v11.

**Results:** A total of 1233 patients were enrolled in the programme. Mean duration of patient participation in the programme was  $12.5 \pm 8.3$  months, with a mean age of  $66.8 \pm 13.1$  years. Among the patients, 11% had chronic renal failure; 16.1% in NYHA Class I; 58.3% in Class II; 24.1% in Class III; and 1.5% in Class IV. Cox proportional hazard model, adjusting for baseline demographics and co-morbidities, was performed on the mortality rate. The mortality rate between patients recruited during their acute heart failure admissions and those who were recruited from the Heart Failure Clinic was statistically significant ( $P = 0.001$ , HR = 2.341, 95% CI 1.492 to 3.910). An increase in 1 year of age also had a 3.1% ( $P = 0.005$ , HR = 1.031, 95% CI

1.009 to 1.053) increase in mortality rate. Non-diagnosis of chronic renal failure ( $P = 0.01$ , HR = 0.494, 95% CI 0.29 to 0.842) and being in NYHA Class I or II ( $P = 0.02$ , HR = 0.318, 95% CI 0.121 to 0.837) seemed to have a protective effect on mortality rate.

**Conclusion:** The findings from the study suggested that heart failure patients who were older, diagnosed with chronic renal failure and in NYHA Class III or IV appeared to have a lower survival rate.

**BAS133****A Comparative Study on Survival Rates between Patients who were Enrolled in the National Healthcare Group Heart Failure Disease Management Programme****HN TAN<sup>1</sup>, XH HUANG<sup>2</sup>, KC NG<sup>3</sup>, MPHS TOH<sup>4</sup>, JS WONG<sup>3</sup>, BH HENG<sup>3</sup>, TS CHEAH<sup>5</sup>**<sup>1</sup>Disease Management, National Healthcare Group HQ, Singapore, <sup>2</sup>Professional Planning and Policy, National Healthcare Group, Singapore, <sup>3</sup>Cardiology, Tan Tock Seng Hospital, Singapore, <sup>4</sup>Health Services and Outcomes Research, <sup>5</sup>Clinical Project Management and Planning, National Healthcare Group, Singapore

**Aim:** To determine if there is a difference in survival rates between patients recruited into the National Healthcare Group (NHG) Heart Failure Disease Management Programme, during their acute heart failure admissions (index admissions) and those who were recruited from the Heart Failure Clinic.

**Methods:** All heart failure patients enrolled in the NHG Heart Failure Disease Management Programme from October 2002 to June 2005 were included in the study. Data on patients' baseline demographics, co-morbidities, death and termination were collected and analysed. Statistical analyses were performed using SPSS v11.

**Results:** A total of 1233 patients were enrolled during the study period. There were 644 patients recruited during their index admissions (Group 1) and 589 from the Heart Failure Clinics (Group 2). Mean duration of patient participation in the programme was  $12.5 \pm 8.3$  months and with a mean age of  $66.8 \pm 13.1$  years. Kaplan-Meier survival curves showed Group 1 with  $26.59 \pm 0.53$ , as compared to Group 2 ( $29.2 \pm 0.43$ ,  $P = 0.0001$ ). Cox proportional hazard model, adjusting for patients' demographics, their co-morbidities and NYHA Class Status, was performed on the mortality rate. Mortality rate in Group 1 versus Group 2 showed HR = 2.341, 95% CI 1.492 to 3.910 ( $P = 0.001$ ).

**Conclusion:** The findings from the study suggested patients enrolled at the heart failure clinics appeared to have a higher survival rate, compared to patients recruited from index admissions. This difference in mortality rates could be closely related to patients who were hospitalised having higher morbidity than patients who sought outpatient treatment.

**BAS134****A Study on the Different Causes of Death among Patients Enrolled in the National Healthcare Group Heart Failure Disease Management Programme****HN TAN<sup>1</sup>, XH HUANG<sup>2</sup>, KC NG<sup>3</sup>, MPHS TOH<sup>4</sup>, JS WONG<sup>3</sup>, BH HENG<sup>3</sup>, TS CHEAH<sup>5</sup>**<sup>1</sup>Disease Management, National Healthcare Group HQ, Singapore, <sup>2</sup>Professional Planning and Policy, National Healthcare Group, Singapore, <sup>3</sup>Cardiology, Tan Tock Seng Hospital, Singapore, <sup>4</sup>Health Services and Outcomes Research, <sup>5</sup>Clinical Project Management and Planning, National Healthcare Group, Singapore

**Aim:** To investigate the different causes of death among patients enrolled in National Healthcare Group (NHG) Heart Failure Disease Management Programme.

**Methods:** All heart failure patients enrolled in the NHG Heart Failure Disease Management Programme from October 2002 to June 2005 were included in the study. Data on patients' baseline demographics, co-morbidities, death and termination were collected and analysed. Statistical analyses were performed using SPSS v11.

**Results:** There were 1233 patients recruited into the programme during the



study period. Mean duration of patient participation in the programme was  $12.5 \pm 8.3$  months, with a mean age of  $66.8 \pm 13.1$  years; males made up of more than half of the total patient population (66.8%). Data on survival rate were collected at 12 months, 24 months and 32 months. There were 154 deaths in total with survival rates of 89% at 12 months, 79% at 24 months and 32.7% at 32 months. Male patients' survival rates stood at 90%, 80% and 79% at the 3 respective time periods, while female patients' survival rates was at 86%, 75% and 64%, respectively. Slightly more than half (56.5%) of the deaths were due to cardiac causes; 10.4% were due to infection; 5.2% had neurological origins; 4.5% due to pulmonary causes; 1.9% had renal-related causes; while 1.3% of the deaths were caused by malignant diseases.

**Conclusion:** The findings from the study suggested that male heart failure patients had a higher survival rate than female patients; and different causes of death contributed to different mortality rates.

### BAS135

#### Topical Heparin with Tetracycline versus Heparin or Tetracycline Alone in Preventing Ocular Scarring due to the Venom of the Black Spitting Cobra (*Naja sumatrana*)

G CHAM<sup>1</sup>, J PAN<sup>2</sup>, F LIM<sup>3</sup>, P GOPALAKRISHNAKONE<sup>4</sup>

<sup>1</sup>Emergency Medicine, <sup>2</sup>Ophthalmology, Tan Tock Seng Hospital, Singapore, <sup>3</sup>Singapore Zoological Garden, Singapore, <sup>4</sup>Anatomy, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** The black spitting cobra (*Naja sumatrana*) spits venom at an attacker's eyes, resulting in blindness, and there is no known therapy. The study aims to determine the efficacy of topical heparin, tetracycline ointment or both, in treating ocular injury in a rabbit model.

**Methods:** New Zealand White rabbits and pooled fresh venom were used. Random groups of 3 rabbits were anaesthetised and 0.05 mL of 20 times dilute venom was introduced on the conjunctivae. After a specified delay, heparin 5000 IU/mL, 1% tetracycline ointment, heparin-tetracycline combination or saline, was introduced on the conjunctivae. The rabbits were assessed after 24, 48, 72 hours, 1 and 2 weeks by an ophthalmologist blinded to the treatment arms. The Roper-Hall classification was used. Corneal defect was revealed by fluorescein staining. Hazy corneal reflex, chemosis, corneal discharge, conjunctival and ciliary injection were considered inflammatory features. Corneal scarring, ectropion or entropion were considered scar features.

**Results:** In the heparin and heparin-tetracycline groups, there were no features of scarring at two weeks, while the saline and tetracycline groups had significantly scarring. Roper-Hall grades were normal from day 2 onward, but highest in the saline group; inflammatory features subsided faster in the heparin and heparin-tetracycline groups when compared to saline or tetracycline groups. There was no difference in the rate of corneal re-epithelialisation.

**Conclusion:** Topical heparin therapy was better than tetracycline or saline. It reduced scarring, inflammation and improved overall ocular outcome after exposure to *Naja sumatrana* venom. The efficacy of the heparin-tetracycline treatment combination is driven by heparin.

### BAS136

#### Identification of a Novel Insertion Mutation Causing Alpha-thalassaemia in a Patient of Sri Lankan Descent

HY LAW<sup>1</sup>, M CHEE<sup>2</sup>, E TAN<sup>2</sup>, I NG<sup>1</sup>

<sup>1</sup>Paediatrics - Genetics, <sup>2</sup>National Thalassaemia Registry, KK Women's & Children's Hospital, Singapore

**Aim:** During a routine screening for deletions causing  $\alpha$ -thalassaemia using a multiplex PCR, an unexpected product was observed in a child who also carried a 3.7 kb deletion. Family study showed that the 3.7 kb deletion was inherited from the Chinese mother and the novel PCR product from the Sri Lankan father. The aim of this study is to define the mutation that gave rise to the novel PCR product detected during routine screening.

**Methods:** Five primers used in the multiplex were tested in pairs using the

family DNA to define which pair generated the novel PCR product. Cycle sequencing of this product was then carried out using primers covering overlapping regions in both directions, and analysed on ABI 3100 Avant Genetic Analyzer. Southern analysis was also carried out to exclude more extensive rearrangement.

**Results:** Sequencing found a 279 bp insertion of 5'  $\alpha$ -globin gene into the "Z" region, ~385 bp upstream of CAAT. This resulted in a net gain of 274 bp as 5 bases were deleted at the insertion site. PCR using the normal  $\alpha 2$  globin gene primers generated both the normal fragment of 1940 bp and the novel PCR product of 2215 bp in the father ( $\alpha T\alpha/\alpha$ ), but only the novel product in the proband ( $\alpha T\alpha/\alpha 3.7$ ) as expected.

**Conclusion:** As the insertion included the promoter of the  $\alpha$ -globin gene, cryptic transcription with no output of functional  $\alpha$ -globin chain could cause  $\alpha$ -thalassaemia. Routine screening has since identified another carrier showing that this may be a relatively common mutation among South Asians.

### BAS137

#### A Novel Exon 13 Duplication in the BRCA1 Gene Identified in a Chinese Patient

KPL YAP<sup>1</sup>, P ANG<sup>2</sup>, IHK LIM<sup>2</sup>, GH HO<sup>1</sup>, ASG LEE<sup>2</sup>

<sup>1</sup>Clinical Departments - Surgical Oncology, <sup>2</sup>Clinical Departments - Medical Oncology, National Cancer Centre, Singapore

**Aim:** The frequency of large gene rearrangements in Chinese women is unknown.

**Methods:** We studied high-risk Chinese women from a clinic-based genetic testing protocol for BRCA1 mutations (n = 30) and also women with early-onset breast cancer diagnosed at age  $\leq 40$  (n = 78) who were negative on BRCA1 mutational analysis. In total, 6 were from high-risk breast and ovarian cancer (HBOC) families, and 23 had a family history of only breast cancer. Multiplex ligation-dependent probe amplification (MLPA) was used to detect large gene rearrangements in BRCA1.

**Results:** An exon 13 duplication was identified in 1 BRCA1 mutation-negative patient, originally classified with early-onset breast cancer until a sibling was diagnosed with ovarian cancer. This 8463 bp duplication, characterised by long-range PCR and sequencing, had a 28 bp core sequence at both breakpoints, which were within AluSq and AluSp repeats that were both oriented in the reverse sense to the BRCA1 transcript. Exon 13 codes for amino acids 1396 to 1452, which lie within the SQ-cluster domain, the site of phosphorylation of the BRCA1 protein by ATM.

**Conclusion:** This is the first report of a BRCA1 large gene rearrangement in a Chinese patient and it differs from the known exon 13 founder mutation in Caucasians.

### BAS138

#### Temozolomide Induces Different Checkpoint Activation in Quiescent and Proliferating Glioma Cells

SW TENG<sup>1</sup>, TT WANG<sup>2</sup>, SY CHENG<sup>2</sup>, CJ ZHU<sup>2</sup>, C CHAN<sup>3</sup>, A TY<sup>3</sup>, MC WONG<sup>3</sup>

<sup>1</sup>Laboratory, <sup>2</sup>Research Divisions - Medical Sciences, National Cancer Centre, Singapore, <sup>3</sup>Neurosurgery, National Neuroscience Institute, Singapore

**Aim:** Temozolomide (TMZ) induces O6-methylguanine (O6-meG) DNA lesions. O6-meG is removed by the suicidal enzyme, MGMT. In proliferating cells, when MGMT is depleted by TMZ, O6-meG is processed by MMR, leading to G2/M cell cycle arrest and genotoxicity. Most chemotherapeutic killing is proliferation dependent but in solid tumours, most cells are quiescent. TMZ-induced differential cytotoxicity in quiescent glioma cells is unknown. Herein, we aim to identify TMZ-induced cell cycle checkpoint signalling and cytotoxicity in quiescent glioma cells.

**Methods:** U118-MG cells were serum starved and cell cycle profile determined by FACS. Cell cycle dependency of MGMT and MMR gene expression was quantified by real-time RT-PCR. Cells were treated with TMZ and cytotoxicity measured by MTT assay. G1 and G2/M checkpoint activation were assessed.

**Results:** Quiescent (G0) cells were serum replete, progressing through G1/S at 21 h. Maximum MGMT expression was observed in G0-phase, while significant MMR gene (MSH2, MSH6, MLH1, and PMS2) expression, initiated at late G1, was discerned in only proliferating cells. MSH2 and MSH6 expression peaked in S-phase. TMZ induced G2/M arrest in proliferating cells, after second S-phase (post-drug treatment). Unlike proliferating cells, TMZ induced sustained G1 arrest in quiescent cells (>24 h, with >90% accumulated at G1/S). Quiescent U118-MG cells were significantly more resistant to TMZ.

**Conclusion:** Quiescent glioma cells differ, including key O6-meG DNA repair gene expression, checkpoint activation and TMZ cytotoxicity. Our findings of TMZ-induced G1 arrest are novel. Insights into quiescent tumour cells may yield new targets for sensitising the tumour bulk to chemotherapy.

### BAS139

#### Epithelial Cell Transforming Factor 2 (ECT2) Promotes Glioma Cell G1/S Cell Cycle Progression Underpinning Oncogenicity

**TT WANG<sup>1</sup>, C ZHU<sup>2</sup>, SY CHENG<sup>2</sup>, SW TENG<sup>2</sup>, J THOMAS<sup>3</sup>, KB KANG<sup>2</sup>, MC WONG<sup>4</sup>**

<sup>1</sup>Laboratory Medicine, <sup>2</sup>Research Divisions - Medical Sciences, <sup>3</sup>Neurosurgery, <sup>4</sup>Neurology, National Neuroscience Institute, Singapore

**Aim:** ECT2 oncogene over-expresses in many tumours including gliomas. ECT2 is up-regulated by mitogens and its C-Terminal (ECT2C) has a high transformation potential. However, the cellular mechanism of ECT2 oncogenic transformation is undefined. We aimed to identify ECT2-mediated G1/S cell cycle progression and its role in ECT2C-induced transformation.

**Methods:** ECT2 was analysed in context of G1/S, including G1/S transition markers, DNA content and DNA synthesis. p21 and cyclin D1 were verified by real-time RT-PCR, Western blotting and immunofluorescence. ECT2 was down-regulated by siRNA and over-expressed by exogenous ECT2 cDNA. Transformation activity was assessed by foci formation using NIH3T3 cells.

**Results:** Quiescent U87-MG glioma cells re-entered the cell cycle following serum repletion. Initiation of endogenous ECT2 expression (mRNA and protein) occurred at restriction point, overlapping expression of delayed early response genes. Significantly enhanced ECT2 expression was observed at G1/S transition. Over-expression of ECT2 [full length (ECT2-F) or (ECT2C)] increased DNA synthesis and G1/S progression. Strikingly, ECT2 and p21 protein expression were mutually exclusive. ECT2 expression suppressed p21 transcription, while steady state cyclin D1 protein level was unaffected. In contrast, siRNA transfection induced G1 arrest with significant reduction of DNA synthesis. The role ECT2 on G1/S progression co-related with its transformation efficiency in NIH3T3 cells.

**Conclusion:** We reveal that ECT2 oncogenicity relies on dysfunction of its C-terminal, wherein cytoplasmic DBL domain activity strongly induces G1-S cell cycle progression through suppression of p21, a key G1/S CDKI.

### BAS140

#### Downregulation of p16INK4A Sensitises Siha Cervical Cancer Cells to UV-induced Apoptosis

**WMLAU<sup>1</sup>, TH HO<sup>2</sup>, KM HUI<sup>1</sup>**

<sup>1</sup>Research Divisions - Cellular & Molecular Research, National Cancer Centre, Singapore, <sup>2</sup>Obstetrics and Gynaecology, Singapore General Hospital, Singapore

**Aim:** p16INK4A (p16) is a well-known tumour suppressor gene that is frequently inactivated in many human cancers. Conversely, p16 is upregulated in cervical cancer and its regulation in cervical cancer has not been well studied. The aim of this study is to further elucidate the role of p16 in cervical cancer.

**Methods:** Using subtracted cDNA libraries and spotted cDNA microarrays, we have shown p16 to be significantly upregulated in 22 cervical cancer biopsies in comparison to tumour-adjacent normal biopsies, and normal cervical biopsies from non-cancerous patients. The upregulation of p16 was further confirmed using Affymetrix Genechip analyses and quantitative real

time PCR assays with a different set of cervical tumour and paired normal biopsies. To further understand the role of p16 in cervical cancer, we silenced p16 gene expression using siRNA against exon 1 ± of the p16 gene.

**Results:** After introducing p16 siRNA into Siha cervical cancer cells, p16 protein and mRNA levels were significantly reduced compared to scrambled siRNA control, as shown by Western blotting and quantitative real time PCR assays. Following UV irradiation, cells with reduced p16 expression had a higher percentage of apoptotic cells compared to scrambled control siRNA-transfected Siha cells. Affymetrix Genechip analyses revealed gene expression changes in critical cell cycle and DNA damage regulatory genes that have been linked to the induction of apoptotic cell death. These regulatory patterns were also observed at the protein level.

**Conclusion:** Our data suggest a potential protective role of p16 in response to cellular stress. In conclusion, we found that downregulation of p16 sensitises Siha cervical cancer cells to UV-induced apoptosis.

### BAS141

#### Identification of Tumour-specific Genes by Novel Modified Suppressive Subtractive Hybridisation

**BH LIU<sup>1</sup>, C GOH<sup>2</sup>, LL OOH<sup>3</sup>, D LIM<sup>3</sup>, KM HUI<sup>1</sup>**

<sup>1</sup>Research Divisions - Cellular & Molecular Research, National Cancer Centre, Singapore, <sup>2</sup>Otolaryngology, Singapore General Hospital, Singapore, <sup>3</sup>General Surgery, Singapore General Hospital, Singapore

**Aim:** Suppressive subtractive hybridisation (SSH) provides a powerful method to identify differentially expressed genes. Despite its potential, SSH has not been used in conjunction with oligonucleotide arrays due to technical difficulties in generating anti-sense RNA from the subtracted cDNAs. Here we report a method termed modified suppressive subtractive hybridisation (MSSH) which we have adopted for the generation of anti-sense RNA and allows the hybridisation of the Affymetrix arrays.

**Methods:** In MSSH, a T7-promoter sequence was introduced to the 5' end of the non-coding strand. To ensure its position, SP6 adaptor was used. Subsequently and in vitro transcription was performed. We employed 5 hepatocellular carcinoma (HCC) biopsies, 5 breast cancer biopsies, and 4 nasopharyngeal carcinoma (NPC) biopsies as testers and their corresponding adjacent normal biopsies as drivers in our study. Hybridisations of the same tissue pairs were performed independently from MSSH for comparisons.

**Results:** Using our method, the subtraction efficiency is over 90%. We were able to identify 3 distinct groups of genes that were specific for human HCC, breast cancer and NPC. The expression and specificity of these genes were further confirmed by in silico studies and real-time PCR analysis. Interestingly, when compared to gene profiling data obtained from the oligonucleotide arrays alone, MSSH detected an abundance of transcripts that are novel or ESTs.

**Conclusion:** MSSH could allow the hybridisation of subtracted samples on oligonucleotide array, and hence the identification of rare tumour-specific genes that would not otherwise be detected via conventional profiling.

### BAS142

#### Targeted Gene Therapy with Nanoparticles

**K TAN<sup>1,2</sup>, CL FONG<sup>1</sup>, R KUMAR<sup>2</sup>, P CHEANG<sup>2</sup>, KM HUI<sup>1,2</sup>**

<sup>1</sup>Research Divisions - Cellular & Molecular Research, National Cancer Centre, Singapore, <sup>2</sup>Division of Bioengineering, Nanyang Technological University, Singapore

**Aim:** Development of gene therapeutics depends on the efficient means of transfer of DNA or RNA into cells. Potential toxicity and immunogenicity surrounding viral methods of DNA delivery have warranted the use of non-viral, synthetic carriers as attractive alternative strategies for gene delivery. In this study, we explored the ability of nano-sized bio-ceramic particles, including silica (SiO<sub>2</sub>), hydroxyapatite and Zirconia, to act as synthetic gene carriers.

**Methods:** Probably due to the extended size of hydrated DNA and its negative charge density, it is difficult for naked DNA to cross the nuclear

membrane pore into the nucleus where transgene expression could take place. We therefore employed various polycations to modulate the charges of the nano-particles so that they could interact with DNA to produce nearly charge-neutral DNA-nano-particle complexes.

**Results:** Among the polycations tested, protamine sulfate (PS) was able to produce stable DNA-nano-particle complexes with SiO<sub>2</sub> both in vitro and in vivo. In addition, the SiO<sub>2</sub>-PS DNA complexes could mediate good reporter gene expression when introduced into different human cancer cell lines. We have also employed the SiO<sub>2</sub>-PS DNA complexes for in vivo gene delivery experiments and observed that the SiO<sub>2</sub>-PS DNA complexes could target transgene expression specifically to the spleen. From the time course study, transgene expression in the spleen could last up to 48 h.

**Conclusion:** Since the spleen plays a vital role in immune regulations, the potential of the SiO<sub>2</sub>-PS DNA complexes to modulate immune responses is being examined.

#### BAS143

##### Cell Cycle-Regulatable HSV-1 Amplicon Viral Vector

**Y WANG<sup>1</sup>, IAW HO<sup>1</sup>, KM HUI<sup>1</sup>, PYP LAM<sup>1</sup>**

<sup>1</sup>Research Divisions - Cellular & Molecular Research, National Cancer Centre, Singapore

**Aim:** We have previously constructed a cell cycle-regulatable HSV-1 amplicon vector, pC8-36, which is based on the binding of the cell cycle-specific CDF-1 transcriptional repressor onto the CDE/CHR regulatory elements within the cyclin A promoter. We hypothesised that the availability of more CDE/CHR elements would enhance the overall cell cycle regulation mediated by pC8-36 amplicon viral vector.

**Method:** Two, 3 and 6 copies of the CDE/CHR elements were incorporated within the minimal cyclin A promoter (designated as pC8-2ccLuc, pC8-3ccLuc and pC8-6ccLuc, respectively). These constructs were subsequently evaluated by transfection into human glioma cells. The degree of cell cycle regulation was measured as a ratio of luciferase activity of the proliferating and G1-arrested cells. These amplicon plasmids were packaged into infectious amplicon virions and characterised in vivo.

**Results:** Our results showed that in dGli36 cells, the cell cycle-dependent transgene expression was significantly observed in all the constructs tested. The degree of cell cycle regulation was enhanced by 2-fold for each additional copy of CDE/CHR element introduced. In partially heparctomised mice, pC8-6ccLuc achieved 3-fold higher cell cycle regulation when compared with pC8-36.

**Conclusion:** Addition of multiple copies of CDE/CHR region enhanced the cell cycle-dependent transgene expression in vitro and in vivo.

#### BAS144

##### Identification of Molecular Biomarkers Associated with the Recurrence of Human Hepatocellular Carcinoma

**SM WANG<sup>1</sup>, LLPJ OOF<sup>2</sup>, KM HUI<sup>1</sup>**

<sup>1</sup>Research Divisions - Cellular & Molecular Research, <sup>2</sup>Clinical Departments - Surgical Oncology, National Cancer Centre, Singapore

**Aim:** This study aims to use combined gene expression profiling approach and conventional clinicopathological judgement to identify biological markers that better predict human hepatocellular carcinoma (HCC) recurrence.

**Methods:** Using univariate analysis, vascular invasion and cirrhosis were significantly associated with recurrence. We then divided the 70 HCC samples into 4 subgroups based on these 2 risk factors and used high density oligonucleotide arrays representing approximately 33,000 well known genes to compare gene expression of the training sets between recurrence and non-recurrence cases. Informative genes selected by both parametric and non-parametric statistical tests that could estimate the training set with the minimum error rate were kept for prediction of the independent set.

**Results:** We showed that the integration of these two risk factors could predict the recurrence of HCC with a high degree of accuracy. Patients with vascular invasion and cirrhosis in Group 1 were likely (83%) to have

recurrence, while HCC patients without vascular invasion and cirrhosis in Group 4 were unlikely (88%) to recur. For patients that either have invasion or cirrhosis (Groups 2 and 3), there were 50% recurrence and non-recurrence patients. The differentially expressed 57-gene set selected between these 2 subgroups could yield prediction accuracy of up to 87%. Validation using real-time PCR showed consistent expression pattern of this gene set with those observed in microarray.

**Conclusion:** The present work using combined conventional clinicopathological judgement and microarray approach can identify candidate genes to predict HCC patients with a high risk of disease recurrence.

#### BAS145

##### The Role of Epithelial Cell Transforming Factor 2 (ECT2) on DNA Synthesis and S-phase Checkpoint Activation in Glioma Cells

**SY CHENG<sup>1</sup>, SW TENG<sup>1</sup>, TT WANG<sup>1</sup>, B LIU<sup>2</sup>, A TY<sup>3</sup>, CJ ZHU<sup>1</sup>, MC WONG<sup>3</sup>**

<sup>1</sup>Research Divisions - Medical Sciences, National Cancer Centre, Singapore, <sup>2</sup>Neurosurgery, <sup>3</sup>Neurology, National Neuroscience Institute, Singapore

**Aim:** Protein BRCT domains modulate signaling unique to DNA damage and checkpoint control. ECT2 is over-expressed in many tumours, but its BRCT domain function is undefined. We aimed to define the role of ECT2 in DNA damage response and checkpoint control.

**Method:** U87-MG cells were treated with temozolomide, etoposide and UV-irradiation. ECT2 expression was measured by real-time RT-PCR and Western blotting. Cellular ECT2 was knocked-down by siRNA and DNA replication and S-phase checkpoint activation analysed by simultaneous FACS analysis of DNA content and BrdU incorporation. S-phase checkpoint was monitored by measuring key signalling events such as ATR foci formation and Chk1 phosphorylation.

**Results:** ECT2 was up-regulated following genotoxic agent exposure. In cells treated with UV and etoposide, which are known to induce S-phase checkpoint activation, up-regulation of ECT2 protein corresponded with onset of S-phase arrest. Subsequent fractionation and nuclease digestion revealed ECT2 predominantly distributed in chromatin fractions indicating proximate association with DNA. Following siRNA knock-down, cells failed to arrest at S-phase, while significant arrest was observed in cells treated with GAPDH or scramble siRNA. ECT2 knock-down reduced DNA replication. Further experiments will verify ATR signaling pathways in cells with different ECT2 levels or BRCT domain mutations.

**Conclusion:** We are the first to report that ECT2 has a close association with chromatin and to demonstrate an important role for ECT2 in DNA synthesis and S-phase checkpoint activation. Checkpoint activation is closely related to chemoresistance. Defining ECT2 modulation of checkpoint activation can present novel adjuvant targets for improving chemotherapy.

#### BAS146

##### Structure Activity Relationship and Antitumour Activities of Andrographolide and its Novel Derivatives

**SR JADA<sup>1</sup>, SR SAGINEEDU<sup>2</sup>, AS HAMZAH<sup>3</sup>, J STANSLAS<sup>2</sup>, MFG STEVENS<sup>4</sup>, B CHOWBAY<sup>1</sup>**

<sup>1</sup>Research Divisions - Medical Sciences, National Cancer Centre, Singapore, <sup>2</sup>Faculty of Medicine and Health Sciences, Universiti Putra Malaysia, Malaysia, <sup>3</sup>Institution of Science, University Technology MARA, Malaysia, <sup>4</sup>Centre for Biomolecular Sciences, University of Nottingham, United Kingdom

**Aim:** In our search for development of antitumour agents from medicinal plants, we have encountered promising in vitro antitumour activity in the methanol extract of *Andrographis paniculata*. Subsequent analysis showed that it is andrographolide, a diterpenoid lactone compound in the extract, that caused the antitumour activity against different tumour cell lines in vitro and in vivo breast cancer models. Despite possessing antitumour activities, andrographolide lacks selectivity and potency towards tumour cell lines. To improve upon its selectivity and potency as an anticancer agent, several attempts were made to chemically modify the molecule so as to improve its



structure activity relationships (SAR).

**Methods:** In our pilot project investigating andrographolide's anticancer activity, we synthesised 18 derivatives of andrographolide. The 18 derivatives of andrographolide were tested for antitumour activities against MCF-7 and HCT-116 cell lines. Parameters of dose-response effects, GI50, TGI and LC50, were determined using a 72 h MTT cell viability assay. The derivatives were found to have submicromolar GI50 values in the 2 cell lines. The 18 compounds were also screened against the NCI panel of 60 human cancer cell lines derived from 9 cancer cell types.

**Results:** NCI's SOM mechanistic analyses indicated that the derivatives' antitumour activities were not similar to that of standard anticancer drugs with known mechanism of actions. Also, of the 18 derivatives screened, SRJ09 showed pronounced selectivity towards cancers of the CNS, renal and melanoma. Preliminary in vitro studies using MCF-7 cell line showed SRJ09 down-regulating CDK4, which correlated with FACS analyses data showing G1/S-phase block.

**Conclusion:** Future work to develop SRJ09 as lead molecule is ongoing in our clinical pharmacology lab.

#### BAS147

##### An Isothermal Method for Whole Genome Amplification of Fresh and Degraded DNA for Comparative Genomic Hybridisation and Genotyping

**C LEE<sup>1</sup>, SH LEONG<sup>1</sup>, A PNG<sup>2</sup>, KW CHOO<sup>2</sup>, C SYN<sup>3</sup>, M TAN<sup>1</sup>, D LIM<sup>4</sup>**  
<sup>1</sup>Research Divisions - Medical Sciences, National Cancer Centre, Singapore, <sup>2</sup>Nanyang Polytechnic, Bioinformatics Group, Singapore, <sup>3</sup>Centre for Forensic Science, Health Sciences Authority, Singapore, <sup>4</sup>General Surgery, Singapore General Hospital, Singapore

**Aim:** Whole genome amplification (WGA) to overcome limitations of clinical and forensic specimens must be efficient and possess quantitative fidelity of genome representation. We designed a primer for unbiased WGA and investigated WGA products by genome-wide assays.

**Methods:** A primer sequence (NYP) was designed by parsing the human genome sequence. WGA of fresh frozen, paraffin-fixed and DNase-degraded DNA samples was performed by degenerate oligonucleotide-primed PCR (DOP PCR) and isothermal primer extension amplification (PEA). The quality of WGA products was assessed by (a) chromosome-based comparative genomic hybridisation (CGH); (b) BAC array CGH and (c) genotyping at 16 microsatellite loci.

**Results:** DOP PCR WGA of normal genomic DNA (gDNA) using NYP primer gave a completely balanced copy number profile on chromosome CGH in self-self hybridisation. In contrast, CGH with the widely used Telenius primer showed many false deletions. PEA increased input DNA more than 5000-fold. In self-self hybridisations on BAC array CGH, NYP-primed and random hexamer-primed WGA products generated false outlier signals on 18 and 65, respectively, out of 2464 BAC clones. Most copy number aberrations were reproduced by array CGH of paraffin-extracted gDNA after WGA. PEA for WGA was tolerant of DNA degradation. Nine, 7 and 6 microsatellite loci were genotyped when input gDNA was degraded to the size ranges of 1500 to 3000, 800 to 1500 and 500 to 800 bp, respectively.

**Conclusion:** A bioinformatically-designed primer used in both PCR-based and isothermal WGA reactions yields products that are relatively unbiased. This method can be used on DNA that is degraded and from formalin-fixed paraffin embedded tissues.

#### BAS148

##### Molecular Cytogenetic Characterisation of Chromosomal Aberrations in Gastric Cancer Cell Lines

**SH LEONG<sup>1</sup>, OL KON<sup>1</sup>, C LEE<sup>1</sup>**

<sup>1</sup>Research Divisions - Medical Sciences, National Cancer Centre, Singapore

**Aim:** This study aims to characterise recurring chromosomal rearrangements of 19 gastric cell lines. Genes at translocation breakpoints may encode fusion products/transcripts of functional significance.

**Method:** Classical G-banding and molecular cytogenetic techniques such as spectral karyotyping (SKY) and comparative genomic hybridisation (CGH) are used to determine junctional breakpoints. High-resolution fluorescence in situ hybridisation (FISH) analysis using custom labelled probes on SNU1 gastric cancer cell line pinpoints the exact breakpoint region.

**Results:** Preliminary analysis of 7 cell lines showed recurrent breakpoints at 1q36.1, 4q32, 5q12q13 and 6q24. High-resolution FISH on SNU1 determined translocation breakpoints at 1q25.3, 4q32.3 and 4q26 with each set of probes spanning a distance of between 10 and 50 kilobases. Nine candidate genes resulting from del(4q) and 2 novel predicted genes at t(1;4)(q25.3;q32.3) and inv(4)(q26q32.3) respectively, have been identified.

**Conclusion:** An approach combining G-banding, SKY, CGH and FISH allows precise determination of chromosomal rearrangements in gastric cancer cell lines. Limitations of G-banding were overcome by SKY. SKY enables a global and accurate determination of complex rearrangements involving 3 or more chromosomes. The utility of CGH lies in global identification of regions of gains and losses. CGH copy number data have good concordance with SKY data. Twelve other gastric cancer cell lines will be analysed using the same approach. Identification of translocation "hotspots" may reveal unique fusion transcripts that may be useful as prognostic and/or diagnostic indicators.

#### BAS149

##### In Vivo Liver Electroporation: Optimisation and Demonstration of Therapeutic Efficacy

**J SIVALINGAM<sup>1</sup>, OL KON<sup>1</sup>, STB YAP<sup>2</sup>, ABM KHOO<sup>3</sup>, LP HO<sup>4</sup>, SL TIEN<sup>4</sup>**

<sup>1</sup>Research Divisions - Medical Sciences, National Cancer Centre, Singapore, <sup>2</sup>Life Sciences, Nanyang Polytechnic, Singapore, <sup>3</sup>Faculty of Science, Office of Life Sciences, National University of Singapore, Singapore, <sup>4</sup>Haematology, Singapore General Hospital, Singapore

**Aim:** The liver is a suitable tissue platform for correcting metabolic disorders characterised by deficient secretion of specific systemic proteins, e.g. insulin and coagulation factor VIII. We investigated in vivo electroporation of naked plasmid DNA as a safe and effective non-viral method of gene transfer to the liver.

**Methods:** We investigated field strength, pulse duration, pulse number, electrical waveforms, electrode contact area, plasmid administration routes and injection technique for their effects on electrotransfer of reporter genes into murine liver. Optimised conditions were used to achieve hepatic expression of insulin in streptozotocin-diabetic mice and factor VIII in haemophilic mice.

**Results:** Optimal electrotransfer occurred when plasmid DNA was injected into a systemic vein, e.g. tail vein, followed immediately by electroporation of mouse liver at 250 V/cm and 8 unipolar pulses of 20 ms each. Electrotransfer also occurred in liver lobes that were not directly electroporated, the extent of which was dependent on electrode contact area. We developed a modified injection technique (injection volume 4% of body weight and injection speed 5 s) which, when combined with electroporation of factor VIII cDNA or insulin cDNA, greatly improved electrotransfer efficiency and was sufficient to cause significant phenotypic correction in haemophilic mice and increased plasma insulin in diabetic mice, respectively.

**Conclusion:** In vivo electrotransfer to liver achieved significant phenotypic correction of haemophilic mice and partial reconstitution of insulin deficiency in diabetic mice. Further improvements are needed to prolong and increase transgene expression before this technique can be considered in the treatment of metabolic diseases.

**BAS150**

**Clinical-Genomic Correlations of Gastric Cancer**

**MEH TAN<sup>1</sup>, SH LEONG<sup>1</sup>, OL KON<sup>1</sup>**

<sup>1</sup>Research Divisions - Medical Sciences, National Cancer Centre, Singapore

**Aim:** Alterations in genomic DNA copy number and gene expression are key in human carcinogenesis. We set out to determine clinical correlations of copy number aberrations and transcriptional changes in gastric cancer.

**Methods:** We characterised genome copy number aberrations of 213 gastric adenocarcinomas (<http://progenetix.net>) by clinical stage and clustered them using SOTA (Self Organizing Tree Analysis, Expression Profiler @ EBI). We compared survivorship of a subset of 55 gastric cancer patients classified by copy number patterns using the Kaplan-Meier method. Transcriptional profiles of these 55 patients were segregated by clinical stage. Genes that were differentially expressed ( $\geq 2$ -fold) were mapped to cytobands (<http://genome-www5.stanford.edu/cgi-bin/source/sourceSearch> and Gene Ontology). For each clinical stage, we compared genomic regions of gains and losses with cytobands to which highly differentially expressed genes were mapped. Genes in chromosomal regions of interest were linked to functional pathways (PubMed, GeneMapps and KEGG).

**Results:** Gastric cancers of all clinical stages had amplifications of chromosomes 8q and 20. Stage 1 tumours also had 5q deletion, 7p and 13q amplifications. SOTA classified gastric cancers into 2 clusters based on copy number aberrations. Changes in 1p, 16p, 17p, 18q, 19p and 22p were common to both clusters. 16p amplification correlated with significantly shorter survival ( $P = 0.0102$ ). Eight genes in 16p were highly expressed in at least 25% of gastric cancers.

**Conclusion:** Gastric cancers can be clustered based on genomic abnormalities. We identified 16p amplification as a marker of poorer prognosis. This chromosomal region also harbours several genes that are highly expressed in gastric cancers.

**BAS151**

**Baseline Colour-coded Tissue Doppler Values for Healthy Swine Models**

**MM DAW<sup>1</sup>, W SHIM<sup>1</sup>, CK POH<sup>1</sup>, K GUNASEGARAN<sup>2</sup>, P WONG<sup>3</sup>**

<sup>1</sup>Research Laboratory, <sup>2</sup>Cardiac Laboratory, <sup>3</sup>Catheterisation Laboratory, National Heart Centre, Singapore

**Aim:** The purpose of this study was to compare endocardial velocities determined from colour-coded tissue Doppler imaging (TDI) with those from mid-myocardial and epicardial levels and to assess the range of myocardial velocities in healthy swine.

**Method:** In 30 swine, myocardial wall velocities of anteroseptal and inferoposterior wall from parasternal short-axis (PSAX) views were measured.

**Results:** The mean systolic (Sm) and early diastolic (E') myocardial wall velocities of the anteroseptal wall from endocardium were significantly lower than those of the inferoposterior wall. For the anteroseptal wall, the range of Sm was 0.95 to 3.96 cm/s in the endocardium, 0.61 to 3.46 cm/s in the mid-cardium and 0.54 to 3.12 cm/s in epicardium. For the same wall, the E' velocities from endocardium to epicardium were  $2.94 \pm 1.72$  cm/s,  $2.52 \pm 1.34$  cm/s and  $2.28 \pm 1.46$  cm/s. The Sm velocities for the inferoposterior wall from endocardium to epicardium were 1.76 to 4.55 cm/s, 1.83 to 4.12 cm/s and 1.53 to 3.91 cm/s, respectively. Similarly, the E' velocity for the same segment were  $8.14 \pm 2.04$  cm/s,  $7.75 \pm 2.05$  cm/s and  $6.15 \pm 2.81$  cm/s. The endocardial velocities were highest ( $P < 0.001$ ) and no significant difference were found between mid-cardium and epicardium level ( $P = ns$ ).

**Conclusion:** From our data, we can conclude that both Sm and E' velocities have heterogeneous distribution at different levels within the myocardium. This study provides insight in understanding of ischemic and nonischemic myopathic processes by comparing the normal values to the abnormal values.

**BAS152**

**Optimisation of Targeted Gene Repair Strategy in Dystrophin Gene Using 2'OMe-S Oligonucleotides**

**ZAD PRAMONO<sup>1</sup>, CC LIM<sup>1</sup>, CL TAN<sup>1</sup>, WC YEE<sup>1</sup>, PS LAI<sup>2</sup>**

<sup>1</sup>Neuroscience Research, National Neuroscience Institute, Singapore, <sup>2</sup>Paediatrics, National University Hospital, Singapore

**Aim:** Despite limitations due to inefficient homologous recombination events in mammalian cells, targeted gene repair involving stem cells remains an important therapeutic strategy. In this study, we aimed to induce targeted gene repair in the dystrophin gene of 2 DMD patient lymphoblastoid cell lines using 2'OMe-S oligonucleotides.

**Methods:** Two DMD patients cell lines with exons 48-52 deletions and exon 50 deletion were used in the study. Five 2'OMe-S-oligos were designed to introduce a single nucleotide in exon 47 (grDMD47) or 53 (grDMD53) respectively for the first cell line, and exon 49 (grDMD49) or 51 (grDMD51-1 and grDMD51-2) respectively for the second cell line. The cells were treated with the oligos in sets of experiment with 4 and 8 rounds of transfections with different time courses. Cells were harvested for DNA isolation and allele specific PCR employed to assess the results.

**Results:** Nine DNA samples were obtained, 1 sample each from cells treated with grDMD49, grDMD51-1 and grDMD51-2 respectively, and 3 samples each from cells treated with grDMD47 and grDMD53, respectively. Using allele specific PCR that will amplify only repaired DNA with single nucleotide inserted in the targeted chromosomal DNA site, we could not detect any PCR product from all 9 samples.

**Conclusion:** The inefficiency of targeted gene repair observed in this study could be due to several reasons, i.e. sub-optimal oligo sequence or modification, and sub-optimal experimental conditions such as oligos concentration, oligo/Lipofectamine ratio and time course. Further optimisation addressing the above aspects is in process to achieve our aims.

**BAS153**

**Studies of Wilm's Tumour (WT1) Gene Expression in Adult Acute Leukaemias**

**CK LIM<sup>1</sup>, YT GOH<sup>2</sup>, LP HO<sup>3</sup>, L SUN<sup>1</sup>**

<sup>1</sup>Clinical Research, <sup>2</sup>Haematology, <sup>3</sup>Pathology, Singapore General Hospital, Singapore

**Aim:** To explore the expression of WT1 gene in adult patients with acute leukaemia (AL) and its clinical implications.

**Methods:** Peripheral blood (PB) samples from AL patients were collected. Total RNA and DNA were extracted from PB MNC. Expression of WT1 was detected by nested reverse transcription-polymerase chain reaction (nested RT-PCR), including 3 cell lines (K562, Jurkat and 3T3 as control), 18 AL patients and 1 healthy subject (as normal control).

**Results:** WT1 gene was over-expressed in all 18 leukaemia patients, including 3 acute lymphoblastic leukaemia (ALL) and 15 acute myeloid leukaemia (AML), consisting of different subtypes when compared to the normal healthy control.

**Conclusion:** WT1 gene expression is associated with pathogenesis of AL. Real time PCR is currently being carried out as a quantitative method using WT1 as a molecular marker in patients with AL.

**BAS154**

**Whole Genome Expression Profiling for Differentially Expressed Genes in Young Colorectal Cancer Patients without Dominant Family History**

**Y HONG<sup>1</sup>, KS HO<sup>1</sup>, KW EU<sup>1</sup>, PY CHEAH<sup>1</sup>**

<sup>1</sup>Colorectal Surgery, Singapore General Hospital, Singapore

**Aim:** Colorectal cancer (CRC) is the second leading cause of cancer death in Singapore. Up to 35% of CRC incidence can be attributed to genetic predisposition. Only about 10% can be accounted for by the autosomal

dominantly inherited familial adenomatous polyposis (FAP) and hereditary non-polyposis colorectal cancer (HNPCC) syndromes. At least another 20% are young patients whose genetic predisposition is currently unknown. We aimed to identify genes differentially expressed between young non-FAP, non-HNPCC patients and age- and ethnicity-matched healthy controls.

**Method:** Whole genome expression profiling using Affymetrix HG U133 plus 2.0 Genechip arrays was performed on a subset of young (aged 50 or less), non-FAP, non-HNPCC Chinese patients with cyclin D1G870A polymorphism data impacting on early onset and disease-specific survival. These patients did not have clinical phenotypes that fit the Bethesda criteria for HNPCC and had three or less polyps in their colon and hence are non-FAP. Their tumours were microsatellite stable.

**Results:** Preliminary data from data mining tool and Spotfire software analysis indicated that approximately 3000 genes (10% of the genome) were differentially expressed between patients' mucosa and mucosa of healthy controls. Further analysis identified 7 consistently up-regulated genes that are involved in various biological processes in diverse cellular compartments. The 7 genes have been validated by SYBR Green quantitative reverse transcriptase polymerase chain reaction (RT-PCR) technique.

**Conclusion:** We have found a susceptibility signature for young CRC patients without dominant family history. This 7-gene signature is potentially useful for presymptomatic detection of early onset CRC.

### BAS155

#### Anticancer Effect of Plant Polyphenols: 2,2'-dihydroxychalcone and 2'-hydroxy-4-methyl-chalcone on Human Tumour Cells

WL LEE<sup>1</sup>, K ZHANG<sup>1</sup>, PKH CHOW<sup>1</sup>

<sup>1</sup>Experimental Surgery, Singapore General Hospital, Singapore

**Aim:** In our previous study, anticancer activity of 78 different plant polyphenols were screened in human liver tumour cells and 2,2'-dihydroxychalcone and 2'-hydroxy-4-methyl-chalcone were found to be the most potent polyphenols for inhibition of the tumour cells. As an extension of that study, we investigated anticancer activity of these 2 chalcones on a variety of human cancer cells, including colon, breast and pancreatic cancer cells.

**Methods:** Cell growth inhibition in vitro was analysed using a colorimetric MTT screening method and cell growth in vivo was assessed by tumour volumetrics. Cell cycle progression and apoptosis were studied by flow cytometry, DNA ladder analysis and Western blotting

**Results:** Growth of these cancer cells in vitro were inhibited by the 2 chalcones significantly. In a study with a colon cancer cell line, 220.1, IC50 values of 11.8 and 23.3  $\mu$ M were obtained for 2,2' dihydroxychalcone and 2'-hydroxyl-4-methyl-chalcone, respectively. Similar results were observed in a breast cancer cell line, MCF 7 and a colon adenocarcinoma cell line, CaCo2 (MCF7: IC 50 values were 41.9 and 51.7  $\mu$ M; CaCo2: IC50 values were 36.8 and 43.7  $\mu$ M).

**Conclusion:** These data implicate that the potencies of these 2 chalcones are not limited to a specific cell line but more generally to a wide variety of cancer cells. Our study showed that CDC2 protein level in HepG2 cells were not affected by treatments with 2,2'-dihydroxychalcone and 2'-hydroxy-4-methyl-chalcone. It is our hypothesis that the 2 chalcones may inhibit CDC2 kinase activity directly, inducing G2 arrest; this is currently under study in our laboratory.

### BAS156

#### Stable Knockdown of RSK Genes in Breast Cancer Cells by RNAi Retro-viruses

K ZHANG<sup>1</sup>, WL LEE<sup>1</sup>, J BLENIS<sup>2</sup>, PKH CHOW<sup>1</sup>

<sup>1</sup>Experimental Surgery, Singapore General Hospital, Singapore, <sup>2</sup>Cell Biology, Harvard Medical School, USA

**Aim:** The 90-kDa ribosomal S6 kinases (RSKs) are serine kinases that are activated by growth factors and many polypeptide hormones via the Ras-Erk pathway. In this study, RNAi retro-viruses were used to stably knockdown RSK genes to characterise the functions of these genes in ERK pathway

mediated cellular processes.

**Methods:** RNAi retro-viruses were prepared by transfection of shRNA constructs specific for RSK 1 to 4 into GP2 293 packaging cells. Breast cancer cell lines MCF 7 and MDA-MB-231 were infected with the RNAi retro-viruses and selected with puromycin.

**Results:** The puromycin-selected MCF7 and MDA-MB-231 cells were analysed for expression of RSK 1 to 4 by Western blotting. Expression of RSK 1 and RSK 2 were significantly reduced by infection of the RNAi viruses in both MCF7 and MDA-MB-231 cells. Three months later, the RSK protein levels in these cells were determined again by Western blotting and this study showed stable knockdown of RSK 1 and RSK 2 genes. When compared to control, analysis of RSK mRNA levels by real time RT-PCR showed -7 and -4.5 fold changes of RSK 1 and RSK 2 mRNA respectively in MCF 7 cells and -17 and -9 fold changes of RSK 1 and RSK 2 mRNA respectively in MDA-MB-231 cells.

**Conclusion:** Stable knockdown of RSK 1 and RSK 2 genes were obtained in MCF7 and MDA-MB-231 cells by RNAi retro-viruses. The effects of knockdown of these genes on cell proliferation and migration are currently being studied in our laboratory.

### BAS157

#### Emergence of Epidemic Clones of Vancomycin-resistant *Enterococcus faecium* in Singapore

TH KOH<sup>1</sup>, LY HSU<sup>2</sup>, LL CHIU<sup>3</sup>, RVTP LIN<sup>3</sup>

<sup>1</sup>Pathology, <sup>2</sup>Internal Medicine, Singapore General Hospital, Singapore,

<sup>3</sup>Laboratory Medicine, National University Hospital, Singapore

**Aim:** To use molecular methods to characterise outbreak strains of vancomycin-resistant *Enterococcus faecium* isolated in the Singapore General Hospital.

**Methods:** Representatives of epidemic strains of VRE were characterised using pulsed-field gel electrophoresis, variable number tandem repeats and multi-locus sequence typing. The presence of the virulence genes esp and hyl were sought by PCR.

**Results:** Four outbreak clones were distinguished by pulsed-field gel electrophoresis. Clone A (esp+/hyl-, ST17), Clone B (esp+/hyl+, ST18), and Clone D (esp+/hyl-, novel ST type 1-3-1-1-1-1), all had the same VNTR profile 573323. Clone C (esp-/hyl-, ST117) had VNTR profile 573222.

**Conclusion:** The epidemic strains of VRE isolated in Singapore all belong to a distinct genetic lineage of *E. faecium* (complex-17) responsible for hospital outbreaks worldwide.

### BAS158

#### Experience with the Roche Lightcycler VRE Detection Kit for Rapid Screening for Vancomycin-resistant Enterococci

TH KOH<sup>1</sup>, RVTP LIN<sup>2</sup>, E KOAY<sup>2</sup>

<sup>1</sup>Pathology, Singapore General Hospital, Singapore, <sup>2</sup>Laboratory Medicine, National University Hospital, Singapore

**Aim:** To correlate results from real time PCR (RT-PCR) detection of vanA/vanB in broth inoculated with stool with broth subculture.

**Methods:** Stool was inoculated into Enterococcosel broth with 8 mg/L vancomycin. Broths that changed colour after 24 hours incubation were tested for the presence of vanA/vanB genes by RT-PCR at 2 sites (without duplication). The broth was subcultured onto blood agar and Enterococcosel agar containing 6 mg/L vancomycin at time of RT-PCR testing and again at least 1 week later.

**Results:** Ninety broths were positive by RT-PCR. VRE was subcultured from 26 broths. In 15 additional cases, VRE was isolated from a separate culture request.

**Conclusion:** In our experience, only 46% of RT-PCR positive results are correlated with successful culture of VRE. This could be because the load of VRE was below the threshold for subculture or the inadvertent detection of van elements in other gut bacteria.



**BAS159**

**Ad Hoc Analysis of Genome-wide Gene Expressions in IgA Nephropathy**

**YK LAU<sup>1</sup>, KT WOO<sup>1</sup>, Y ZHAO<sup>2</sup>, KY PUONG<sup>2</sup>, SE AW<sup>2</sup>, KS WONG<sup>1</sup>**

<sup>1</sup>Renal Medicine, Singapore General Hospital, Singapore, <sup>2</sup>Clinical Research, Singapore General Hospital, Singapore

**Aim:** In this study, we examined 7 IgAN patients and 7 normal subjects for genome-wide gene expressions. The Human Genome U133 Plus 2.0 Arrays (Affymetrix, USA) were used to quantitate the differential expression of 38,500 well-characterised human genes.

**Methods:** Leukocytes RNA was isolated from whole blood by PAXgene Blood RNA Kit. RNA isolates were purified with DNase to remove contaminating DNA. Target preparation, target hybridisation, probe array washing and staining, probe array scan and analysis were done according to manufacturer procedures.

**Results:** A total of 7761 gene expressions were identified to have an IgAN/normal gene expression ratio of 0.06-fold to 5.58-fold (213 with ratio  $\geq 2.0$ -fold and 244 with ratio  $\leq 0.2$ -fold). About 30% of the altered gene expressions have no gene title or just a hypothetical protein label such as FLJ30679. Most of the remaining 70% are identified proteins such as the most up-regulated gene, activated leukocyte cell adhesion molecule which is implicated in tumorigenesis but whose importance and relevance to IgAN are not apparent. Preliminary ad hoc analysis revealed uterensin II (U2) which was up-regulated 3.09-fold, 569  $\pm$  405 versus 1761  $\pm$  1124 arbitrary units,  $P < 0.05$ . Fatty-acid binding protein 6 was down-regulated to 0.12-fold,  $P < 0.05$ . Retinoic acid receptor alpha (RAR $\alpha$ ) was down-regulated (561  $\pm$  227 versus 231  $\pm$  77 arbitrary units,  $P < 0.01$ ).

**Conclusion:** Preliminary ad hoc analysis of genome-wide gene expressions in IgAN had pointed to possible involvement of uterensin II, disturbance in lipid metabolism and vitamin A deficiency in the aetiology and pathogenesis of the renal lesion.

**BAS160**

**ACE Gene Sequence, Nucleotide Variants, Haplotypes and Disease Progression in IgA Nephropathy**

**KT WOO<sup>1</sup>, YK LAU<sup>1</sup>, Y ZHAO<sup>2</sup>, HB TAN<sup>1</sup>, S FOOK-CHONG<sup>2</sup>, EK TAN<sup>2</sup>, KS WONG<sup>1</sup>**

<sup>1</sup>Renal Medical, <sup>2</sup>Clinical Research, Singapore General Hospital, Singapore

**Aim:** The ACE gene sequence was determined in 20 IgAN patients and 4 normal subjects.

**Methods:** Leukocyte DNA was amplified by PCR with 36 overlapping primer sets that spanned the whole ACE gene. Amplicons were sequenced using BigDye Terminator cycle. Nucleotide variants were identified and haplotypes inferred using Clark's algorithm.

**Results:** IgAN patients showed 53 variants, 17 were unique. Normals had 38 variants and 2 were unique ( $P < 0.005$ ). No unique variant was significant as a risk factor for IgAN. Eleven variants were in absolute linkage disequilibrium with the Alu variant. Stratification of the 20 IgAN patients showed that progression to end-stage renal failure (ESRF) was not predicted by age at biopsy, severity of initial proteinuria or years of follow-up. Patients with impaired renal function (IRF) and ESRF had similar initial serum creatinine levels that were significantly higher than in patients with normal renal function (NRF). Significant genotype and allele frequency differences in the variants 11447 G>A, 13230 A>G, 14094 I>D, 14521 A>G and 15214 G>A, were observed between IRF and ESRF patients ( $P < 0.02$ ) but not between NRF and ESRF patients. These variants in IRF patients appear to be risk factors for progression to ESRF. Among 6 haplotypes inferred from these 5 variants, 2 showed significant count difference between IRF and ESRF patients (odds ratios 14.0,  $P < 0.02$  and 0.07,  $P < 0.02$ ). However, all 5 variants, when analysed alone, showed similar significance (odds ratios range, 0.12 to 14.0 and  $P$  values range,  $< 0.05$  to  $< 0.02$ ).

**Conclusion:** Fifty-five variants were found, 19 were unique but none was significant risk factor for developing the IgAN. Eleven variants in absolute linkage may replace the Alu I/D as genetic marker. At least in the ACE gene,

haplotypes construct within a single gene seems to have no added advantage over genotyping the individual component SNPs for predicting progression to ESRF.

**BAS161**

**Expression of Vascular Endothelial Growth Factor 165b in Transitional Cell Carcinoma of Bladder**

**K DAS<sup>1</sup>**

<sup>1</sup>Urology, Singapore General Hospital, Singapore

**Aim:** Vascular endothelial growth factors (VEGF) play a pivotal role in tumour angiogenesis. A novel isoform, VEGF165b, containing a novel exon, exon9, was recently identified in renal cell carcinoma and was shown to be down-regulated. We studied the differential expression of this novel isoform in patients with superficial bladder carcinoma.

**Methods:** Tumour tissues and corresponding non-malignant tissues were harvested from transurethral resection of bladder tumor (TURBT) of 24 patients with superficial bladder carcinoma. Total RNA was extracted and cDNA (complementary DNA) synthesised using reverse transcriptase. Since VEGF165b contains exon 9, specific primers were designed to detect exon9 and amplified by real-time quantitative PCR. Housekeeping gene, beta-actin, served as internal control. Identity of the amplicon was confirmed by sequencing. Comparative (Ct) values of internal control, tumour and normal samples were determined and results analysed. Ct method for relative quantitation of gene expression was used to determine the differential expression of VEGF165b in malignant and non-malignant tissues.

**Results:** VEGF165b was present in all 24 non-malignant bladder samples and also in all 24 cases from matched tumour tissues. VEGF165b expression in tumour was more than in normal tissues, although this was not statistically significant ( $P = 0.092$ ). Increased expression of VEGF165b was observed in Grade 3 and pT2-3 stages of transitional cell carcinoma of bladder cases (median Ct value was 6.06 as compared to 2.3 in stages T1 and Grade 1-2).

**Conclusion:** VEGF165b showed an increased mRNA expression in tumour than in normal tissues. Hence, it is not down-regulated as in renal cell carcinoma.

**BAS162**

**Epithelial Wound Healing in the Rabbit Conjunctiva**

**X ZHU<sup>1</sup>, RW BEUERMAN<sup>2</sup>, ZY CHENG<sup>2</sup>, LPK ANG<sup>2</sup>, DTH TAN<sup>2</sup>**

<sup>1</sup>Corneal and External Eye Disease Service, Singapore National Eye Centre, Singapore, <sup>2</sup>Ophthalmology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** To understand the process of conjunctival epithelial wound healing in the rabbit eye and to establish an experimental baseline for evaluating the wound recovery process in ocular surface regeneration.

**Method:** Circular 4- and 5-mm diameter wounds were mechanically created over the upper quadrant of the conjunctiva in the rabbit eye. A total of 12 rabbit eyes were assessed, with 4-mm wounds in 6 eyes and 5-mm wounds in 6 eyes. Kinetic analysis of conjunctival epithelial wound healing was monitored by sequential slit-lamp examinations with fluorescein staining. Wound area (mm<sup>2</sup>/day) was measured by topographic templates and digitised with image analysis software. The record of wound closure assessment was performed at 48-hour intervals until full re-epithelisation was noted.

**Results:** Epithelial wound closure of the conjunctival defects was noted to be rapid and complete in all cases. A consistent initial 24-hour latent phase in defect closure was noted immediately following surgery, in which minimal wound closure occurred. Thereafter, wound closure proceeded linearly at a relatively rapid pace over 2 to 5 days, suggesting a secondary linear healing phase. The healing rate of epithelia in this linear phase was 3.16  $\pm$  0.17 mm<sup>2</sup> per day. Similar latent and linear phases were found in both 4-mm and 5-mm defect study groups.

**Conclusion:** This study demonstrates conjunctival wound healing in the rabbit eye occurs as a biphasic process similar to what has been previously reported in corneal wound healing. This process did not appear to be influenced by initial wound size.

**BAS163****Functional Expression of Toll-like Receptors on Ocular Surface****J LI<sup>1</sup>, JB SHEN<sup>1</sup>, D TAN<sup>2</sup>, R BEUERMAN<sup>2</sup>**<sup>1</sup>Ocular Inflammation and Immunology Service, Singapore National Eye Centre, Singapore, <sup>2</sup>Ophthalmology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** Toll-like receptors (TLR) are a family of pattern-recognition receptors that detect the conserved molecular products of microorganisms. They play an important role in innate immune response against microbial infection. This study has investigated the expression and function of TLR on human ocular surface epithelial cells.

**Methods:** Normal bulbar conjunctival (Cj) RNA was extracted from human impression cytology. Corneal RNA was extracted from cells collected by laser-aided micro-cell dissection (PALM) of cadaver cornea tissue. Cultured human Cj and limbal epithelial cells were obtained by dispase digestion of donor tissue. TLR expression was analysed by comparative Taqman real time PCR, immunohistochemistry and Western blot analysis. TLR-mediated NFkB activation and interleukin secretion was analysed by ELISA in cultured cells.

**Results:** Of the 10 members of TLRs, TLR 1, 2, 3 and 5 were consistently found expressed in cornea, limbal and Cj epithelial cells in vivo by real time PCR and immunofluorescent staining. Cultured limbal and Cj epithelial cells also expressed TLR 4 and 9 in addition to those mentioned above as confirmed by real time PCR and Western blot analysis. Upon stimulation with specific ligands to each expressed TLRs, increased IL-6/8 secretion was observed in cultured limbal and Cj cells, which can be effectively blocked by preincubating cells with antibody against the corresponding receptor. Stimulation with ligands also led to the activation of NFkB in cultured cells.

**Conclusion:** The functional expression of multiple TLRs indicated the existence of a complicated defense system against microbial infections in human ocular surface epithelial cells.

**BAS164****Proteomic Analysis Revealed Defensin Levels in Tear Fluid after an Experimental Corneal Wound in the Rabbit are Correlated with Wound Healing****L ZHOU<sup>1</sup>, RW BEUERMAN<sup>2</sup>, SP LIU<sup>1</sup>, A BARATHI<sup>1</sup>, YH FOO<sup>1</sup>, D TAN<sup>3</sup>**<sup>1</sup>Para-medical/Allied Health Services, Singapore National Eye Centre, Singapore, <sup>2</sup>Ophthalmology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>3</sup>Corneal and External Eye Disease Service, Singapore National Eye Centre, Singapore

**Aim:** The corneal epithelium is a barrier for preventing attacks from environmental pathogens. Despite recent advances in understanding corneal wound healing, much work remains to be done to identify signalling components found in tears during wound healing. The aim of the present study was to identify tear protein profile changes prior to and during the critical 5 days after a wound when the cornea is in re-epithelisation.

**Methods:** Tears were collected from New Zealand White rabbits prior to and daily for 5 days following a standard unilateral 8-mm diameter corneal epithelial abrasion. Tear protein profiles obtained from wounded and control eyes were compared using proteomic approaches, SELDI ProteinChip technology (on NP20 hydrophilic surface chips) and LC-MS. Two microlitres of rabbit tears were used for each analysis. Peptides and proteins of interest were purified by HPLC and further characterised by nanoLC-ESI-MS/MS.

**Results:** The general pattern of the tear protein profile was also correlated with the progress of re-epithelisation. An important finding was that the levels of some of rabbit defensins (NP-1 and NP-2) were elevated after wounding and returned to normal levels when cornea epithelium healing was completed. Specifically, NP-1 and NP-2 levels in rabbit tears were estimated by SELDI to be 5 to 20 times and 4 to 12 times higher than basal levels respectively, after corneal wounding.

**Conclusion:** The marked increase of the levels of selected defensins in tear fluids after corneal wounding suggested these peptides play an important role in protecting the cornea from microbial attack and may also modulate wound-healing processes as well.

**BAS165****PINK1 Mutations in Sporadic Early Onset Parkinson's Disease****E CHUA<sup>1</sup>, E LEE<sup>2</sup>, EK TAN<sup>3</sup>, H SHEN<sup>4</sup>**<sup>1</sup>Neurology, SingHealth HQ, Singapore, <sup>2</sup>Diagnostic Radiology, <sup>3</sup>Clinical Research, Singapore General Hospital, Singapore, <sup>4</sup>Research, SingHealth HQ, Singapore

**Aim:** To report the frequency of PINK1 mutations of early onset Parkinson's disease (EOPD) in an Asian cohort comprising ethnic Chinese, Malays and Indians and to expand the phenotypic spectrum associated with PINK1-positive patients.

**Methods:** Eighty consecutive sporadic EOPD patients from the movement disorder clinics of 2 major tertiary institutions in the country were included. Sequence analysis of all coding and exon-intron junctions of PINK1 was carried out using specific primer sets.

**Results:** Three different novel mutations in the putative kinase domain were found in 3 patients, giving a 3.9% frequency of PINK1 mutations in the EOPD cohort. All mutations were absent in 200 healthy controls. One patient with a novel homozygous nonsense PINK1 mutation in exon 3 (C99A), which leads to a truncated PINK1 protein, presented with restless legs syndrome.

**Conclusion:** We report a 3.9% frequency of PINK1 mutations in an Asian cohort of EOPD. The phenotypic spectrum associated with PINK1-positive patients may be wider than previously expected.

**BAS166****Biochemical Characterisation of Variants of Ku86 in Multiple Myeloma Cells****F GE<sup>1</sup>, G COW<sup>1</sup>, C GULLO<sup>2</sup>, G TEOH<sup>3</sup>**<sup>1</sup>Research, SingHealth HQ, Singapore, <sup>2</sup>Clinical Research, <sup>3</sup>Haematology, Singapore General Hospital, Singapore

**Aim:** The Ku autoantigen has been implicated in regulation of growth control, immunoglobulin gene rearrangement and DNA repair. A truncated form of Ku86, lacking the C terminus, with an apparent molecular weight of 69 kDa, has been reported to be present in several human cell types, including multiple myeloma (MM). The aim of this study is to characterise further this 69 kDa variant of Ku and describe a new 56 kDa variant of Ku and to ascertain the functional consequence of such variants.

**Methods:** Biochemical assays including Western and Northern Blotting, and immunoprecipitation and cell fractionation studies were performed to address the aims.

**Results:** We confirmed that in HL60 and MM cells, the variant form of Ku86 existed in vivo and was not a result of in vitro cleavage. We found that MM cells containing Ku86 protein variants did not express additional shorter mRNAs, suggesting a post-transcriptional mechanism may be responsible for Ku86 variant formation. Furthermore, 56-kDa variant form of Ku86 was identified using antibodies that target the Ku86 C terminus in MM cell lines, suggesting that this new variant form has a truncated N terminus.

**Conclusion:** Presently, the mechanisms that contributed to the expression of the Ku86 variants are not clear. A series of experiments are being performed to explore the function of these truncated variants in MM cell lines. Variants of Ku86 could result in disrupted DNA repair and lead to genomic instability in MM cells and these novel forms of Ku are poised to serve as a source of tumour antigens in MM.

**GP167**

**Asthma Prescription Pattern: A Predictor of Asthma Control in Primary Care**

**PN CHONG<sup>1</sup>, CL LEE<sup>2</sup>, M ZHU<sup>3</sup>, TK LIM<sup>4</sup>**

<sup>1</sup>Medical, <sup>2</sup>Nursing/Paramedical, National Healthcare Group Polyclinics, Singapore, <sup>3</sup>Statistics, Clinical Trials and Epidemiology Research Unit, Singapore, <sup>4</sup>Medicine, National University Hospital, Singapore

**Aim:** To determine if the asthma prescription pattern of doctors is a good predictor of asthma management outcomes.

**Methods:** The asthma prescription pattern, i.e. preventor versus reliever drug ratio (P:R ratio), is computed by measuring the total number of units of anti-inflammatory drugs such as steroid inhalers against the total number of reliever drugs such as the salbutamol inhalers prescribed by doctors for all asthmatic patients in a clinic. This is compared with nebuliser rate (number of patients being nebulised for acute asthma/total number of attending asthma patients). This reflects the quality of asthma control in the clinic. The data were collected monthly from the Patient Management Patient Accounting system and iPharm (NHG Pharmacy's electronic system) for all 9 National Healthcare Group Polyclinics from October 2004 to May 2005.

**Results:** The correlation between the P:R ratios and the nebuliser rates of all 9 clinics is significant ( $P < 0.01$ ) with Pearson correlation =  $-0.67$ . Thus, patients managed in clinics that showed a higher pattern of preventor medication use experienced lower rates of nebulisation, reflecting better asthma control.

**Conclusion:** The asthma prescription pattern is a good predictor for asthma outcomes. Hence, it is important to encourage the prescription of preventor drug over reliever drug amongst doctors for better asthma control and outcomes in primary care.

**GP168**

**Prevalence of Foot Complications among Diabetic Patients in Toa Payoh Polyclinic**

**H LEONG<sup>1</sup>, K NG<sup>1</sup>, DD PREZ<sup>2</sup>, YK LAI<sup>3</sup>, FS LIM<sup>1</sup>, S EMMANUEL<sup>1</sup>**

<sup>1</sup>Medical, National Healthcare Group Polyclinics, Singapore, <sup>2</sup>Private Podiatrist, Singapore, <sup>3</sup>Nursing/Paramedical, National Healthcare Group Polyclinics, Singapore

**Aim:** To study the prevalence of foot complications among diabetic patients in Toa Payoh Polyclinic.

**Methods:** All diabetic patients were referred to the Diabetes Foot Screening (DFS) nurses trained by podiatrists to: a) inspect foot for discolouration, infection, dystrophied nails, deformities and ulcers; b) assess vibration sensation using neurothesiometer and touch sensation using 10-g monofilament; c) palpate pulses; and when vasculopathy was suspected, ankle-brachial index was measured using Doppler scan. Patients were referred to the podiatrist for abnormalities such as corns, callosities, fungal infection, loss of touch/vibration sense, weak pulses and small ulcers. Patients with severe ischaemia, infection and large ulcers would be reviewed by the doctors.

**Results:** From January to September 2004, 4471 patients had foot screening. Of these, 11.7% were referred to the podiatrist and 2.7% to the polyclinic doctors. Among those referred to the podiatrist, 5.8% had complications such as ulcers, vasculopathy, neuropathy and 21.1% had conditions such as callosities, corns, infection and ingrown toe nails. Only 0.3% had past history of toe, below knee or above knee amputation. Among patients who did not require referral, 34.7% had HbA1c  $\leq 7\%$ . In contrast, 30.3% among those who needed referral had HbA1c  $\leq 7\%$  ( $P = 0.028$ , chi-square test, odds ratio (OR) = 1.225, 95% confidence interval for OR: 3.84 to 6.33).

**Conclusion:** Prevalence of diabetic foot complications was low at 5.8%. However, 21% of the patients had conditions such as callosities, which predisposed them to developing foot ulcers. Good glycaemic control reduced the risk of having foot complications.

**GP169**

**Instituting Warfarin Monitoring Protocol in Primary Care**

**YJ LEW<sup>1</sup>**

<sup>1</sup>Medical, National Healthcare Group Polyclinics, Singapore

**Aim:** To demonstrate the effectiveness of the warfarin monitoring protocol in a primary care setting, for patients who are discharged from hospitals on long-term warfarin medication.

**Methods:** The warfarin protocol was introduced to National Healthcare Group (NHG) Polyclinics in 2002, in consultation with neurologists and cardiologists in the cluster hospitals, as well as pharmacists in the hospitals' anti-coagulation clinics. These patients were seen by senior doctors in the polyclinics, who have experience in titrating the warfarin dosages based on the international normalised ratio (INR). They go for INR testing every 3 months or less. Medical Affairs conducts 6-monthly audits of these patients. The polyclinic heads randomly selected 20 of such cases, and noted the frequency of the INR tests, and decided if the INR results were within the recommended range.

**Results:** Five audits were conducted since 2003. The majority of the patients had the underlying condition of atrial fibrillation ( $>68\%$ ). Other conditions that required the use of warfarin included valve defects or replacement, CVA with IHD, and cardiomyopathy. Almost all clinics sent their warfarin patients for INR testing in every 3 months or less. All the clinics are able to maintain the INR levels within the recommended range (2 to 3) in 75% of their patients.

**Conclusion:** The warfarin monitoring protocol in NHG Polyclinics adopts the anticoagulation protocol from the hospitals' Anticoagulation Clinics. This is to enable primary care doctors to effectively manage the patients on warfarin, who are discharged from hospitals to the primary care.

**GP170**

**Knowledge, Attitude and Beliefs of Adolescents in Singapore Towards Acne**

**FS LIM<sup>1</sup>, M CHEN<sup>2</sup>**

<sup>1</sup>Medical, National Healthcare Group Polyclinics, Singapore, <sup>2</sup>Infectious Disease, Tan Tock Seng Hospital, Singapore

**Aim:** To study the knowledge, attitudes and beliefs (KAB) pertaining to acne among adolescents in Singapore.

**Methods:** Self-administered KAB questionnaires were given to 94 students from a secondary school. Students were examined for acne severity based on number of facial comedones and papulopustules.

**Results:** The students were given a list of possible causes of acne. 33% of them quoted genes, 84% oily complexion, 61.7% hot weather, 60.6% stress, 72.3% oily foods, 66.0% hormones, 23.4% hair creams and 31.9% cosmetics as causes of acne. Similarly, when asked what was effective in reducing pimples, 55.3% quoted avoiding oily foods, 37.2% blotting paper, 63.8% acne creams, 31.9% facials, 31.9% oral antibiotics, 34% other drugs, 66.0% washing face frequently with soap and 6.4% traditional treatments. Acne was observed in 93.6% of the students. None had severe acne. 2.1% were seeing a doctor and 11.7% had seen doctors previously for acne. 42.6% with acne saw no need for treatment. 29.8% squeeze their pimples.

**Conclusion:** There are possible gaps in the knowledge, attitude and beliefs of adolescents towards acne as suggested by this small study. Adolescents will benefit from a focused health education on acne in schools.

**GP171**

**Improving Hypertension Control in National Healthcare Group Polyclinics**

**E TAN<sup>1</sup>, YJ LEW<sup>1</sup>, G DORAISAMY<sup>1</sup>, SK CHEONG<sup>1</sup>**

<sup>1</sup>Medical, National Healthcare Group Polyclinics, Singapore

**Aim:** To improve hypertension control for National Healthcare Group Polyclinic (NHGP) patients through a multi-pronged approach.

**Methods:** Coordinating and synergising the efforts of a healthcare team comprising care managers, doctors, medical social workers and dieticians



have been achieved through structured training programmes and system support. Patient empowerment is promoted through hypertension workshops and support groups. Early diagnosis and treatment of hypertension is aimed for at risk patients through enhanced opportunistic screening. The Collaborative method, as a quality tool in NHGP since August 2003, has allowed identification and spread of good clinical practices amongst its 9 polyclinics. These practices include a personal mentoring system for doctors, optimising drug therapy and personalising patient care. Four 3-day surveys were conducted to assess hypertension control in all 9 polyclinics. The aim is to eventually achieve blood pressures of below 140/90 mm Hg in 80% of non-diabetic hypertensives at all centres.

**Results:** An average of 44.3% of non-diabetic hypertensive patients had achieved blood pressures of below 140/90 mm Hg in August 2003; this rose to 70% in April 2005. In April 2005, mean systolic and diastolic blood pressures for patients under 65 years were 134.6 mm Hg and 82.2 mm Hg, respectively; and 136.9 mm Hg and 79.3 mm Hg respectively for those aged 65 years or more.

**Conclusion:** Improved hypertension control has been achieved in NHGP since 2003 through a variety of strategies. Continued efforts should be made towards achieving the goal of good control in 80% of all hypertensive patients.

## GP172

### The Determinants of Doctors' Professional Satisfaction: A Cross-sectional Study Involving Primary Care Doctors in National Healthcare Group Polyclinics

**Y TAN<sup>1</sup>**

<sup>1</sup>Medical, National Healthcare Group Polyclinics, Singapore

**Aim:** To study the doctor dimension of the doctor-patient relationship (DPR), exploring the barriers and challenges towards a more satisfying practice.

**Methods:** Anonymised questionnaires were sent to all doctors in the National Healthcare Group Polyclinics (NHGP). Questions included the global indices of desired practice and professional satisfaction, exploring the factors influencing the doctor's practice including the main domains of patient-centeredness; and the obstacles to a more satisfying practice.

**Results:** The response rate was 38%. More than 45% of the respondents reported high professional satisfaction. This was found to be strongly correlated with his perception of desired practice ( $r = 0.71, P < 0.001$ ). "Not enough time" was cited by all the respondents as a factor for a less satisfying practice. Other factors which influenced the doctor's satisfaction were years of graduation ( $P = 0.04$ ); a sense of achievement ( $P \leq 0.001$ ), enjoying contact with patients ( $P = 0.02$ ), a sense of fulfillment ( $P < 0.001$ ), meeting aspiration as a doctor ( $P = 0.002$ ) and happy with the remuneration ( $P = 0.043$ ); feeling less frustrated ( $P < 0.001$ ), feel less overwhelmed ( $P = 0.04$ ), feeling less used by the patient ( $P = 0.01$ ) and seeking informed consent for treatment ( $P = 0.043$ ). The obstacle and patient-centered indices were not significantly associated. After adjustment, sense of fulfillment ( $P = 0.046$ ) and seeking informed consent ( $P = 0.03$ ) remained significant.

**Conclusion:** The doctors surveyed had a high level of professional satisfaction. "Seeking informed consent", a patient-centered factor, and positive experiences influenced the doctor's satisfaction. Postgraduate education of doctors should include competencies like time management and negotiation skills; confidence through positive feedback from both trainers and patients; and provision of an inspiration source through good mentoring and role modelling.

## GP173

### Predictors of Nursing Home Admission from a Community Hospital

**KWB KOH<sup>1</sup>, ESL LIM<sup>2</sup>, BY TAN<sup>3</sup>, K AWYONG<sup>3</sup>, J WONG<sup>4</sup>, NP FONG<sup>3</sup>**

<sup>1</sup>Medical, SingHealth Polyclinics, Singapore, <sup>2</sup>Medical Social Work Department, St Luke's Hospital, Singapore, <sup>3</sup>Medical, St Luke's Hospital, Singapore, <sup>4</sup>Medicine, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** The aim of this study is to describe and identify the factors that predispose a nursing home (NH) admission from a general rehabilitation ward in a community hospital.

**Methods:** This is a retrospective case controlled study of 300 patients admitted to St Luke's Hospital in the year 2004 primarily for the purpose of rehabilitation. Almost all of these patients were transferred from acute hospitals. Data obtained during the course of patient stay at the community hospital were extracted from the computer archives and patient case sheets. The main outcome measures are patient discharges to a nursing home or home.

**Results:** The study showed that 106 out of the 1202 live discharges (8.8%) were to a NH. The majority of these patients were Chinese (85.3%), with a mean age of 74 years. NH discharges had a longer length of hospital stay (50.8 versus 39.2 days;  $P < 0.0001$ ). They were more likely to have dementia ( $P < 0.0001$ ), depression ( $P = 0.012$ ), increased functional impairment on admission ( $P < 0.0001$ ), and had a higher number of medications upon discharge ( $P = 0.005$ ). Multiple logistic regression identified impaired cognition ( $P < 0.018$ ) and low socioeconomic status ( $P < 0.001$ ) as independently associated with the risk of having a NH discharge.

**Conclusion:** This is the first local study to analyse the predictors of nursing home admission after a stay in a community hospital. The knowledge of these factors would aid in the right siting of patients and more efficient use of services.

## GP174

### Family Physicians' Behaviour with Personal Protection Equipment during the Outbreak of Severe Acute Respiratory Syndrome in Singapore: Does It Fit the Becker Health Belief Model?

**NC TAN<sup>1</sup>, LG GOH<sup>2</sup>, SS Lee<sup>2</sup>**

<sup>1</sup>Medical, SingHealth Polyclinics, Singapore, <sup>2</sup>College of Family Physicians, Singapore

**Aim:** To explore and understand the family physicians' experience, behaviour and use of personal protection equipment (PPE) in their encounter with probable severe acute respiratory syndrome (SARS) patients. A secondary aim was to determine if the findings could fit into a known health behaviour model.

**Methods:** Qualitative research using standard content analysis of in-depth interviews with 8 family physicians from both the private and public sectors who were exposed to confirmed SARS patients.

**Results:** Family physicians perceived the risk of infection and the benefit of using the mask as absolutely essential. They also spoke of their problems in procuring PPE due to severe shortage during the outbreak and the discomfort and inconvenience associated with their use. Despite increasing operating cost and declining patient attendance and high price of PPE, they continued PPE use. They also noted the initial apprehension of patients at the sight of their PPE, which eased eventually through media education and publicity.

**Conclusion:** The family physicians perceived the mask to be essential PPE, which was effective against the SARS virus. Despite the shortage, cost and discomfort, they continued its use. The behaviour fit well in the Becker Health Belief Model of perceived susceptibility, severity, benefits and barriers. The perceived benefits of PPE in this case outweighed the perceived barriers of shortage, cost and discomfort and doctors continued to wear them.

## GP175

### Environmental Pollution and its Impact on Asthma Exacerbations

**NC TAN<sup>1</sup>, A NGOH<sup>2</sup>, IH TAY<sup>2</sup>, LW KHIN<sup>3</sup>, BC TAI<sup>4</sup>**

<sup>1</sup>Medical, <sup>2</sup>Nursing, SingHealth Polyclinics, Singapore, <sup>3</sup>Epidemiology, Clinical Trials and Epidemiology Research Unit, Singapore, <sup>4</sup>Community, Occupational and Family Medicine, National University of Singapore, Singapore

**Aim:** This study aimed to determine the threshold of asthma exacerbation based on the Pollutant Standards Index (PSI). The PSI is an index of air

pollution as determined by a combination of sulphur dioxide, oxides of nitrogen, ozone, carbon monoxide and particulate matter.

**Methods:** This study is a retrospective epidemiological study correlating weekly average PSI and the corresponding weekly total asthma attendances and asthma exacerbations. These data was retrieved from the SingHealth Polyclinics (SHP) database based on disease coding and the Singapore National Asthma Programme database funded by the Ministry of Health. Logistic regression was used in the data analysis.

**Results:** In 2002, if the adjusted odds ratio (AOR) of acute asthma exacerbation resulting from PSI of between 25 and 37 is 1, AOR = 1.13 for PSI of 38 to 43 and 1.24 for PSI of  $\geq 44$ . In 2004, if the AOR = 1 for baseline PSI of 25 to 37, the AOR = 1.01 for PSI of 38 to 43 and AOR = 0.99 for PSI of  $\geq 44$ . The impact of environmental pollution on asthma exacerbations was reduced in 2004 and was postulated to be associated with the asthmatic patients' increased use of inhaled corticosteroids, but this needs further evaluation by prospective studies.

**Conclusion:** Asthma exacerbations were increased when PSI rose above 37. The triggering effect from environmental pollution may possibly be modified by increased use of inhaled corticosteroids.

#### MP176

##### A Pilot Study on Subutex Abuse and the Associated Risk Factors for HIV/HB/HCV

M WINSLOW<sup>1</sup>, S GUO<sup>1</sup>, WL NG<sup>1</sup>

<sup>1</sup>Addiction Medicine, Institute of Mental Health/Woodbridge Hospital, Singapore

**Aim:** To describe the profile of subutex abusers coming to IMH, CAMP specialist addiction clinic for treatment. Risk factors for infectious diseases and the association between trauma and drug addiction are analysed. Findings will be used to improve the current treatment for subutex abusers and for prevention strategies against blood borne infections.

**Methods:** A cross-sectional study. Data were gathered using validated scales and a semi-structured questionnaire on socio-demographics, current and past drug use history, viral hepatitis/HIV status and past exposure to trauma. Logistic regression and descriptive statistics on correlations are used for data analysis. Subjects, n = 100 Subutex abusers fulfilling the DSM-IV diagnostic criteria for opiate dependence are invited for this research. Users with serious medical conditions (e.g. surgery or cancer) prescribed with opiates for analgesia are excluded from the study.

**Results:** Forty to 50 per cent of participants have viral hepatitis, unknown before their intravenous drug abuse. Majority of abusers have a forensic history of incarceration for illicit drug use, especially heroin. Combination drug abuse is on the rise with a high percentage of users abusing Subutex together with short-acting benzodiazepines. Intravenous drug use is the most common method of abuse. An association is observed between drug abuse and trauma experience in Singapore addicts.

**Conclusion:** Treatment medications like Subutex can be abused as other opiate drugs, if not adequately supervised and controlled. Prescriptive drug abuse, a worldwide trend is supported by local findings. Public health concerns and spread of infectious diseases as a result of drug abuse should be given urgent attention. Chronic drug abusers require a holistic approach in treatment as they often have multiple life stressors.

#### MP177

##### Non-resolving Postoperative Pain as a Presenting Symptom of Deep Venous Thrombosis after Total Knee Replacement

A WAGLE<sup>1</sup>, HS HO<sup>1</sup>

Anaesthesia, Tan Tock Seng Hospital, Singapore

**Aim:** To report a case of non-resolving postoperative pain following total knee replacement (TKR) caused by deep venous thrombosis (DVT).

**Methods:** Observational case report.

**Results:** A 50-year-old ASA-1 male patient with osteoarthritis knee underwent uneventful right TKR surgery under spinal anaesthesia. Patient controlled

analgesia (PCA) with morphine was used for postoperative pain relief. On second postoperative day, he complained of leg pain, both dynamic and at rest, despite adequate usage of PCA. The entire lower leg was painful and delayed his physiotherapy. The operated limb was swollen and had calf tenderness on examination. A Doppler study showed popliteal DVT. He was started on warfarin therapy and subsequently recovered well.

**Conclusion:** Severe non-resolving postoperative pain despite PCA following TKR should prompt a detailed history and physical examination. It may indicate the presence of a new surgical or medical problem, which may need urgent medical attention.

#### MP178

##### Vancomycin-resistant Enterococcus among a Cluster of Hospitalised HIV Patients

GG FERNANDEZ<sup>1</sup>, YS LEO<sup>2</sup>, PS SEONG<sup>1</sup>, B ANG<sup>2</sup>, V LEE<sup>2</sup>, YL TEOH<sup>1</sup>

<sup>1</sup>Clinical Epidemiology, <sup>2</sup>Infectious Disease, Tan Tock Seng Hospital, Singapore

**Aim:** To describe a cluster of VRE colonisers among HIV patients at the Communicable Disease Centre (CDC), Tan Tock Seng Hospital (TTSH) identified through active screening and to discuss relevant infection control strategies.

**Methods:** This is a case series of HIV patients warded in CDC found to be VRE positive through active screening and epidemiological investigation.

**Results:** The hospital was alerted of an outbreak of VRE in a tertiary care centre (Hospital X) in Singapore on 1 April 2005. In TTSH, isolation and stool screening of high-risk patients including those with known inpatient stay at Hospital X were implemented. Other measures included VRE testing of stool samples submitted for Clostridium Difficile Toxin test. A VRE-positive HIV patient was identified on 8 April 2005. Contact tracing was done and additional control measures were concurrently implemented in CDC. Three more cases were identified. All cases were male with mean age of 46. CD4 count ranges from 3 to 141. One was previously admitted to Hospital X. None had prior Vancomycin use. Other common features were the use of Antiretroviral therapy and tuberculosis treatment. The VRE cultures of all 4 cases were similar typing as Hospital X outbreak. Seventy-three other inpatients, outpatients and day care centre patients who were contacts of these 4 cases were screened negative.

**Conclusion:** Immunocompromised patients such as those with HIV form a population at risk of acquiring and propagating VRE. Active surveillance and effective control measures need to be put in place to prevent transmission of the infection.

#### MP179

##### Effects of Rehabilitation on the Outcome of Psychiatric Patients Referred to Assertive Community Treatment Programme (ACT)

A LIEW<sup>1</sup>, BL LIM<sup>1</sup>, WC POON<sup>2</sup>, C LEE<sup>1</sup>

<sup>1</sup>Community Psychiatry, <sup>2</sup>Medical Social Work, Institute of Mental Health / Woodbridge Hospital, Singapore

**Aim:** This retrospective and naturalistic study aims to compare the outcome of patients referred from rehabilitation wards to ACT vs. those referred from non-rehabilitation wards.

**Methods:** One hundred and sixteen patients accepted to ACT from November 2003 to December 2004 were included in this study. The percentage reduction in the number of admissions per month (NOA/m) prior to acceptance into ACT and after acceptance was compared between the above 2 groups (characteristics not matched at baseline).

**Results:** For patients referred from Rehabilitation wards (n = 41), the mean NOA/m pre vs. post-ACT, was 0.20 vs. 0.07 respectively; mean reduction in NOA/m after ACT is 0.13 (SE = 0.02, P < 0.001). For patients from non-Rehabilitation wards (n = 75), the mean NOA/m pre vs. post-ACT, was 0.24 vs. 0.14 respectively; mean reduction in NOA/m after ACT is 0.11 (SE = 0.02, P < 0.001). The mean percentage reduction in NOA/m for patients from

rehabilitation wards after ACT was 72.1% compared to 43.0% for patients from non-rehabilitation wards. This corresponds to a mean difference of 29.1% (SE = 11.34,  $P = 0.012$ ). Analysis of covariance using age, diagnosis, duration in ACT, number of admissions per year before ACT, race, sex, and source of referral showed no statistically significant effects by these variables; patients from rehabilitation wards compared to non-rehabilitation wards, however, have greater mean percentage reduction in NOA/m (26.2%, SE = 13.8,  $P = 0.06$ ), which is almost statistically significant.

**Conclusion:** Differences in patients' characteristics at baseline between the 2 groups could likely account for the findings that ACT patients referred from rehabilitation wards have a better outcome compared to those from non-rehabilitation wards.

#### MP180

##### Effects of Assertive Community Treatment Programme (ACT) on Outcome of Patients with Serious Mental Illness

**BL LIM<sup>1</sup>, H SEN, A LIEW<sup>2</sup>, WC POON<sup>1</sup>, C LEE<sup>1</sup>**

<sup>1</sup>Community Psychiatry, <sup>2</sup>General Psychiatry, Institute of Mental Health/Woodbridge Hospital, Singapore

**Aim:** ACT is a team treatment approach designed to provide comprehensive, community-based psychiatric treatment, rehabilitation, and support to persons with serious and persistent mental illness such as schizophrenia. This study aims to examine the effects of ACT on the outcome of patients who joined the programme.

**Methods:** Forty patients who were accepted between November 2003 and June 2004 and had completed one year of ACT programme were included in the study. Parameters used to measure outcome were: i) number of admissions and ii) total length of stay (in days) one year pre- and post-acceptance into ACT. This study also compared the employment status (any form of employment vs. non-employment) of patients before and at one year with ACT.

**Results:** Mean number of admissions, in one year pre- vs. post-ACT, was 2.75 vs. 2.03 respectively with a mean reduction of 0.72 (SE = 0.34,  $P = 0.02$ ). This corresponds to a 28% reduction in the number of admissions in one year. Mean total length of stay, in 1-year pre vs. post-ACT, was 87.35 days vs. 32.30 days respectively with a mean reduction of 55.05 (SE = 14.22,  $P < 0.01$ ). This corresponds to a 38% reduction in the total length of stay in one year. Patients at one year post-ACT compared to pre-ACT were also more likely to be employed (OR = 3.77,  $P < 0.01$ ).

**Conclusion:** ACT appears to reduce the number of admissions, total length of stay, and improve employment status of patients with serious mental illnesses.

#### MP181

##### An Immunohistochemical Study of Extra-mammary Paget's Disease at the National Skin Centre

**MTW CHIO<sup>1</sup>, J LEE<sup>1</sup>, SH TAN<sup>1</sup>**

<sup>1</sup>Dermatology, National Skin Centre, Singapore

**Aim:** To review the epidemiology of cases of extra-mammary Paget's disease (EMPD) seen at the National Skin Centre (NSC) and correlate any associated internal malignancies with immunohistochemical staining of histology specimens.

**Methods:** A retrospective review was performed. Cases of histology-confirmed EMPD in NSC were identified from the histopathology files and the case records were reviewed. Immunohistochemical staining was done on skin biopsy specimens for CK5/6, CK7, CK20, GCDFP-15, CEA, PSA & Uroplakin III.

**Results:** This case series were from 9 patients: 8 Chinese male and 1 Chinese female. Age at presentation ranged from 50 to 67 years (mean 54.7). Duration of lesions ranged from 3 months to more than 48 months. Site of lesions were mainly genital skin with 1 case of peri-anal involvement. Immunohistochemical staining was done for 7 patients (tissue blocks exhausted in 2 cases). The tumour cells of cases stained positive for CK7. 2 stained positive for GCDFP-

15. None stained positive for CK20, CK5/6, PSA & Uroplakin III. No patients have been diagnosed with any internal malignancies.

**Conclusion:** The immunohistochemical profile of CK7 positive/CK20 negative of our cases is consistent with those of previous reports of primary EMPD. The lack of internal malignancy in our cases was confirmed from screening and follow-up. Nevertheless, a thorough screening for internal malignancy is recommended as diagnosis of EMPD may pre-date cancer diagnosis.

#### MP182

##### T-cell Receptor- $\gamma$ Gene Analysis in Evolving to Advancing Cutaneous T-cell Lymphoma

**C FOO<sup>1</sup>, TKL CHONG<sup>2</sup>, YJ SUN<sup>3</sup>, MBY TANG<sup>1</sup>, YC GIAM<sup>1</sup>, SH TAN<sup>1</sup>**

<sup>1</sup>Dermatology, <sup>2</sup>Laboratory, National Skin Centre, Singapore, <sup>3</sup>Research, Tan Tock Seng Hospital, Singapore

**Aim:** The diagnosis of cutaneous T-cell lymphomas (CTCL) is often a challenge for the dermatopathologist. Early stages of CTCL can mimic inflammatory dermatoses. The detection of a monoclonal population of T-cells through T-cell receptor- $\gamma$  (TCR $\gamma$ ) gene analysis by polymerase chain reaction (PCR) method has been used as a molecular marker of CTCL. Our aim is to explore the applicability of a standard TCR $\gamma$ PCR in various subtypes of CTCL.

**Methods:** Formalin-fixed, paraffin-embedded tissue of 86 biopsy specimens from 38 patients with CTCL were selected. Biopsy specimens included 62 cases of mycosis fungoides (MF), 12 cases of non-MF T-cell lymphomas and 12 cases where histology was non-specific/equivocal in patients later diagnosed to have lymphoma. 14 cases of unequivocal inflammatory dermatoses and 2 of cutaneous B-cell lymphomas acted as negative controls.

**Results:** T-cell clones were detected in 53 of 62 cases of MF (85.5%) and 8 of 12 cases of non-MF lymphomas (66.7%). The rates of clonal detection increased with advancing stages of MF. T-cell clones were detected in 8 of 10 cases of MF-associated follicular mucinosis and pigmented purpura-like MF. 4 cases (33.3%) from the 12 pre-diagnostic for CTCL showed presence of T-cell clones, identical to subsequent clones detected when lymphoma was fully established.

**Conclusion:** CTCL evolves as a clonal inflammatory dermatitis, to a monoclonal neoplastic disorder. In cases where histology is not yet diagnostic and TCR $\gamma$  PCR is positive, patients should be followed up with greater surveillance. TCR $\gamma$  PCR is also a useful adjunct to histologic diagnosis of early stage and variant types of MF.

#### MP183

##### A Retrospective Study of Linear IgA Disease in Adults seen at the National Skin Centre: A 12-year Review from 1992 to 2004

**JCC HO<sup>1</sup>, PPL NG<sup>1</sup>, SH TAN<sup>1</sup>**

<sup>1</sup>Dermatology, National Skin Centre, Singapore

**Aim:** Linear IgA bullous disease (LABD) is a rare acquired subepidermal blistering disorder affecting children and adults. The disease is characterised by the presence of a linear deposition of immunoglobulin A (IgA) along the basement membrane zone in the skin. A proportion of the cases is caused by drugs. We review the cases diagnosed between 1992 and 2004, comparing drug-related cases with idiopathic cases.

**Methods:** A total of 17 patients were seen at the National Skin Centre between 1992 and 2004. The estimated annual incidence of the disease was estimated at 0.35 per million of the population. The mean age of onset was 52 years, with a range of 24 to 90 years. Males were more frequently affected than females (2.4:1).

**Results:** Drug-induced cases accounted for 35% of LABD cases. The drugs included phenytoin, alprazolam, trental, ampicillin and a traditional Chinese herbal medicine, *ling zhi*. On direct immunofluorescence of drug-induced cases, IgA was the sole immunoreactant; this is contrasted to idiopathic cases where 36% (4/11) had both IgA and IgG deposition. 31% of patients (4/13) had detectable anti-basement membrane IgA; 3 localising to the epidermal side and 1 to the dermal side. Drug-induced cases were more easily controlled



and resolved following removal of the offending drug. The duration of disease was significantly shorter compared to idiopathic cases ( $P = 0.045$ ).

**Conclusion:** Drug-induced LABD were distinct clinically and immunologically to idiopathic cases. An exhaustive drug history is vital. Removal of the offending drug will result in early resolution of blisters and reduced patient morbidity.

#### MP184

##### Neutrophilic Dermatoses Seen at National Skin Centre: A Review of Their Association with Systemic Disease

**CY NEOH<sup>1</sup>, AWH TAN<sup>1</sup>, SK NG<sup>1</sup>**

<sup>1</sup>Dermatology, National Skin Centre, Singapore

**Aim:** Neutrophilic dermatoses (NDs) are a heterogeneous group of skin diseases characterised by sterile neutrophilic infiltrates and their association with systemic diseases. We aim to identify these disease associations in our local population.

**Methods:** Medical records of 42 patients diagnosed with NDs from June 1999 to December 2004 were reviewed. They were matched with data from the Cancer Registry to detect any unreported malignancies. Patients were also contacted regarding their updated health status.

**Results:** Fourteen (33.3%) patients with NDs had associated systemic diseases. Mean age was 48.1 years. Ten out of 36 patients (27.8%) with Sweet's syndrome (SS) had systemic diseases (2 acute myeloid leukaemia, 1 chronic myeloid leukaemia (CML), 2 systemic lupus erythematosus (SLE), 1 undifferentiated connective tissue disease, 1 Mycobacteria chelonae and herpes simplex infection, 1 submandibular abscess and 2 upper respiratory tract infections). The patient with CML had imatinib-induced SS during treatment. Two of the 4 patients with pyoderma gangrenosum (PG) had CML and myelodysplastic syndrome (MDS) respectively. The latter patient presented with concomitant neutrophilic panniculitis (NP). Another patient with isolated NP had MDS. Human immunodeficiency virus (HIV) infection was diagnosed for the only patient with erythema elevatum diutinum. Sweet's syndrome preceded the diagnosis of SLE by a year in 1 patient. Other patients had coincident diseases diagnosed through abnormal screening tests and/or associated systemic symptoms.

**Conclusion:** The neutrophilic dermatoses are a complex spectrum of clinicopathological entities frequently associated with systemic diseases. Haematological malignancies, in particular, are significantly associated with SS, PG and NP. Patients presenting with a neutrophilic dermatosis should be carefully evaluated for associated systemic disease and followed up.

#### MP185

##### Significance of Autoimmunity in Chronic Urticaria in Singapore Asian Patients

**KT TAN<sup>1</sup>, M GREAVES<sup>1</sup>, CL GOH<sup>1</sup>, T TANAKA<sup>2</sup>, K ISHI<sup>2</sup>, M HIDE<sup>2</sup>**

<sup>1</sup>Dermatology, National Skin Centre, Singapore, <sup>2</sup>Medicine, Hiroshima University School of Medicine, Japan

**Aim:** 1) To determine the prevalence of anti-FcεR1 and anti-IgE autoantibodies in Asian Singaporean patients with chronic urticaria. 2) To ascertain if the autologous serum skin test (ASST), which is used as a screening test for autoimmune urticaria, correlates with presence of autoantibodies in this population.

**Methods:** Asian adult patients with chronic urticaria were recruited from the Dermatology service at the Singapore General Hospital and National Skin Centre. Serum samples were obtained for ASST and in vitro histamine determination. The ASST was performed with intradermal injections of autologous serum, saline and histamine in the forearms. In vitro histamine release was determined by using basophils of healthy Japanese donors.

**Results:** Sixty patients were recruited. Thirty-eight patients had chronic idiopathic urticaria (CIU) and 22 had physical urticaria (PU). The ASST was positive in 20 patients with CIU and 2 patients with PU. 7 CIU patients with positive ASST showed histamine releasing activity. The sensitivity of the ASST was 100% and specificity 56%. The prevalence of autoimmune

urticaria due to anti-FcεR1 and/or anti-IgE autoantibodies in this population was 18.4%. Two PU patients showed histamine releasing activity and both had negative ASST.

**Conclusion:** In this Singaporean Asian population, the percentage of CIU patients with evidence of anti-FcεR1 and/or anti-IgE autoantibodies was low compared with published data from European and North American centres. The specificity of the ASST as a screening test for autoimmune urticaria was poor in Asian patients.

#### MP186

##### Sonographically Guided Ethanol Ablation of Thyroid Cysts

**SSS TAN<sup>1</sup>, PC SOON<sup>2</sup>**

<sup>1</sup>Diagnostic Radiology, <sup>2</sup>Medicine, Tan Tock Seng Hospital, Singapore

**Aim:** To study the safety and efficacy of ethanol sclerotherapy for benign thyroid cysts. Benign thyroid cysts are known to recur frequently following needle aspiration. Ethanol injection following aspiration has been used to induce sclerotherapy, but has not been reported locally.

**Methods:** A total of 10 patients were studied. All had clinically palpable lesions confirmed by ultrasound to be cystic/predominantly cystic. Fine-needle aspiration with histological confirmation of benignity was performed. Patients were offered ethanol ablation following recurrence. Procedures were done in the Radiology Department by both authors. Lesions were aspirated under ultrasound guidance followed by instillation of 100% alcohol. Volumes of alcohol injected depended on the initial cyst size, and ranged from 2 to 10 mL.

**Results:** Patients experienced no or minimal immediate side effects. These consisted of flushing, feeling of intoxication and local skin reddening. None experienced delayed or more severe complications; in particular none of our patients suffered hoarseness of voice. Post-therapy all patients had good partial or full resolution of swelling on clinical review within 2 weeks. 2 patients however developed recurrence, which required a second treatment; both were carried out successfully with no subsequent recurrence.

**Conclusion:** We conclude that in keeping with other published studies, sonographically-guided ethanol ablation is a safe and effective mode of treatment for benign thyroid cysts.

#### MP187

##### Duration of Untreated Psychosis and Outcome in 2 Years

**J LEE<sup>1</sup>, YH CHAN<sup>2</sup>, SA CHONG<sup>1</sup>**

<sup>1</sup>Early Psychosis Intervention, Institute of Mental Health/Woodbridge Hospital, Singapore, <sup>2</sup>National University Medical Institute, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** To study duration of untreated psychosis (DUP) as a predictor of outcome in our local population.

**Methods:** One hundred and thirty-three patients, who presented with their first episode psychosis and subsequently followed for 2 years, were recruited for the study. Correlations were examined between DUP and Positive and Negative Syndrome Scale (PANSS) and Global Assessment of Functioning Scale (GAF) at baseline and 2 years.

**Results:** DUP in our population followed a bimodal distribution. Median DUP was measured at 5 months and the mean was 15.6 months with standard deviation at 29.0 months. The mean percentage improvement in PANSS and GAF total scores at 2 years was 40.5% and 95.4% respectively. Tests of between-subjects effects showed DUP to have a  $P < 0.05$  in PANSS positive subscale score at 3 months and 2 years.

**Conclusion:** In our local population, DUP has been shown to have significant correlations to improvement in PANSS positive subscale at 3 months and 2 years but not to GAF improvement. There is a significant improvement in the PANSS and GAF total scores even in those with long DUP. However, this study did not take into account the default rate that could be a significant cause for bias.

## MP188

**Emergency Department-initiated Non-invasive Ventilation for Chronic Obstructive Pulmonary Disease (COPD) Patients****LIBRAHIM<sup>1</sup>, TK LIM<sup>2</sup>, PG MANNING<sup>1</sup>**<sup>1</sup>Emergency Medicine, <sup>2</sup>Medicine, National University Hospital, Singapore

**Aim:** To determine the feasibility and safety of emergency department-initiated non-invasive ventilation (NIV) for patients with acute severe exacerbations of chronic obstructive pulmonary disease (COPD).

**Methods:** A prospective study of consecutive COPD patients presenting with acute respiratory failure in the Emergency Department. These patients had NIV initiated by the Emergency Physicians for persistent acute hypercapnic respiratory acidosis despite emergency medical treatment. We monitored the patients' blood pressure, respiratory rate, Borg's Dyspnoea Scale as well as arterial blood gas during the administration of the NIV. Complications associated with NIV, necessity for intubation, disposition and in-hospital mortality were also recorded.

**Results:** A total of 36 patients were studied. The average arterial gases for patients in the ED was pH 7.24, PaCO<sub>2</sub> 74 mm Hg, PaO<sub>2</sub> 97 mm Hg, and RR 27/min, PR 123/min; 1(2.8%) patient was intubated and the in-patient mortality was 3(8.3%). NIV was employed for an average of 64 min in the ED and only 9 patients (25%) needed admission to the Intensive Care. There were no complications associated with NIV use in the ED.

**Conclusion:** Emergency Department-initiated NIV is feasible, safe and effective in the treatment of severe acute exacerbations of COPD.

## MP189

**The Effect of Ramadan Fasting on Glycaemic Control in Muslim Type 2 Diabetic Patients on Oral Hypoglycaemic Agents or Insulin as Measured by Continuous Interstitial Glucose Monitoring (CGMs), Fructosamine Assay and HbA1c: A Singapore Study****YCKON<sup>1</sup>, NOTHMAN<sup>2</sup>, CL CHUA<sup>3</sup>, KMNG<sup>4</sup>, SCLIM<sup>5</sup>, RHAWKINS<sup>6</sup>, MS WONG<sup>6</sup>**<sup>1</sup>Endocrinology, <sup>2</sup>Nursing, Tan Tock Seng Hospital, Singapore, <sup>3</sup>Nursing, Alexandra Hospital, Singapore, <sup>4</sup>Nutrition & Dietetics, Tan Tock Seng Hospital, Singapore, <sup>5</sup>Endocrinology, Alexandra Hospital, Singapore, <sup>6</sup>Laboratory Medicine, Tan Tock Seng Hospital, Singapore

**Aim:** To compare the effect of Ramadan fasting on glycaemic control in type 2 diabetic Muslims by continuous glucose monitoring (CGM), serum fructosamine and HbA1c.

**Methods:** Fifty-five patients (26 males, 29 females), age 45.3 ± 9.7 yrs, diabetes duration 8.7 ± 6.9 yrs, BMI 30.1 ± 5.7 kg/m<sup>2</sup>, UACR 25.9 ± 56.5 g/mol, were enrolled. Twenty-seven were on single or combined OHAs, 26 on combined insulin and OHA and 2 on insulin alone. Forty-one patients performed CGM (Medtronic) 1-2 weeks before the start of Ramadan, and again during Ramadan using the identical monitor. Body weight, serum fructosamine, serum total protein, and HbA1c (NRL) were determined just before, and at the end of Ramadan. All serum samples were stored at -20°C and assayed in the same run. Statistical analysis was performed by 2-tailed paired *t*-test.

**Results:** Difference between pre- and end of Ramadan HbA1c (8.2 ± 1.6 vs. 7.8 ± 1.3 %, *P* < 0.001) and serum fructosamine (corrected to 70 g/dL protein) (344.6 ± 64.8 vs 326.6 ± 55.5 uM, *P* = 0.01) were significant. Difference between pre- and Ramadan number of sensor values (833 ± 66 vs 835 ± 80, *P* = 0.86), number of paired glucometer readings (14 ± 2 vs 14 ± 1.9, *P* = 0.82), mean absolute difference (10.5 ± 6.3 vs 11.5 ± 5.4 %, *P* = 0.32), CGM duration (69.4 ± 5.5 vs 69.4 ± 5.5 hrs, *P* = 0.28), mean glucose (8.6 ± 2.7 vs 8.1 ± 2.0 mM, *P* = 0.06), nadir glucose (3.6 ± 1.5 vs 3.5 ± 1.3 mM, *P* = 0.52) and peak glucose (15.3 ± 4.0 vs 15.2 ± 3.1 mM, *P* = 0.92) were not significant. There was a significant difference in glucose excursion (peak minus nadir) (11.6 ± 3.8 vs 14.2 ± 2.1 mM, *P* < 0.05).

**Conclusion:** Ramadan fasting tends to improve overall diabetic control, but may be associated with increased glucose excursions.

## MP190

**Disclosure of Diagnosis and Prognosis: What Do Singaporean Feel?****CK CHIA<sup>1</sup>, K KOO<sup>2</sup>, A TAN<sup>3</sup>, C TAN<sup>3</sup>, CC LIM<sup>1</sup>**<sup>1</sup>Gastroenterology, <sup>2</sup>Medicine, <sup>3</sup>Nursing, Tan Tock Seng Hospital, Singapore

**Aim:** We are faced with the dilemma of whether to tell patient the whole truth when communicating diagnosis and prognosis. Two surveys were conducted to study the preference of Singaporean with regards to disclosure of cancer diagnosis.

**Methods:** A bilingual, self-administered, multiple-choice survey was used. Data collected includes age, gender, language used, race, religious affiliation, educational level, income, and prior experience with cancer. 11 questions with regards to preference of extent and manner of cancer disclosure were asked. The survey was conducted first in a public forum and then in the hospital wards, where the relatives of our patients were selected.

**Results:** Two hundred and thirty out of 545 participants of the public forum responded. 99.1% want to be informed of their diagnosis, 98.6% of their prognosis. Fewer people want their afflicted family to know the diagnosis and prognosis (93% and 81.4%). 71.8% expect their specialist to break the news and 84.3% want to know everything. 72.6% want their doctor to be completely open and 54.4% feel that knowing will not affect them more than not knowing. 50.5% want to be in the presence of family when the bad news is broken. The result of inpatient relative survey was similar.

**Conclusion:** Most people want to know their diagnosis and prognosis, even when the prognosis is dismal. They want their doctor to be completely open and tell them everything. Majority also want their afflicted family to be informed of their diagnosis and prognosis but we should be aware that there is a minority that feels otherwise.

## MP191

**Biliary Microhamartomata: Can They be Familial?****LL LIEW<sup>1</sup>, CK CHIA<sup>1</sup>, CC LIM<sup>1</sup>**<sup>1</sup>Gastroenterology, Tan Tock Seng Hospital, Singapore

**Aim:** Von Meyenberg's complexes are rare biliary microhamartomata characterised by deformed bile ducts forming cystic-looking structures. They have been reported in many cases. As far as we know, there are no documented cases of Von Meyenberg's complexes occurring in a familial distribution. We are reporting Von Meyenberg's complexes in two sisters.

**Methods:** Our patients are 2 sisters aged 38 and 36 years respectively, both of whom presented with retrosternal chest discomfort. As part of their blood work-up, they were discovered to have transaminitis, and ultrasonography was ordered. Both scans showed cystic areas of varying sizes scattered throughout the liver parenchyma, and were reported as suspicious for cholangiohepatitis. In fact, 1 of our patients was empirically treated for such.

**Results:** The findings on ultrasonography were Von Meyenberg's complexes in both cases.

**Conclusion:** Von Meyenberg's complexes are known to be mistaken for cholangiohepatitis, and have been mistaken for liver metastases. However, they have not been reported to be associated with chest discomfort, or to occur in siblings. There is much more to discover about this benign hepatic lesion. However, because of the rarity of its occurrence, it is likely that we will depend on cumulative case reports for further study.

## MP192

**Endoscopic Ultrasonography (EUS) and EUS-guided Fine-Needle Aspiration (FNA) with Cyst Fluid (CF) Analysis in the Evaluation of Pancreatic Cystic Tumours (PCTs)****WC LIM<sup>1</sup>, HY WONG<sup>1</sup>, CK CHIA<sup>1</sup>, C VU<sup>1</sup>, CC LIM<sup>1</sup>**<sup>1</sup>Gastroenterology, Tan Tock Seng Hospital, Singapore

**Aim:** To demonstrate the clinical usefulness of EUS and EUS-guided FNA with CF analysis in the evaluation and diagnosis of PCTs.

**Methods:** Three female patients (mean age 69 [61-76] years) were evaluated in this case-series. None had gastrointestinal symptoms or a prior episode of acute pancreatitis. PCT was detected incidentally on chest computed tomography (CT) in 1 and abdominal CT in 2. EUS was performed with both radial and linear echoendoscope and FNA with a 22-gauge echotip needle. CF obtained was sent for cytological examination, and when possible carcinoembryonic antigen (CEA) and amylase determination. All received prophylactic antibiotics post-FNA.

**Results:** EUS detected 5 pancreatic cysts in 3 patients, located at the pancreatic head (3), body (1) and tail (1), with a mean diameter of 15.6 (range, 4-30) mm. They were uniloculated in 3, septated/multiloculated in 2; all were thin-walled, with no associated masses or intracystic nodules, and did not communicate with the pancreatic duct (normal calibre). None had sonographic changes suggestive of chronic pancreatitis. EUS-guided FNA was successfully performed (1-2 passes/patient) and CF aspirated (1-6 mL/patient) were clear/thick/mucoid in 2 (CEA >15,000 ug/L and amylase 167 U/L in 1; insufficient CF for analysis in 1; cytology no malignant cells) and clear/non-viscous in 1 (CEA 990 ug/L, amylase 6447 U/L, cytology demonstrated mucinous epithelial cells). They were diagnosed with mucinous cystic neoplasm, with possible malignancy in 1 with highly elevated CEA. One patient has refused operation while surgical resection will be discussed with the other 2.

**Conclusion:** EUS and EUS-guided FNA with CF analysis are useful in the evaluation and diagnosis of PCTs.

### MP193

#### A Prospective Randomised Placebo-controlled Double-blind Trial of Prophylaxis with Single Oral Dose of Ciprofloxacin in Percutaneous Endoscopic Gastrostomy

CYU<sup>1</sup>, HL LAW<sup>2</sup>, AC TAY<sup>3</sup>, HY WONG<sup>1</sup>, VH CHONG<sup>1</sup>, WC LIM<sup>1</sup>, CC LIM<sup>1</sup>

<sup>1</sup>Gastroenterology, <sup>2</sup>Pharmacy, <sup>3</sup>Nursing, Tan Tock Seng Hospital, Singapore

**Aim:** To study whether the prophylactic use of a single dose of ciprofloxacin is effective in lowering PEG infection rates.

**Methods:** We conducted a prospective, randomised, double-blind placebo-controlled study on patients referred for PEG. A single dose of 750 mg ciprofloxacin tablet or an identical placebo is administered in a blinded and randomised fashion 2 hours before PEG. After insertion, the PEG site was inspected for 4 days by a wound nurse and scores were given for erythema, induration and secretions. Temperature and white blood count were monitored. Wound culture was performed if there was infection. Patients were subsequently followed up at 1 month.

**Results:** Of the 34 patients recruited, 1 (placebo group) pulled out the PEG on the second day and was thus excluded from the study. The incidence of PEG peristomal infection was significantly reduced in the ciprofloxacin compared to the placebo group [(2/15 (11.8%) vs 7/16 (43.8%),  $P = 0.039$ ]. The cultures from the infected placebo group yielded 2 cloxacillin-sensitive staphylococcus aureus, 2 pseudomonas aeruginosa and 1 with both organisms. One from the infected ciprofloxacin group grew diptheroid bacilli and another mixed coliforms. All infected patients were subsequently treated successfully with full courses of antibiotics. No patient developed allergy with ciprofloxacin. One patient died at 14 days from pneumonia.

**Conclusion:** A single dose of oral ciprofloxacin prophylaxis is effective in reducing PEG peristomal infection. Its anti-pseudomonas and anti-staphylococcus activity may lower infections with these organisms.

### MP194

#### Trends in Oesophageal Adenocarcinoma and Squamous Cell Carcinoma in a Multi-ethnic Asian Country

ML FERNANDES<sup>1</sup>, A SEOW<sup>2</sup>, HH CHAN<sup>3</sup>, KY HO<sup>1</sup>

<sup>1</sup>Gastroenterology and Hepatology, National University Hospital, Singapore, <sup>2</sup>COFM, <sup>3</sup>Medicine, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Objectives:** To describe the trends in oesophageal adenocarcinoma and squamous cell carcinoma amongst the 3 major ethnic groups in Singapore

from 1968 to 2002.

**Methods:** Cancer cases in Singapore citizens and permanent residents were obtained from the Singapore Cancer Registry and used to calculate the incidence rates from 1968 to 2002.

**Results:** The ASR for squamous cell carcinoma decreased progressively from 8.31 to 3.85 per 100,000 men ( $P = 0.017$  for trend) and from 3.43 to 0.81 per 100,000 women ( $P = 0.027$  for trend). The ASR for adenocarcinoma rose from 0 to 0.54 per 100,000 men and from 0.03 to 0.13 per 100,000 women. However, these time trends did not achieve statistical significance. The frequency of regular/daily smoking in the population decreased from 23% in 1976/77 to 12.6% in 2004. The percentage of obese (BMI >30) adults rose from 4.3% in 1982 to 1985 to 5.9% in 1998. The frequency of oesophagitis in Singapore based on endoscopic findings has also increased from 3.9% in 1992 to 9.8% in 2001.

**Conclusions:** Decline in the incidence of squamous cell carcinoma is likely to be associated with a decrease in the incidence of smoking in the population. In contrast, there appears to be a trend towards an increase in the incidence of adenocarcinoma in Singapore, although the absolute incidence remains relatively low. This may be due to an associated rise in reflux oesophagitis and obesity in Singapore. However, the low absolute incidence is likely to be due to the lower prevalence of these risk factors in our population compared to western countries.

### MP195

#### Melatonin Improves Abdominal Pain in Irritable Bowel Syndrome Patients who Have Sleep Disturbances: A Randomised Double-blind Placebo-controlled Study

KY HO<sup>1</sup>, GH SONG<sup>1</sup>, PH LENG<sup>2</sup>, KA GWEE<sup>1</sup>

<sup>1</sup>Gastroenterology and Hepatology, <sup>2</sup>Medicine, National University Hospital, Singapore

**Aim:** We aimed to determine if melatonin was effective in improving bowel symptoms and sleep disturbances in irritable bowel syndrome (IBS) patients with sleep disturbance.

**Methods:** Forty IBS patients (aged 20-64 years; 24 female) with sleep disturbances were randomly assigned to receive either melatonin 3 mg nocte ( $n = 20$ ) or matching placebo nocte ( $n = 20$ ) for two weeks. Immediately before and after the treatment, the subjects completed bowel, sleep and psychological questionnaires, and underwent rectal manometry and overnight polysomnography.

**Result:** Compared with placebo, melatonin taken for two weeks significantly decreased mean abdominal pain score (2.35 vs. 0.70,  $P < 0.001$ ), and increased mean rectal pain threshold (24.8 vs. 33.7 mm Hg,  $P < 0.01$ ). Bloating, stool type, stool frequency, anxiety and depression scores did not significantly differ after treatment in both groups. Data from sleep questionnaire and polysomnography showed that the 2-week course of melatonin did not influence sleep parameters including total sleep time, sleep latency, sleep efficiency, sleep onset latency, arousals, duration of stage 1-4, REM sleep and REM onset latency.

**Conclusion:** Administration of melatonin 3 mg nocte for 2 weeks significantly attenuated abdominal pain and reduced rectal pain sensitivity without improvements in sleep disturbance and psychological distress. The findings suggested that the beneficial effects of melatonin on abdominal pain in IBS patients with sleep disturbance were independent of its action on sleep disturbances and psychological profile.

### MP196

#### Endoscopic Ultrasonography for Gastric Cancer: Does it Influence Treatment?

KY HO<sup>1</sup>, JBY SO<sup>2</sup>, IS GANPATHI<sup>2</sup>

<sup>1</sup>Gastroenterology and Hepatology, <sup>2</sup>Surgery, National University Hospital, Singapore

**Aim:** This study was aimed to evaluate the utility and shortcomings of endoscopic ultrasound (EUS) in TNM staging of gastric cancer and its influence on treatment.



**Methods:** The series included 126 gastric cancer patients underwent EUS from July 1997 to June 2003 at National University Hospital, Singapore. One hundred and nine patients were included in the final analysis. There were 65 male and 44 female patients with age range 29-97 years (mean 63.13).

**Results:** EUS staging for primary: Specimen histology was available for 102/109 patients operated. The accuracy for T1, T2, T3 and T4 was 79%, 73.9%, 85.7% and 72.7% respectively (overall accuracy = 80.4%). EUS staging for Nodes: The sensitivity of EUS for detecting nodal disease was 74.2% for N0, 78% for N1, 53.8% for N2 and 50% for N3 respectively. The overall sensitivity, specificity, positive predictive value, negative predictive value, and accuracy for N staging by EUS were 82.8%, 74.2%, 85.4%, 70.2%, and 77.7%, respectively. Radical gastrectomy was proposed in 95 patients based on the staging with EUS and CT scan and 87 patients underwent the same (91.6%). Preoperative staging accurately predicted the operative strategy in 89% of the patients. Performing a logistic regression analysis for the correct staging of T stage using EUS and adjusting for tumour location (middle part /distal third/whole stomach vs proximal/cardio-oesophageal) ( $P = 0.873$ ), operator ( $P = 0.546$ ) and subject's sequence (initial 50 vs last 50 cases) ( $P = 0.06$ ), there was no significant predictor for accuracy.

**Conclusion:** EUS is the most accurate and reliable method for preoperative staging of gastric carcinomas and mandatory if tailored therapeutic approach is planned according to stage.

### MP197

#### A Survey of Endoscopic Ultrasonographic Practice and Training in the Asia-Pacific Region

**KY HO<sup>1</sup>**

<sup>1</sup>Gastroenterology and Hepatology, National University Hospital, Singapore

**Aim:** Little is known about the current status of endoscopic ultrasonography (EUS) training in the Asia-Pacific region. This study aimed to assess EUS practice and training in the Asia-Pacific region and seek to identify areas where the development of EUS expertise could be further enhanced.

**Methods:** A direct mail survey was sent out to 87 practicing endosonographers in various parts of the Asia-Pacific region outside of Japan. They were asked to report on their prior training, utilisation of EUS, and EUS training in their country.

**Results:** The respondents ( $n = 71$ ) were mostly young (median age 40 years), male (97%), practicing in academia (36.6%) or public hospitals (50.7%) and fairly experienced (median 5 years) in EUS practices; they had performed a median of 500 procedures in their career. Among them, 49.3% were self-taught. Only 22.5% and 21.1% had undergone formal overseas fellowship lasting  $\geq 6$  months, and local gastrointestinal fellowships of various durations, respectively. Fifty-six per cent were currently involved in EUS teaching. Most (90%) thought that a formal EUS training fellowship is necessary for acquiring acceptable competence and there should be a minimum number (median 100) of supervised procedures performed and minimum amount of time (median 6 months) spent on training.

**Conclusion:** Although EUS practitioners in Asia-Pacific were not behind their European or American counterparts in hands-on experience, the lack of formal EUS training programmes and opportunities remains an area of concern. For the region to expand EUS utilisation, the current shortage of training opportunities needs to be addressed.

### MP198

#### Functional Bowel Disorders in Rotating Shift Nurses are Related to Sleep Disturbances

**KY HO<sup>1</sup>, WZ LU<sup>2</sup>, KA GWEE<sup>3</sup>, SM MOOCHHALA<sup>3</sup>**

<sup>1</sup>Gastroenterology and Hepatology, National University Hospital, Singapore,

<sup>2</sup>Pharmacology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>3</sup>DSO National Laboratories, Defence Medical & Environmental Research Institute, Singapore

**Aim:** To compare the frequency and severity of bowel disturbances between rotating shift and regular day nurses to determine if functional bowel disorders (FBD) were related to sleep disturbances.

**Methods:** Sixty regular day and 58 rotating shift nurses answered three standardised questionnaires – the Gastrointestinal Symptom Questionnaire, the Hospital Anxiety and Depression Scale and the IBS Symptoms Evaluation Questionnaire which included the Sleep Questionnaire – on the frequency and severity of gastrointestinal symptoms, sleep disturbances and psychological distress. Responses to questions were numerically rated and the sums of individual symptom scores under the respective categories were computed and analysed using Mann-Whitney U, chi-square, correlation coefficient, general linear model and stepwise linear regression tests, as appropriate.

**Results:** While 22/58 (38%) of the rotating shift nurses had FBD, only 12/60 (20%) of the regular day nurses had it ( $P = 0.04$ ). Mean FBD symptom score ( $P < 0.002$ ), sleep disturbance score ( $P < 0.0001$ ) and anxiety score ( $P < 0.002$ ) were all significantly higher among the rotating shift nurses. FBD symptom scores were positively correlated with the sleep disturbance ( $P = 0.0001$ ), anxiety ( $P = 0.0001$ ), depression ( $P = 0.0001$ ), well-being ( $P = 0.0001$ ), fatigue ( $P = 0.0001$ ), and somatic pain scores ( $P = 0.0001$ ). Sleep disturbance ( $P = 0.04$ ), decreased well being ( $P = 0.04$ ), anxiety ( $P = 0.02$ ), and somatic pain ( $P = 0.03$ ) were independent predictors of the FBD symptoms.

**Conclusion:** FBD were more common and severe among the rotating shift nurses. The FBD symptom score was positively and independently correlated with the sleep disturbance score. Poor sleep might be associated with increased FBD symptoms in rotating shift nurses.

### MP199

#### Melatonin Improved Bowel Symptoms in Female Patients with Irritable Bowel Syndrome: A Double-blind Placebo-controlled Trial

**KY HO<sup>1</sup>, WZ LU<sup>2</sup>, S MOOCHHALA<sup>3</sup>, LL LIM<sup>1</sup>, KA GWEE<sup>1</sup>**

<sup>1</sup>Gastroenterology and Hepatology, National University Hospital, Singapore,

<sup>2</sup>Pharmacology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>3</sup>Defence Medical Research Institute, Singapore

**Aim:** To determine its potential therapeutic effects in IBS.

**Methods:** Female patients satisfying the Rome II criteria for IBS were considered for the study. Seventeen patients had completed the treatment. Each was randomised to receive either melatonin 3 mg nocte or identically appearing placebo 1 nocte for 8 weeks, followed by a 4-week washout period and placebo or melatonin in the reverse order for another 8 weeks. Three validated questionnaires: the GI symptom, the sleep questionnaires and the hospital anxiety and depression scale were used to assess symptom severity and to compute the IBS, sleep and anxiety/depression scores respectively.

**Results:** Table shows the mean scores before treatment minus those after treatment with either melatonin or placebo. The improvements in mean IBS scores were significantly greater after treatment with melatonin than with placebo therapy. Percent response rate, a-priori defined as % subjects achieving mild to excellent improvement in IBS symptoms rated by patients, was also greater in the melatonin treated arm than in the placebo treated arm (87% vs. 50%,  $P = 0.04$ ). The changes in mean sleep, anxiety, and depression scores were similar after treatment with either melatonin or placebo.

**Conclusion:** The present study showed that oral melatonin is a promising therapeutic agent in irritable bowel syndrome. It is most effective in relieving abdominal pain, abdominal distension and abnormal sensation of defecation in female patients with IBS.

### MP200

#### The Role of Gastric Mucosa Cyclo-oxygenase and Prostaglandin in the Pathogenesis of Gastroduodenitis and Ulcer Disease in Uremic Patients

**KY HO<sup>1</sup>, TZ ONG<sup>1</sup>, P SIVARAMAN<sup>2</sup>**

<sup>1</sup>Gastroenterology and Hepatology, <sup>2</sup>Medicine, National University Hospital, Singapore

**Aim:** To determine if inhibition of the cyclo-oxygenase (COX) enzymes, particularly COX-1, thereby leading to a decrease in the biosynthesis of

gastroprotective prostaglandin, occurs in the pathogenesis of gastroduodenitis and ulcers in uremic patients.

**Methods:** Thirty-nine uremic patients with end stage renal failure (creatinine clearance of <5 mL/min) were compared to 36 patients presenting with non-ulcer dyspepsia (NUD). Another group of 21 patients with history of NSAID ingestion and peptic ulcer disease (PUD) at endoscopy acted as a secondary control. All underwent gastroduodenoscopy. Biopsies were taken from the antrum for histology and for COX-1, COX-2 and prostaglandin E2 (PGE2) analysis.

**Results:** PGE2 level (median and interquartile range) in uremic patients was 5.24 (1.97-7.82) ng/mg. This compares with 8.93 (2.30-12.00) ng/mg in NSAID ingesting PUD patients, and 19.22 (13.30-35.80) ng/mg in NUD patients. PGE2 levels in uremic patients were significantly depressed ( $P < 0.001$ ) when compared to NUD patients, the absolute difference being 13.98 ng/mg, and 10.29 ng/mg less in uremic, and PUD patients, respectively. No difference was observed in the gastric expression of COX-1 and COX-2 in both the uremic patients and NSAID ingesting PUD patients when compared to NUD controls. COX-1 was detected in 69% (25/36) of NUD patients, 59% (23/39) of uremic patients and 71% (15/21) of NSAID ingesting PUD patients. COX-2 was detected in 86% (31/36) of NUD patients, 90% (35/39) of uremic patients and 90% (19/21) of NSAID ingesting PUD patients.

**Conclusion:** The depression of PGE2 levels in uremic patients may explain the pathogenesis of gastroduodenitis and ulcer disease in uremia.

#### MP201

##### A Prospective Study of Endoscopic Complications using the ODD Score

LL LIM<sup>1</sup>, KY HO<sup>1</sup>, FY KWOK<sup>2</sup>, A LEONG<sup>3</sup>

<sup>1</sup>Gastroenterology and Hepatology, <sup>2</sup>Nursing, <sup>3</sup>Surgery, National University Hospital, Singapore

**Aim:** 1) To prospectively determine the frequency of endoscopic complications in a large endoscopy centre. 2) To prospectively grade these complications using the ODD scoring system.

**Methods:** We prospectively enrolled consecutive patients >18 years of age undergoing endoscopy at our institution into the study and documented any immediate or delayed complications associated with the endoscopy using a standardised form. Trained nurses also phoned all the patients at days 14 and 30 post-procedure and interviewed them regarding possible procedure-related complications. All complications were graded using the ODD score.

**Results:** Over the study period of 9 months, 4063 procedures (2218 OGDs, 1393 colonoscopies, 193 ERCs) were performed. A total of 3748 patients completed the phone interviews giving a response rate of 92.2%. Overall there were 12 procedure-related complications (0.29%), including 7 post-ERCP pancreatitis (3.63%), 1 post-ERCP cholangitis (0.52%), 1 post-polypectomy bleeding (0.07%), 1 esophageal perforation post-stricture dilation (4.35%), and 2 PEG-related cellulitis (18.2%) with ODD score ranges of O10-70D20-50D0. Twenty diagnostic and 5 therapeutic procedures were unsuccessfully performed (0.62%). Of these failed procedures, there were 5 OGDs (0.23%), 4 colonoscopies (0.29%), 16 ERCs (8.29%) with ODD score ranges of O2-65D0-20D5-80. One patient died during hospitalisation and this was possibly related to the failed procedure.

**Conclusion:** This prospective study with 30-day follow-up data showed that the overall rate of endoscopic complications in a tertiary endoscopy centre is low and comparable to those of other international centres. The ODD scoring system can be used as a means of defining, classifying and grading endoscopic complications and failed procedures.

#### MP202

##### Predictive Value of Four *Helicobacter pylori* Rapid Blood Tests in Screening Dyspepsia in Ambulatory Patients: A Prospective Study

LG LIM<sup>1</sup>, KY HO<sup>1</sup>, B HO<sup>2</sup>, KG YEOH<sup>1</sup>

<sup>1</sup>Gastroenterology and Hepatology, National University Hospital, Singapore, <sup>2</sup>Microbiology, NUS – Yong Loo Lin School of Medicine, Singapore

**Aim:** This prospective study aimed to determine the predictive value of *H. pylori* rapid blood test (RBT) in screening for serious gastroduodenal disease (SGD).

**Methods:** Consecutive dyspeptic patients without alarm symptoms, referred from general practice or specialist clinics, for endoscopy at National University Hospital, Singapore, were interviewed. Blood was drawn for serology. The first 109 patients were tested with BM-test (BM), PylorisetScreen (PS) and QuickVue (QV) and the next 99 with PS and Unigold (UG). Endoscopies were performed blinded to RBT results. Biopsies were taken for culture and rapid urease test (RUT). After endoscopies, urea breath tests (UBT) were performed blinded to other results. RBT results were compared with 4 reference tests (RUT, culture, serology and UBT): >2 positives out of 4 were considered positive, 1 positive was considered indeterminate. SGD was defined as gastric cancer, gastric ulcer (GU) or duodenal ulcer (DU).

**Results:** Eleven had indeterminate results; 102, 102, 95 and 197 patients were evaluable for BM, QV, UG and PS, respectively. For diagnosing *H. pylori*, all 4 RBT had sensitivity of 43-80%, specificity 96-99%, positive predictive value (PPV) 97-99% and negative predictive value (NPV) 48-73%. Seventy-five patients had SGD (52 DU, 20 GU, 3 GU and DU, no cancer). For detecting SGD, the 4 RBT had sensitivity of 43-72%, specificity 60-82%, PPV 53-62%, NPV 69-77%. PS had the highest NPV of 77% (70% for patients aged >40 years, 84% for those <40 years).

**Conclusion:** In this series, PS had high NPV for SGD in young patients. Use of RBT for screening young dyspeptic patients without alarm symptoms should be evaluated in primary care.

#### MP203

##### What is the Appropriate Endoscopic Surveillance Interval for Patients with *Helicobacter Pylori*-associated Gastritis and Intestinal Metaplasia in a Country with Moderate Risk of Gastric Cancer?

A RAJNAKOVA<sup>1</sup>, KY HO<sup>1</sup>, M TUN<sup>2</sup>, KG YEOH<sup>1</sup>

<sup>1</sup>Gastroenterology and Hepatology, <sup>2</sup>Medicine, National University Hospital, Singapore

**Aim:** This study analyses patients with endoscopy records prior to developing gastric cancer to provide information for decisions on appropriate surveillance intervals for those with premalignant gastric lesions.

**Methods:** A total of 20,985 patients underwent gastroscopy at NUH over a 10-year period and 402 (1.9%) were diagnosed with gastric cancer. Those patients who underwent gastroscopy with initial non-cancer findings but who subsequently developed gastric cancer were identified.

**Results:** Twenty-four patients developed de novo gastric cancer with records of prior endoscopy at least 18 months before. The endoscopic findings at first gastroscopy were: normal findings in 6 patients, gastritis in 11, peptic ulcer in 7. Histology was obtained at the initial endoscopy in 9 of 24 patients, and this showed *H. pylori* in all of them and intestinal metaplasia in 4 of them. The median time between gastroscopy with initial non-cancer findings and the subsequent discovery of gastric cancer was 51 months (18-121) for the series of 24 cancer patients; 50 months (18-82) for patients with gastritis (n = 9); 39 months (18-81) for gastritis with Hp (n = 6); 31 months (18-81) for gastritis with Hp plus IM (n = 4) respectively. Surveillance at 18 and 24 months from the previous endoscopy would have detected 100% and 87.5% of cancer cases respectively.

**Conclusion:** Patients with *H. pylori* gastritis and intestinal metaplasia are at increased risk of developing gastric cancer and endoscopic surveillance at 2-year intervals is appropriate to detect gastric cancer at an early stage. A prospective surveillance programme for cohorts at high risk of gastric cancer is in progress.

**MP204****Association between NOD2 Gene Mutation and Inflammatory Bowel Disease among Asian Patients****A RAJNAKOVA<sup>1</sup>, KY HO<sup>1</sup>**<sup>1</sup>*Gastroenterology and Hepatology, National University Hospital, Singapore*

**Aim:** An association between mutations in a gene involved in bacterial recognition by monocytes, CARD15/NOD2 and Crohn's disease has been reported in Western population. The aim of this study was to investigate this mutation in Asian patients with inflammatory bowel disease.

**Methods:** Prospective cohort study was performed with 65 patients with inflammatory bowel disease from a single centre and 10 healthy ethnically matched controls. We genotyped an insertion polymorphism affecting the leucine-rich region of the protein product by the allele specific PCR.

**Results:** Fifty-six per cent of Crohn's disease patients and 51% of ulcerative colitis patients showed the C-insertion mutation of NOD2 gene. The mutation was confirmed by sequencing. There was no significant difference found in expression of C-insertion mutation of NOD2 gene between patients with Crohn's disease and ulcerative colitis. However, only one healthy control showed the expression of insertion mutation.

**Conclusion:** NOD2 gene 3020insC frameshift mutation is expressed in both Crohn's disease and ulcerative colitis in Asian patients.

**MP205****Long Term Post Liver Transplant Complications – Data From Singapore****D SUTEDJA<sup>1</sup>, CT WAI<sup>1</sup>, KF TEOH<sup>1</sup>, YM LEE<sup>1</sup>, J ISAAC<sup>5</sup>, K PRABHAKARAN<sup>3</sup>, SG LIM<sup>1</sup>**<sup>1</sup>*Gastroenterology and Hepatology, <sup>2</sup>Surgery, <sup>3</sup>Paediatric Surgery, National University Hospital, Singapore*

**Aim:** Patients who survived past the initial post liver transplantation period faced the development of chronic diseases in the long run. We studied 2 important complications of liver transplantation — renal impairment (RI) and diabetes mellitus (DM).

**Methods:** We analysed adult patients followed up for >1 year using data from our liver transplant clinical records. RI was defined as GFR <60 mL/min/1.73 m<sup>2</sup> and DM defined as fasting blood glucose >7.8 mmol/L. Pre- and post-transplant factors that could be associated with RI and DM were examined.

**Results:** Thirty-five patients were evaluated. Mean age at transplant was 50 years. Mean duration of follow up was 58.4 months. There was 11.4% of pre-transplant RI from hepatorenal syndrome and 17.0% of pre-transplant DM, mostly due to liver cirrhosis. Prevalence of post-transplant RI was 43.5% at 1 yr and 45.0% at 4 yrs. Post-transplant RI was associated with RI at 6 months post-transplant ( $P = 0.033$ ). Prevalence of severe post-transplant RI (GFR <30 mL/min/1.73 m<sup>2</sup>) at year 4 was 5.7%. Prevalence of post-transplant DM increased to 45.5% at 2 years but declined to 5.3% at 4 years.

**Conclusion:** Post-transplant renal impairment appears to be a potential long-term problem, whilst post-transplant diabetes mellitus appears to improve with time.

**MP206****Epidemiology of Acute Liver Failure in Singapore****KF TEOH<sup>1</sup>, CT WAI<sup>1</sup>, MO AUNG<sup>1</sup>, DAC MAUREEN<sup>1</sup>, SG LIM<sup>1</sup>**<sup>1</sup>*Gastroenterology and Hepatology, National University Hospital, Singapore, <sup>2</sup>Gastroenterology and Hepatology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore*

**Aim:** Acute liver failure (ALF) is a rare but devastating disease but its epidemiology in Asia is not well studied. Our aim is to review causes and courses of ALF referred to the national liver transplant centre in Singapore.

**Methods:** We retrospectively analysed all cases of adult patients with ALF referred to the Liver Transplant Programme in Singapore from 1991 to 2003.

**Results:** Eighty-five patients were referred for consideration of emergency liver transplant for ALF during the 13-year period. Age [mean  $\pm$  SEM, median (range)] was 43  $\pm$  1, 43 (15-72) years, 65 (77%) Chinese and 48 (57%) were male. The 3 commonest causes of ALF were reactivation of chronic hepatitis B in 38 (45%), drug-induced liver injury (DILI) in 32 (38%), and Wilson disease in 4 (5%). Overall transplant-free survival was 15/85 (18%). Among the 32 DILI patients, traditional Chinese medicines (TCM) was implicated in 8 patients, followed by acetaminophen (n = 6), and anti-tuberculosis drugs (n = 5). Patients with DILI were more likely to be female (20/32 vs 17/53,  $P = 0.007$ ), and had better survival (11/32 vs 8/53,  $P = 0.039$ ) and transplant-free survival (9/32 vs 6/53,  $P = 0.049$ ) than those with other diagnosis. At multivariate analysis, age at presentation ( $P = 0.019$ ) was the only independent factor associated with transplant-free survival.

**Conclusion:** Clinical course of ALF in Singapore is different from those in the West with reactivation of hepatitis B being the commonest cause. TCM is an important cause for ALF in Singapore. Unfortunately, use of TCM is not regulated in most countries so further studies and audit on safety of use of TCM are needed.

**MP207****Presentation of Drug-induced Liver Injury in Singapore****CT WAI<sup>1</sup>**<sup>1</sup>*Gastroenterology and Hepatology, National University Hospital, Singapore*

**Aim:** Drug-induced liver injury (DILI) is an important clinical problem. However, although traditional Chinese medicines (TCM) are widely consumed in Asia, most cases of TCM-DILI are reported as case reports or case series. We aim to evaluate the clinical course of DILI at an Asian tertiary liver centre.

**Methods:** All patients with DILI seen by 1 hepatologist from July 2003 till June 2004 at a local liver centre has been prospectively collected and were reviewed.

**Results:** Twenty-nine cases of DILI were seen by the hepatologist over the 12-months period. Median (range) age was 51 (18-76) years. Twenty (69%) were female, 24 (83%) were Chinese. TCM were the commonest group of drug implicated as 15 (52%) of the patients had presumed DILI from TCM. Four (14%) were from anti-tuberculosis drugs. Eighteen (62%) presented as hepatic picture, 7 (24%) as cholestatic, and 4 (14%) as mixed picture. Extrahepatic manifestations were seen only in 10% of patients. Three (10%) died and 1 (3%) underwent liver transplant for liver failure.

**Conclusion:** DILI is a common clinical problem with significant mortality. TCM is an important cause of DILI in Asia. Further studies on DILI from TCM or other complementary medicines are needed.

**MP208****Impact of New Legislation on the Number of Liver Transplant in Singapore****CT WAI<sup>1</sup>, LG LIM<sup>1</sup>, HC LOW<sup>1</sup>, M DA COSTA<sup>1</sup>, J ISAAC<sup>2</sup>, SG LIM<sup>1</sup>**<sup>1</sup>*Gastroenterology and Hepatology, <sup>2</sup>Surgery, National University Hospital, Singapore*

**Aim:** To evaluate the impact of HOTA on the number of liver transplant performed in Singapore.

**Methods:** All cases of potential liver organ donors referred to the Liver Transplant Programme from 1 July 2002 to 30 May 2005 were reviewed. Number of referrals, liver retrieval, and liver transplant were compared between the 24 months pre- and the 11 months post-HOTA period.

**Results:** Two hundred and forty potential cadaveric donors were referred over the 35 months period, i.e., 6.86 cases/month: 7.46 vs. 5.54 cases/month pre- and post-HOTA, respectively. Characteristics of donors: age 46  $\pm$  1 years and 168 (70%) were male. The commonest causes of death were intracranial bleeding or stroke 155 (65%), non-traffic accident trauma 34 (14%) and traffic accident trauma 29 (12%). Liver donation was deemed unsuitable in 175 (73%) of the referrals, with commonest reasons were disapproval from family 66 (38%) and medically unsuitability 55 (31%). Seven and 4 of liver grafts were eventually transplanted in the pre- and post-



HOTA period ( $P = 0.48$ ).

**Conclusion:** The number of cadaveric liver graft referral and actual cadaveric liver transplants did not differ pre- and post-HOTA period.

#### MP209

##### Liver Transplantation for Hepatocellular Carcinoma in Singapore

CT WAI<sup>1</sup>, LG LIM<sup>1</sup>, SC WANG<sup>4</sup>, YM LEE<sup>1</sup>, J ISAAC<sup>2</sup>, A WEE<sup>3</sup>, SG LIM<sup>1</sup>

<sup>1</sup>Gastroenterology and Hepatology, <sup>2</sup>Surgery, <sup>3</sup>Pathology, <sup>4</sup>Diagnostic Imaging, National University Hospital, Singapore

**Aim:** Prognosis of patients with hepatocellular carcinoma (HCC) is poor. Surgical resection offers the benefit of removal of the tumour but is associated with liver decompensation and tumour recurrence even after successful surgery. Liver transplantation offers the benefits of complete tumour removal with prevention of both decompensation and recurrence post-operation. This paper aims to review results of liver transplantation for patients with HCC in Singapore.

**Methods:** All adult patients with HCC accepted on the waiting list for liver transplantation (based on the Milan's criteria) from 1996 till 2004 in Singapore were reviewed. Patients' HCC were managed with either transarterial chemoembolisation or percutaneous radiofrequency ablation while they were on waiting list. Post-transplant survival and factors associated with mortality were analysed by Cox regression analysis.

**Results:** Forty-one patients with HCC were accepted onto the waiting list over the 9 years period: 22 underwent transplantation and 19 did not, with 1-year survival at 91% vs 24% ( $P < 0.001$ ). Mean waiting time for transplanted patients were 39 weeks. Post-transplant HCC recurrence was 2/22 (9%). Among all patients, mortality was significantly related to baseline white cell counts, prothrombin time, age, alpha-fetoprotein level, Child-Pugh score, and whether patients underwent transplant.

**Conclusion:** Despite the relatively long waiting time of mean of 39 weeks, post-transplant recurrence of HCC was relatively low at 9%. Liver transplant is an effective treatment for patients with HCC, with reasonable long-term survival.

#### MP210

##### Long-term Results of Liver Transplant in Patients with Chronic Viral Hepatitis Related Liver Disease in Singapore

CT WAI<sup>1</sup>, LG LIM<sup>1</sup>, D SUTEDJA<sup>1</sup>, YM LEE<sup>1</sup>, KH LEE<sup>2</sup>, J ISAAC<sup>2</sup>, SG LIM<sup>1</sup>

<sup>1</sup>Gastroenterology and Hepatology, <sup>2</sup>Surgery, National University Hospital, Singapore

**Aim:** To evaluate long-term results and survival in patients transplanted for CHB and CHC related liver diseases.

**Methods:** Patients transplanted for CHB and CHC related diseases from 1990 till March 2004, which included decompensated cirrhosis and hepatocellular carcinoma (HCC), were reviewed and analysed.

**Results:** Twenty-five patients were transplanted for CHB related liver disease, with mean follow up of  $153 \pm 25$  weeks. Two- and 4-year survival rates were 75% and 69% respectively. Hepatitis B recurrence from YMDD mutants occurred in 5 patients and 4 were treated successfully with adefovir dipivoxil with resolution in transaminases and/or improvement in histology. One patient became non-compliant with follow up and medications and died 173 weeks post transplant from reactivation of the wild-type hepatitis B virus. Nine patients were transplanted for CHC related liver disease, with mean follow up of  $188 \pm 40$  weeks, and 2- and 4-year survival rates were 89% and 76%, respectively. Two patients developed hepatitis C recurrence and were treated with interferon and ribavirin. One responded with sustained response but the other remained viremic and died of HCC recurrence 2 years post transplant.

**Conclusion:** Long-term results from CHB and CHC related liver diseases were satisfactory and comparable to major transplant centres in the U.S. and

Europe. Recurrence of viral hepatitis post transplant is controllable with current antiviral therapy.

#### MP211

##### Liver Transplantation in Singapore 1990-2004

CT WAI<sup>1</sup>, YM LEE<sup>1</sup>, D SUTEDJA<sup>1</sup>, M DA COSTA<sup>2</sup>, KH LEE<sup>2</sup>, SH QUAK<sup>3</sup>, J ISAAC<sup>4</sup>, SG LIM<sup>1</sup>

<sup>1</sup>Gastroenterology and Hepatology, <sup>2</sup>Medicine, <sup>3</sup>Paediatrics, <sup>4</sup>Surgery, National University Hospital, Singapore

**Aim:** Liver transplantation is the accepted standard of care for patients with hepatocellular carcinoma, decompensated liver cirrhosis and acute liver failure. Since the first liver transplant done in Singapore in 1990, results have been improving. We review the overall results of liver transplantation over the last 15 years.

**Methods:** All transplant cases from 1990 to 2004 were reviewed retrospectively.

**Results:** One hundred liver transplants were performed over the last 15 years, 4 in the first 5 years and 96 in the subsequent 10 years. Overall 1- and 5-year survival rates were 80% and 78%, respectively. Forty-four were paediatric transplants, of which biliary atresia was the commonest indication for paediatric transplant. Fifty-six were adult transplants of which hepatocellular carcinoma and decompensated hepatitis B cirrhosis were the commonest indication for adult transplant. Infection remained the commonest cause of mortality.

**Conclusion:** The number of transplants carried out per year was small due to the low cadaveric donation rate, but the survival of liver transplant patients was comparable to well established liver transplant centres.

#### MP212

##### Pre-liver Transplant Locoablative Therapy: A Double-edged Sword

CT WAI<sup>1</sup>, LG LIM<sup>1</sup>, J ISAAC<sup>2</sup>, D SUTEDJA<sup>1</sup>, SC WANG<sup>3</sup>, G LAU<sup>3</sup>, SG LIM<sup>1</sup>

<sup>1</sup>Gastroenterology and Hepatology, <sup>2</sup>Surgery, <sup>3</sup>Diagnostic Imaging, National University Hospital, Singapore,

**Aim:** To evaluate locoablative therapy as bridging therapy prior to liver transplant.

**Methods:** Patients with HCC who fulfilled the Milan criteria and listed for liver transplantation from January 1996 till April 2005 at our centre were studied. Patients on waiting list were treated with locoablative therapy for tumour control. CT scan of the tumour was done 4 weeks post therapy and then 3 monthly. Further locoablative therapy was given if viable tumours were seen. Rate of hepatic decompensation and tumour progression pre-transplant, and HCC recurrence post transplant were evaluated.

**Results:** Forty-three patients were listed for liver transplant over the 10-year period: Chronic hepatitis B (58%) and C (19%) were the two commonest causes of cirrhosis. Number of nodule and size of HCC were  $1.6 \pm 0.1$  and  $3.5 \pm 0.4$  cm, respectively. Four (9%) had tumour progression after  $43 \pm 8$  weeks, despite  $4 \pm 1$  sessions of locoablative therapy. 22 underwent transplant after waiting time of  $40 \pm 8$  weeks, and had  $2.1 \pm 0.3$  sessions of locoablative therapy (1.9 TACE and 0.2 RFA). Post-transplant survival at 1 and 3 year were 91% and 76%, respectively. Two patients (9%) had HCC recurrence at 6 and 24 months post-transplant. Twenty-one were not transplanted after being followed for  $47 \pm 9$  weeks, and had  $2.2 \pm 0.4$  sessions of locoablative therapy (1.6 TACE, 0.4 RFA, 1 patient had 2 sessions of percutaneous ethanol injection, and 2 patients had brachytherapy). Fourteen died after follow up of  $28 \pm 9$  weeks: 11 from liver failure, 2 ruptured HCCs, and 1 septicemia.

**Conclusion:** Bridging therapy with locoablative treatment was effective in minimising tumour progression pre-transplant (9%), and tumour recurrence post-transplant (9%).

## MP213

**Improving the Diagnostic Algorithm for Colorectal Cancer (IDAC Study) — Positive Predictors for Colorectal Neoplasia in Patients Undergoing Colonoscopy****RKM WONG<sup>1</sup>, KY HO<sup>2</sup>, YH CHAN<sup>2</sup>, KG YEOH<sup>2</sup>**<sup>1</sup>Gastroenterology and Hepatology, National University Hospital, Singapore,<sup>2</sup>Medicine, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** Colorectal cancer is the commonest cancer in Singapore. This study aims to identify positive predictors for colorectal neoplasia in order to improve diagnostic algorithms for cancer.

**Methods:** Colonoscopy records for consecutive patients with no known colorectal carcinoma, within the study period were reviewed. Advanced neoplasia was defined as adenomas >1 cm, presence of high-grade dysplasia, villous adenoma or carcinoma. Multivariate logistic regression was performed to identify factors predictive for neoplasia.

**Results:** A total of 1,881 colonoscopy records were reviewed, mean age 56 ( $\pm$  15.4) years, 57.6% were male, 81.2% Chinese, 7% Malay and 6.7% Indians. Advanced neoplasia was detected in 41/1881 (2.2%; 95% CI, 1.6-2.9) for which age ( $P$  = 0.004; OR 1.04; 95% CI, 1.01-1.07) and past history of previous polyp ( $P$  = 0.007; OR 3.2; 95% CI, 1.4-7.6) were significant predictors. Adenomas were diagnosed in 225/1881 (12%; 95% CI, 10.5-13.5) and male gender ( $P$  < 0.001; OR 2; 95% CI, 1.3-3.0), age ( $P$  < 0.001; OR 1.03; 95% CI, 1.03-1.04), past history of previous polyp ( $P$  < 0.001; OR 2.5; 95% CI, 1.6-4.1) and altered bowel habits ( $P$  = 0.045; OR 1.5; 95% CI, 1.0-2.2) were significant predictors. A negative association was seen with abdominal pain ( $P$  = 0.006; OR 0.5; 95% CI, 0.28-0.97). ROC analysis indicated an optimal age for detection of neoplasia was 55 years for adenomas and 65 years for advanced neoplasia. In patients >55 years, colorectal adenomas were diagnosed in 16.7% of colonoscopies, while in patients >65 years 4.5% were positive for advanced neoplasia.

**Conclusion:** Positive predictors for colorectal neoplasia included age, male gender, past history of polyps, and altered bowel habits, while abdominal pain was negatively associated. Information on positive predictors and age-specific diagnostic yields can be helpful in guiding decisions on colonoscopy.

## MP214

**Primary Biliary Cirrhosis: Study of a Singaporean Population — Demographics, Prognosis and Factors Involving Progression****RKM WONG<sup>1</sup>, SG LIM<sup>1</sup>, YH CHAN<sup>2</sup>, MO AUNG<sup>1</sup>, CT WAI<sup>1</sup>**<sup>1</sup>Gastroenterology and Hepatology, National University Hospital, Singapore,<sup>2</sup>Medicine, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** Primary biliary cirrhosis (PBC) is a rare disease, with most studies performed on Caucasians. We aimed to evaluate the natural history of PBC among Asian patients at our tertiary liver centre.

**Methods:** Patients with PBC presenting at our institution from 1990 till 2005 were reviewed. Factors including demographics, baseline and change of laboratory markers, were evaluated for their association with hepatic decompensation. Multivariate analysis was not performed due to the small number of subjects and multicollinearity amongst the clinical predictors.

**Results:** Thirty-two patients with PBC, mean  $\pm$  sd (range) age of 55.1  $\pm$  10.7 (26.7 to 79.8) years were identified, of which 31 (97%) were female and 29 (91%) Chinese. Sixteen (50%) were asymptomatic at diagnosis, 14 had bone mineral densitometry performed with a mean T-score of -1.79 (spine) and -1.99 (hip) and AMA was positive in 26 (81%). Duration of follow-up was 5.3  $\pm$  4.4 (0.02-5.1) years, of which 5 (15.6%) had an event of hepatic decompensation within 5 years and at end a total of 10 (31%) within 10 years. Kaplan-Meier analysis showed a mean 9.94 (95% CI 7.6-12.3) with median 8.7 years to hepatic decompensation. Significant predictors upon univariate analysis were initial s.bilirubin (14.8 vs. 77.6  $\mu$ mol/L,  $P$  < 0.001), prothrombin time (11.7 vs 14s,  $P$  = 0.008), s.albumin (38.3 vs 31.8 g/L,  $P$  < 0.001), s.ALP (271.7 vs 571.8 U/L,  $P$  = 0.005) and HDL levels (1.73 vs 0.66 mmol/L,  $P$  = 0.01) between stable patients and those with decompensation. Interestingly,

rate of change of laboratory indices was not a significant predictor.

**Conclusion:** The demographics of PBC in Singapore mirrored the populace ethnic make-up, with a preponderance for middle-age females and the rate of decompensation at 5 and 10 years being 15.6% and 31%. Initial bilirubin, prothrombin time, albumin, ALP and HDL levels at time of diagnosis have promise as prognostic indicators for an adverse outcome.

## MP215

**Effects of Metabolic Enzyme Gene Polymorphisms on Smoking Cessation in Nicotine Sublingual Tablets Clinical Trial****S GUO<sup>1</sup>, C DAFANG<sup>2</sup>**<sup>1</sup>General Psychiatry, Institute of Mental Health/Woodbridge Hospital, Singapore, <sup>2</sup>College of Human Genetics, Peking University, China

**Aim:** Investigate the association between metabolic enzyme gene and smoking cessation.

**Methods:** We conducted a randomised, double-blind, placebo-controlled pharmacogenetic study on Chinese smokers using nicotine sublingual tablets for smoking cessation for 2 months with 1 month follow-up between September 2003 and February 2004. Two hundred and thirty smokers provided the informed consent and blood samples for genetic analysis. Genotyping was performed for the polymorphisms of NQO1 Pro/Pro187Ser, EPHX Tyr113His and EPHX His139Arg using PCR-RFLP.

**Results:** Our results indicate that the individuals carrying NQO1 Ser/Ser187 genotype show much worse efficacy of smoking cessation with nicotine sublingual tablets than those carrying NQO1 Pro/Pro187 genotype at the end of the second month (OR = 0.37, 95% CI = 0.15-0.90,  $P$  = 0.028). At the end of the third month of treatment, the individuals carrying either NQO1 Pro/Ser187 or Ser/Ser187 genotypes show much worse efficacy of smoking cessation than those carrying NQO1 Pro/Pro187 genotype (Pro/Ser187 genotype: OR = 0.47, 95% CI = 0.24-0.91,  $P$  = 0.024; Ser/Ser187 genotype: OR = 0.39, 95% CI = 0.17-0.91,  $P$  = 0.03). We did not find any significant results for EPHX Tyr113His and EPHX His139Arg, or the interaction between NQO1 Pro187Ser and EPHX genes.

**Conclusion:** In conclusion, NQO1 187Ser variant allele was associated with worse efficacy on smoking cessation with nicotine sublingual tablets.

## MP216

**Outcomes and Effectiveness of a Structured Rehabilitation Programme for Schizophrenic Patients****R MAHENDRAN<sup>1</sup>, MM HENDRICKS<sup>2</sup>, SC AW<sup>3</sup>, T V<sup>2</sup>, X LIN<sup>4</sup>**<sup>1</sup>General Psychiatry, <sup>2</sup>Case Management Unit, <sup>3</sup>Psychiatric Rehabilitation, Institute of Mental Health/Woodbridge Hospital, Singapore, <sup>4</sup>Biostatistician, Clinical Trial & Epidemiology Research Unit, Singapore

**Aim:** To illustrate the effectiveness of a 6-month rehabilitation programme for a group of schizophrenic patients.

**Methods:** Twenty-six patients were recruited from the acute and long-stay wards in IMH. The Activities of Daily Living (ADL) skills, domestic skills, Social Skills Training (SST), Psychological Aspect, Positive and Negative Scores (PANSS) and Clinical Global Scales (CGI) were administered by trained clinicians upon admission and at the end of the programme.

**Results:** Demographics consisted of 21 Chinese, 4 Malays and 1 Indian with an age range of 19 years to 54 years. Two patients opted out during the programme. A comparison of before and after results of the programme revealed a significant  $p$  score of  $P$  < 0.001 for ADL, domestic skills, SST, psychological aspects and  $P$  < 0.006 for PANSS. This was further studied with Median scores, which registered ADL before as 20, after 25, domestic skills before 24, after 33, SST before 20 after 25, PANSS before 70 after 70, CGI after score was 2. Frequency scores substantiated this improvement with only 12.6% of patients scoring >20 for ADL before but 95.8% after, 25% patients scoring >28 for domestic skills before but 83.3% after, 79.2% patients scoring >18 for SST but 95.8% after, 45.8% scoring >22 for psychological aspects but 91.7% after and 62.5% with <70 points before for PANSS but 75% after. CGI after was 95.8% for all patients with a score of 1

to 3. Only 1 patient (4.4%) had a score of 4.

**Conclusion:** The results support the concept that a rehabilitation programme can assist patients to reach their potential assets, even if this falls short of full independence.

#### MP217

##### Pharmacoepidemiology of Antidepressant Prescriptions in East Asia: Findings from a Multicentre Study

**K SIM<sup>1</sup>, R MAHENDRAN<sup>1</sup>, NB LEE<sup>1</sup>, HC CHUA<sup>1</sup>, MY CHONG<sup>2</sup>, N SHINFUKU<sup>3</sup>, CH TAN<sup>4</sup>**

<sup>1</sup>General Psychiatry, Institute of Mental Health/Woodbridge Hospital, Singapore, <sup>2</sup>Psychiatry, Kaohsiung Medical University, Taiwan, <sup>3</sup>Human Sciences, Seinan Gakuin University, Japan, <sup>4</sup>Psychological Medicine, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** Data are sparse on the prescription patterns of antidepressants in East Asia. We seek to examine the differences between those patients given newer antidepressants (defined as antidepressants introduced after 1990) vs. older antidepressants (defined as antidepressants introduced before 1990), especially in relation to demographic, clinical factors, different treatment settings and hypothesise that the use of newer antidepressants was associated with treatment settings rather than specific diagnostic categories.

**Methods:** A multi-site, drug-centred, cross sectional study was conducted on 1898 patients in 5 countries within East Asia (China, Japan, Korea, Taiwan and Singapore) in 2004 using a structured data form. Multiple logistic regression was carried out to adjust for relevant covariates and to determine the predictors of newer antidepressant prescription.

**Results:** Prescription of newer antidepressants was associated with younger age ( $z = -4.52, P < 0.001$ ) and inpatient setting ( $P = 0.009$ ). Using Japan as a reference, newer antidepressant prescription was more likely to occur in Taiwan (OR 1.78, 95% CI 1.63-1.95,  $P < 0.001$ ), Singapore (OR 1.76, 95% CI 1.56-1.99,  $P < 0.001$ ), China (OR 1.44, 95% CI 1.31-1.59,  $P < 0.001$ ) and Korea (OR 1.42, 95% CI 1.27-1.59,  $P < 0.001$ ). Age ( $P < 0.001$ ), treatment setting ( $P < 0.05$ ), country ( $P < 0.001$ ), but not specific diagnosis (affective or anxiety disorders), were significant predictors of antidepressant use.

**Conclusion:** Demographic factors and different treatment settings may influence antidepressant use more than clinical factors such as diagnosis. Further longitudinal studies are warranted to determine changes in antidepressant use over time as well as further elucidate factors related to the patient, clinician, setting, regulatory and socio-economic factors influencing antidepressant prescription.

#### MP218

##### Medical Comorbidity in Patients with First Episode Psychosis: a Longitudinal Perspective

**K SIM<sup>1</sup>, THB CHUA<sup>1</sup>, R MAHENDRAN<sup>1</sup>, SA CHONG<sup>2</sup>**

<sup>1</sup>General Psychiatry, <sup>2</sup>Early Psychosis Intervention, Institute of Mental Health/Woodbridge Hospital, Singapore

**Aim:** Previous reports have highlighted increased rates of physical illnesses in patients with psychotic disorders such as schizophrenia, with rates ranging from 19% to 57%. This prospective study seeks to determine the clinical impact of medical comorbidity on patients with first episode psychosis.

**Methods:** The PANSS, SUMD, GAF, WHOQOL-Bref were used to assess psychopathology, insight, social/occupational functioning and quality of life respectively at baseline and at 6, 12, 18 and 24 months. A repeated measurement analysis was performed and the model was fitted with an autoregressive structure within each subject. The absolute change in SUMD from baseline and the percentage change in PANSS, GAF & QOL were compared between groups with and without medical comorbidity by Mann Whitney U test for each time-point.

**Results:** Out of 142 patients, medical comorbidity was present in 21.8% ( $n = 31$ ) of the patients and the common medical conditions were related to the cardiovascular, respiratory and endocrine systems. Patients with medical

comorbidity had greater awareness of their psychiatric illness, consequences and the need for treatment at 12 and 18 months, were associated with longer period of psychiatric admission at 18 months but had lower PANSS total and general psychopathology subscale score at 24 months. No significant differences were found in gender, marital status, employment status, duration of untreated psychosis, quality of life and GAF scores.

**Conclusion:** Clinicians need to be aware of the presence of medical comorbidity in patients with first episode psychosis, which may not be necessarily associated with a worse outcome.

#### MP219

##### Reliability and Validity of the Short Zarit Burden Interview for Family Caregivers of Patients with Dementia

**PLK YAP<sup>1</sup>, L HENDERSON<sup>2</sup>, J GOH<sup>3</sup>**

<sup>1</sup>Geriatric Medicine, <sup>2</sup>Nursing, <sup>3</sup>Medical Social Work, Alexandra Hospital, Singapore

**Aim:** To examine the reliability and validity of the 12-item Short Zarit Burden Interview (SZBI) for assessing caregiver burden in dementia caregivers in Singapore.

**Methods:** An expert panel (doctor, nurse and social worker) and a group of dementia caregivers reviewed the SZBI for content validity. The scale, together with a single question to elicit a "yes" or "no" answer on whether the caregiver felt burdened in caregiving overall, was administered to 66 consecutive primary caregivers of patients with dementia attending a geriatric clinic. Internal consistency by Cronbach Alpha was used to assess reliability. Construct validity was determined through t-test and factor analysis. Cutoff for burden was elicited through Receiver Operating Characteristic (ROC) analysis.

**Result:** Caregivers were mainly females (74%), aged 30-60 (82%) and children (71%) of the patients. Internal consistency (alpha) of the SZBI was high (0.86). Factor analysis revealed 3 factors, accounting for 69% of the variance. The factors were: 1) effect on personal life of caregiver; 2) negative emotions related to caregiving; 3) feeling the need to do more for the patient. Area under the curve for ROC was 0.84 and the cutoff for caregiver burden on the scale was 20.

**Conclusion:** The SZBI is reliable and valid for assessing caregiver burden in caregivers of patients with dementia in our population.

#### MP220

##### Effect of Continuous Positive Airway Pressure on Sleepiness in Mild Alzheimer's Disease Patients with Sleep-disordered Breathing

**MS CHONG<sup>1</sup>, M MARLER<sup>2</sup>, S ANCOLI-ISRAEL<sup>2</sup>**

<sup>1</sup>Geriatric Medicine, Tan Tock Seng Hospital, Singapore, <sup>2</sup>Psychiatry, University of California, San Diego, USA

**Aim:** Studies report that 33% to 70% of demented subjects have sleep-disordered breathing (SDB). Continuous positive airway pressure (CPAP) treatment has been shown to reduce daytime sleepiness and improve health-related quality of life in non-demented elderly. No current data is available in demented patients. The effect of therapeutic CPAP treatment on daytime sleepiness in mild Alzheimer's disease (AD) patients with SDB was assessed.

**Methods:** This is a randomised, double-blind, placebo-controlled trial. Patients with mild AD and SDB were randomly assigned to receive 6 weeks of therapeutic CPAP or 3 weeks of sham CPAP followed by 3 weeks of therapeutic CPAP. Epworth Sleepiness Scale was administered at baseline, 3 and 6 weeks. Changes in daytime sleepiness in subjects who received optimal therapeutic CPAP compared to the sham CPAP group were analysed.

**Results:** Within the therapeutic CPAP group, ESS scores were reduced from 8.84 during baseline to 6.37 after 3 weeks of treatment ( $P = 0.021$ ), and reduced to 5.39 after 6-weeks of treatment ( $P = 0.002$ ). Within the sham CPAP group, there was no significant difference after 3 weeks of sham CPAP, but a significant decrease from 7.85 to 6.72 ( $P = 0.012$ ) after 3 weeks of therapeutic CPAP.



**Conclusion:** These data provide initial evidence of effectiveness of CPAP in improving subjective daytime sleepiness in AD patients with SDB.

#### MP221

##### Is Clinical Aspiration Associated with a Higher Mortality in Elderly Patients with Recent and Previous Strokes?

**A HUM<sup>1</sup>, PK LIEU<sup>1</sup>, YY SITOH<sup>1</sup>, MS CHONG<sup>1</sup>**

<sup>1</sup>Geriatric Medicine, Tan Tock Seng Hospital, Singapore

**Aim:** To study the survival outcomes of a heterogeneous group of elderly stroke patients with clinical aspiration, compared with those without clinical aspiration.

**Methods:** Fifty elderly patients (mean age  $75 \pm 6.8$  years) with stroke disease had their swallowing evaluated by clinical aspiration methods and fiberoptic endoscopic examination of swallowing (FEES) between April 2000 and September 2001. The sensitivity of the clinical aspiration test was 94.1% with a specificity of 62.5%. They were subsequently followed up over a period of 48 months, with progress monitored through phone interviews with caregivers, review of medical charts in the event of readmissions and review of speech therapy sessions. The outcome studied being death during the study period. Kaplan-Meier survival curves were used to compare differences in mortality between patients with clinical aspiration vs. those without clinical aspiration.

**Results:** Of the 50 subjects, 25 patients were  $\leq 74$  years old (young-old) and 25 were  $\geq 75$  years old (old-old). Twenty-three patients died on follow up, of which 7 were in the young-old and 16 were in the old-old age groups. Old-old patients with clinical aspiration did not have greater mortality compared to patients without clinical aspiration. However, young-old patients with clinical aspiration had a higher mortality in the first 20 months, compared with those without clinical aspiration.

**Conclusion:** These results suggest that in young-old patients with stroke disease who have clinical aspiration, there is a need for closer supervision and surveillance, especially in the first 20 months following stroke disease.

#### MP222

##### Non-Myeloablative Haematopoietic Stem Cell Transplantation (NMT) is Well Tolerated and Effective in Patients with High-risk Haematological Malignancies: the NUH Experience

**CS CHEN<sup>1</sup>, N YUSOF<sup>1</sup>, B TAN<sup>1</sup>, P LAW<sup>2</sup>, TG SOH<sup>2</sup>, F YASIR<sup>2</sup>, LK TAN<sup>1</sup>**

<sup>1</sup>Haematology-Oncology, <sup>2</sup>Laboratory Medicine, National University Hospital, Singapore

**Aim:** Choosing suitable NMT conditioning regimen is critical for the outcome. To evaluate the safety and feasibility of NMT for high risk diseases or patients excluded from conventional allogeneic transplant due to comorbidity, we initiated an IRB-approved protocol adapting fludarabine (day -4 to -2, total 90 mg/m<sup>2</sup>) and TBI (day 0, 200 cGy) initiated in Seattle. However, GvHD prophylaxis was modified with the combination of cyclosporin, MMF and methotrexate.

**Methods:** A total of 13 high-risk patients (10/3 M/F) received NMT in 2004. Median age was 42 (range, 19-62) and diagnosis included Myelodysplastic Syndrome (n = 5, 1 with end stage renal failure on dialysis; 1 with aplastic marrow without recovery after first induction chemotherapy), Multiple myeloma (MM) (n = 4, all failed previous autologous and/or allogeneic transplants), AML (n = 3, each with compromised cardiac function, chronic hepatitis and transformed AML respectively) and CML (n = 1).

**Results:** In median follow-up of 10 months (6.5-17), no transplant related mortality was seen. Twelve patients were alive and 9 remained in complete remission. 1) and required transfusions of 2 units (median, range 2-9) ml for all except one patient and the duration of neutropenia was 14 days (0-20). Only 4 patients experienced thrombocytopenia (platelet less than 20,000/ $\mu$ ANC fell below 500/mild acute GvHD in 1 and chronic GvHD in 7 were easily managed.

**Conclusion:** NMT regimen in NUH appears to be a safe and effective treatment for haematological malignancies patients with high-risk features. Continued patient enrollment is warranted.

#### MP223

##### A Denaturing High Performance Liquid Chromatography (DHPLC) Assay for Detecting Extracellular Growth Factor Receptor (EGFR) Mutations

**TM CHIN<sup>1</sup>, D ANAUR<sup>2</sup>, M SALTO-TELLEZ<sup>2</sup>, B AHMAD<sup>2</sup>, K KAWAKAMI<sup>3</sup>, B IACOPETTA<sup>4</sup>, R SOONG<sup>2</sup>**

<sup>1</sup>Haematology-Oncology, National University Hospital, Singapore, <sup>2</sup>Cancer Programme, National University of Singapore, Office of Life Sciences, Singapore, <sup>3</sup>Surgery, Kanazawa University School of Medicine, Japan, <sup>4</sup>Surgery and Pathology, The University of Western Australia, Australia

**Aim:** EGFR mutations have recently been shown to predict for response to small molecule inhibitors (Gefitinib; Erlotinib) in NSCLC patients. Sequencing is the current method of choice, however its high costs and difficulty in detecting minority alleles are limitations to its application. In BRCA1 and hMLH1 studies, DHPLC has been shown to be a cost-efficient alternative to sequencing with a lower limit for detecting minority alleles. The goal of this study was to optimise a DHPLC assay for detecting EGFR mutations.

**Methods:** Numerous PCR and DHPLC parameters were rigorously tested to identify optimal running conditions. Using this assay, 195 lung cancer samples from Singapore, Perth and Japan were screened for mutations in exons 18-21 of EGFR. The detection limit of DHPLC was compared to sequencing in mixing experiments.

**Results:** DHPLC detected most of the commonly described mutations, namely deletions around codons 746-752 in Exon 19 and T-G substitutions at codon 858 in Exon 21. Sequence variants at codons 719, 720, 836 were also detected. DHPLC detected mutations in a 1:500 mutant:wild-type mixture. Cost analysis showed that DHPLC can reduce expenses by 20%.

**Conclusion:** Our results have shown DHPLC can detect most of the commonly described EGFR mutations with a low detection limit, and hence may be a cost-efficient and sensitive alternative for detecting EGFR mutations for future EGFR inhibitor response prediction.

#### MP224

##### Ketoconazole Renders Poor CYP3A Phenotype Status With Midazolam as Probe Drug

**LS THAM<sup>1</sup>, HS LEE<sup>2</sup>, LZ WANG<sup>1</sup>, L FAN<sup>2</sup>, R SOO<sup>1</sup>, SC LEE<sup>1</sup>, BC GOH<sup>1</sup>**

<sup>1</sup>Haematology-Oncology, National University Hospital, Singapore, <sup>2</sup>Pharmacology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** Drugs metabolised by cytochrome CYP3A isoenzymes have wide interindividual variability and normally distributed plasma clearance distributions. This makes precise dosing difficult to achieve clinically, which may compromise safe therapy. We hypothesised that with potent inhibition of CYP3A, we could clinically render patients "poor metaboliser" phenotype status by creating a drug-sparing interaction and thus reduce interindividual pharmacokinetic variability of midazolam, a well-known CYP3A substrate.

**Methods:** Intravenous (IV) bolus midazolam at doses of 2.5 mg and 1 mg were administered to 28 and 29 patients with cancer with and without co-administration of 200 mg of oral ketoconazole twice a day respectively for 3 days, starting a day before midazolam. Pharmacokinetic analyses of midazolam on both groups were derived using non-compartmental methods and compared.

**Results:** The mean clearance (CL) of midazolam was reduced 6 times by ketoconazole. Midazolam CL were normally distributed in both groups, and ranged from 1.7-51.9 and 1.4-8.2 L/h in the control and ketoconazole groups, respectively, corresponding to a 7-fold reduction in dispersion between the 2 groups. Area-under-the-curve (AUC) variability was reduced by more than 100%. A limited sampling model consisting of time points at 15 and 300 minutes was validated as a phenotype for CYP3A activity to facilitate the use of midazolam as a probe drug for CYP3A activity.

**Conclusion:** Potent inhibition of CYP3A by ketoconazole reduced midazolam CL and AUC variability, allowing for more precise achievement of therapeutic target drug exposure. Prospective evaluation of this approach, together with dose adjustment based on limited sampling appears warranted.

**MP225**

**The Effect of Stavudine Extended-Release (ER) And Immediate-Release (IR) on HIV-Related Lipodystrophy**

**Y YANG<sup>1</sup>, A WILDER-SMITH<sup>1</sup>, A PANCHALINGHAM<sup>1</sup>, NOO THA<sup>1</sup>, N PATON<sup>1</sup>**

<sup>1</sup>Infectious Disease, Tan Tock Seng Hospital, Singapore

**Aim:** Stavudine (d4T) extended release (ER), which was developed to simplify the drug regimen, was suggested to be mild in HIV-related lipodystrophy development based on clinical assessment, but no objective assessment results are available. The aim of this study is to determine and compare the effect of d4T ER and immediate-release (IR) formulation on body composition change over time.

**Methods:** Body composition was measured 3-monthly for 18 months by dual energy X-ray absorptiometry in 29 HIV-infected patients who were taking either d4T ER (15 patients) or IR as a substudy of a randomised controlled clinical trial.

**Results:** At the substudy entry, whole and regional body composition results were comparable between the two groups of patients (all  $P > 0.05$ ). During 18 months of further follow up, there were significant decreases of limb fat, leg fat percent, ( $P = 0.003$  and  $0.05$ ). Lipodystrophy assessed by questionnaire were also showed no difference between the two groups of patients both at the sub-study entry and at the end of study (all  $P > 0.05$ ).

**Conclusion:** No different body composition changes over 18 months follow up between d4T ER and IR were found.

**MP226**

**Collection of Autologous Peripheral Blood Stem Cell (PBSC) Products from Patients with Low Platelet Counts**

**P LAW<sup>1</sup>, J MAH<sup>1</sup>, F YASIR<sup>1</sup>, TG SOH<sup>1</sup>, TC LIU<sup>1</sup>, LK TAN<sup>1</sup>**

<sup>1</sup>Laboratory Medicine, National University Hospital, Singapore

**Aim:** A substantial portion of patients undergoing autologous (PBSC) mobilisation has low platelet counts and frequently requires platelet transfusion during collection. The aim of this analysis is to compare platelet loss and PBSC collection using 2 systems so that platelet transfusions can be minimised.

**Methods:** Between August 04 and March 05, 35 autologous products were collected from 18 patients with low platelet counts ( $\leq 75,000/\mu\text{L}$ ) prior to leukapheresis. All were collected using automated procedures and 3 times blood volume was processed for each product on either Spectra (Cobe) (21 products) or Amicus (Baxter) (14). Collection efficiencies were calculated as total cells (either CD34+ or platelets) in the product divided by the circulating counts prior to leukapheresis times processed volume. Statistical significance was determined by unpaired Student's t-test.

**Results:** There were no differences in patient age, weight, WBC, platelets, and CD34+ cell count before leukapheresis on either machines. There were also no differences in the proportion and the total CD34+ cells in the PBSC products. While both devices collected CD34+ cells with similar efficiencies ( $64 \pm 37\%$  for Amicus and  $68 \pm 37\%$  for Spectra), the Amicus PBSC products had a significantly ( $P \leq 0.05$ ) smaller volume ( $159 \pm 17$  mL vs.  $193 \pm 28$  for Spectra) and contained fewer platelets ( $6.4 \pm 2.6 \times 10^{10}$  vs.  $9.6 \pm 3.2 \times 10^{10}$ ). The platelet collection efficiency was also lower with Amicus ( $8.6 \pm 2.4\%$  vs.  $18.2 \pm 17.8\%$ ), indicating lower platelet losses during collection.

**Conclusion:** Our results suggested that Amicus is more appropriate than Spectra for PBSC collection in patients with low platelet counts.

**MP227**

**Monitoring Peripheral Blood (PB) CD34+ Cells for Collecting Autologous and Allogeneic Peripheral Blood Stem Cell (PBSC) Products**

**P LAW<sup>1</sup>, F YASIR<sup>1</sup>, TG SOH<sup>1</sup>, J MAH<sup>1</sup>, J LI<sup>1</sup>, TC LIU<sup>1</sup>, LK TAN<sup>1</sup>**

<sup>1</sup>Laboratory Medicine, National University Hospital, Singapore

**Aim:** Most patients undergoing autologous or allogeneic PBSC transplantation require multiple leukapheresis sessions to achieve a sufficient cell dose. Initiating collection at an optimal time will reduce cost (procedures and processing as well as G-CSF) and patient inconvenience (number of visits). The aim of this analysis is to summarise our institutional experience so that cost-effective treatment for these patients can be designed.

**Methods:** All patients undergo leukapheresis (Cobe Spectra or Baxter Amicus) processing 3 times the blood volume. A total of 170 collection procedures (118 autologous and 52 allogeneic) was performed between January 2004 and May 2005. Autologous patients were mobilised with chemotherapy and G-CSF while allogeneic donors with G-CSF alone. A "good" product is defined as having  $\geq 1 \times 10^6$  CD34+ cells/kg so that a sufficient dose ( $3 \times 10^6/\text{kg}$ ) can be achieved in 3 collections.

**Result:** Each PBSC product contained  $6.07 \times 10^8$  WBC/kg (median, range, 0.13–17.5) and  $1.59 \times 10^6$  CD34+ cells/kg (0.14–24.9). Collected CD34+ cells in the PBSC products were correlated to PB CD34+ cell counts ( $r^2 = 0.63$ ). A total of 129 collections (76%) contained  $\geq 1 \times 10^6$  CD34+ cells/kg. When leukapheresis was started at 5 PB CD34+ cells/ $\mu\text{L}$ , 80% of the products contained  $\geq 1 \times 10^6$  CD34+ cells/kg. If collection was initiated at  $\geq 10$  or  $\geq 20$  CD34+ cells/ $\mu\text{L}$ , the probability of achieving good products increased to 87% or 95%, respectively. However, out of the collections that would *not* have been performed, 48% and 64%, respectively, would contain  $\geq 1 \times 10^6$  CD34+ cells/kg.

**Conclusion:** Initiating leukapheresis of autologous and allogeneic PBSC at 5 PB CD34+ cells/ $\mu\text{L}$  is an acceptable practice with a high probability of achieving a good collection.

**MP228**

**Dielectrophoretic Characterisation of Fetal Nucleated Red Blood Cell for Non-invasive Prenatal Diagnosis**

**GL XU<sup>1</sup>, M CHAN-PARK<sup>2</sup>, P SUKUMAR<sup>3</sup>, HM ZHANG<sup>3</sup>, K NARASIMHAN<sup>3</sup>, JY YING<sup>4</sup>, M CHOOLANI<sup>3</sup>**

<sup>1</sup>Maternal Fetal Medicine, Institute of Bioengineering and Nanotechnology, Singapore, <sup>2</sup>Chemical and Biomedical Engineering, Nanyang Technological University of Singapore, Singapore, <sup>3</sup>Obstetrics and Gynaecology, NUS – Yong Loo Lin School of Medicine, Singapore, <sup>4</sup>Nanotech, Institute of Bioengineering and Nanotechnology, Singapore

**Aim:** Fetal nucleated red blood cells (FNRBCs) from maternal blood are suitable candidates for non-invasive prenatal diagnosis which would eliminate the risk of invasive procedures such as amniocentesis. A technique to enrich these rare cells (1 cell/mL maternal blood) for clinical application is not yet available. We hypothesised that dielectrophoretic properties of FNRBCs would enable to develop a Micro-Electro-Mechanical-System (MEMS) for enrichment.

**Methods:** A microfabricated electrode system was designed and developed for single cell dielectrophoretic characterisation. Strength of electric field, field gradient and dielectric-force act on cell were calculated. Specific-cell membrane-capacitance of FNRBCs collected from termination of pregnancy tissue (7-9 weeks gestation) were studied in the system, and compared with that of six different peripheral blood cell types. Video on cell crossover was recorded.

**Results:** Electric field strength and gradient generated by electrodes were  $5.51 \times 10^4$  V/m and  $1.13 \times 10^{14}$  V<sup>2</sup>/m<sup>3</sup>, respectively. Cell within 10- $\mu\text{m}$  distance from electrode-edge and at a velocity  $> 1.852 \mu\text{m/s}$  could be moved by DEP force of  $2.685 \times 10^{-13}$  N with 1 KHz offset from crossover frequency. Cell crossover frequencies of FNRBCs from three samples were measured under suspending buffer conductivities of 32, 62 and 92 mS/m. The mean specific membrane-capacitance of FNRBCs were  $9.06 (\pm 1.68)$  mF/m<sup>2</sup>,  $10.50$

( $\pm 2.07$ ) mF/m<sup>2</sup> and 10.28 ( $\pm 2.58$ ) mF/m<sup>2</sup>, respectively. Dielectrophoretic spectra of FNRBC, RBC, T-lymphocyte, B-lymphocyte, monocyte and granulocyte indicated a difference in crossover frequency between FNRBCs and other cells which ranged 5 KHz to 50 KHz.

**Conclusion:** Dielectrophoretic properties of FNRBCs studied for first time suggest that these cells can be separated from others under appropriate conditions.

#### MP229

##### Clinical Utility of Repeat Fine Needle Aspiration under Ultrasound Guidance in Patients with Thyroid Nodules

**LC LIM<sup>1</sup>, CF SUM<sup>1</sup>, A KOH<sup>1</sup>, AHY CHIN<sup>2</sup>, SC LIM<sup>1</sup>, RC RAJASOORYA<sup>1</sup>**

<sup>1</sup>Medicine, <sup>2</sup>Nursing, Alexandra Hospital, Singapore

**Aim:** Non-diagnostic thyroid fine needle aspiration (FNA) poses a management dilemma. Ultrasound guided repeat FNA can be useful in such situations. We sought to evaluate the yield and results of repeat ultrasound guided FNA in those with initial non-diagnostic and benign results.

**Methods:** We evaluated 31 patients between 2000 and 2004 whose initial thyroid FNAs showed either benign (17 patients) or non-diagnostic (14 patients) results. Five and 12 patients in these 2 respective groups consented to repeat FNAs under ultrasound guidance.

**Results:** The mean age of all patients was 48.5 years ( $\pm$  SD of 13.7). There was a female preponderance with a female: male ratio of 5:1. Among all, solitary nodules occur in 13, while 16 had dominant nodules within multinodular goiters and 2 had nodules with autoimmune thyroid disease. A family history of thyroid disease was present in 32.3% of all patients. Among the 12 initial non-diagnostic FNAs, all had conclusive results and adequate yield with ultrasound guided repeat FNAs. The mean interval between the 2 FNAs was 10.5 months. All 5 initial benign FNAs had concordant results except 1 who had hurthle cell neoplasm on the repeat ultrasound guided FNA which targeted at the solid component within the nodule.

**Conclusion:** In our series of patients with initial non-diagnostic thyroid FNAs, ultrasound guided repeat FNA provided conclusive results with better yield. There is general concordance of benign results with repeat FNAs. The clinical utility of ultrasound-guided thyroid FNAs is reaffirmed with regards to improved yield and realtime targeted aspiration.

#### MP230

##### Takayasu Arteritis and Ulcerative Colitis

**HH OON<sup>1</sup>, SC NG<sup>2</sup>, EF SHEN<sup>3</sup>**

<sup>1</sup>Medicine, <sup>2</sup>Rheumatology, <sup>3</sup>Gastroenterology, Alexandra Hospital, Singapore

**Aim:** Takayasu arteritis is an uncommon granulomatous vasculitis affecting the aortic arch and its main branches. We highlight a case of Takayasu arteritis with acute hematochezia secondary to ulcerative colitis.

**Methods:** A 36-year-old Chinese female with known Takayasu arteritis presented with a 5-day history of bloody diarrhoea after a course of antibiotic therapy. Stool cultures were sent, including for *Clostridium difficile*. Urgent CT angiography of the mesenteric vessels excluded mesenteric vasculitis. Colonoscopy was performed and revealed inflammation of the colon. Histology of colonic biopsies showed inflammation throughout the colon, focal glandular destruction and occasional crypt abscesses. The patient was treated with antibiotics and after the histology was reported, she was placed on high dose prednisolone and sulphasalazine.

**Result:** Repeat colonoscopy and histological sections 6 weeks after therapy showed resolving pancolitis. The patient went into remission.

**Conclusion:** Literature review shows that Takayasu arteritis has a known, though rare, association with inflammatory bowel disease. The majority of papers are case reports, mainly from Japan and France. This is the first case report of a patient with Takayasu arteritis and ulcerative colitis from Singapore. The literature is reviewed and we discuss the approach to a patient with Takayasu arteritis and hematochezia.

#### MP231

##### Prevalence and Risk Factors for Peripheral Vascular Disease in Patients with Diabetes Mellitus

**S TAVINTHARAN<sup>1</sup>, SC LIM<sup>1</sup>, YY ONG<sup>2</sup>, XH XU<sup>2</sup>, CF SUM<sup>1</sup>**

<sup>1</sup>Medicine, <sup>2</sup>Clinical Research Unit, Alexandra Hospital, Singapore

**Aim:** To study the prevalence and risk factors for peripheral artery disease (PAD) in the patients with diabetes mellitus (DM).

**Methods:** Assessment for DM complications is performed annually in the DM Centre. These patients are recruited for the present study. Patients already having complications of diabetic foot with major limb amputations previously, were excluded from this study. ABI <0.9 defined presence of PAD.

**Results:** Two hundred and seven patients were assessed; ABI available in 173. Males 60%, females 40%. Chinese, Malays, Indians, 76.3%, 13.5%, 8.7% respectively. Mean age 55.9 years (s.d. 14.7), BMI 26.0 kg/m<sup>2</sup> (4.3), DM duration 10.4 years (8.9). HbA1c 8.3% (1.6), glucose 8.1 mM (3.0), LDL-C 2.7 mM (0.8), HDL-C 1.3 mM (0.4), serum creatinine 73.1  $\mu$ mol/L (30.2), urinary albumin creatinine ratio (ACR) 152  $\mu$ g/mg. Prevalence of PAD was 7.7%. PAD was significantly associated with hypercholesterolaemia and CAD. Age (72.9 vs 54.5 y), duration of DM (18.8 vs 9.5 y), weight (55.7 vs 70.2 kg), height (1.53 vs 1.63 m), BMI (23.5 vs 26.1 kg/m<sup>2</sup>), systolic blood pressure (138 vs 129 mm Hg), ACR (339 vs 127  $\mu$ g/mg) and neurothesiometer reading (24 vs 17 volts) were significantly different in patients with and without PAD respectively. We constructed a model using the above 8 covariates to predict the presence of PAD by logistic regression analysis. This model explained 60% of the variation in the outcome of having PAD. Age was the most important predictor for PAD (OR 1.21).

**Conclusion:** PAD is an important complication in DM, especially with increasing age. Recognition of factors that are associated or predict PAD gives better chance of prevention and early detection.

#### MP232

##### Cardiovascular Risk Profile of Asian Subjects with Impaired Fasting Glucose According to the New Diagnostic Criteria Proposed by the American Diabetes Association (ADA)

**P TONG<sup>1</sup>, SC LIM<sup>1</sup>, T SUBRAMANIAM<sup>1</sup>, YS WU<sup>1</sup>, T GOH<sup>1</sup>, MS WONG<sup>1</sup>, WK WEE<sup>1</sup>**

<sup>1</sup>Medicine, Alexandra Hospital, Singapore

**Aim:** The American Diabetes Association (ADA) has recently proposed to lower the diagnostic threshold for impaired fasting glucose (IFG) from >6.0 to 6.9 mM to >5.5 to 6.9 mM. It is known that subjects with IFG are at risk for cardiovascular disease. The cardiovascular risk profile of subjects with fasting plasma glucose (FPG) 5.6 to 6.0 mM has not been well studied.

**Methods:** We examined the cardiovascular risk profile among 3 groups of Asian subjects. Group I: FPG >6.0 to 6.9 mM to >5.5 to 6.9 mM. It is known that subjects with IFG are at risk for cardiovascular disease. The cardiovascular risk profile of subjects with fasting plasma glucose (FPG) 5.6 to 6.0 mM has not been well studied.

**Results:** Ethnic distribution: Chinese 60%, Malay 23%, Indians 17% and 71% were female. Age distribution: group I [mean (SD)] 35(11) years, II 42 (10) and III 49 (11). The following cardiovascular risk factors were similar among subjects in group II and III but higher than group I – BMI Group II 25.5 (4.2) kg/m<sup>2</sup> and Group III 25.7 (3.9) versus Group I 23.6 (4.5), respectively; Apolipoprotein B 94 (24) mg/dL and 95(20) versus 78 (20); hsCRP 0.49 (0.72) mg/L and 0.53(0.96) versus 0.29 (0.41); total cholesterol 5.9 (1.0) and 6.1 (0.9) versus 5.4 (1.0). On the other hand, the following were similar among group II and III but lower than group I: Adiponectin 5.9 (3.3)  $\mu$ g/mL and 6.5 (5.4) versus 8.0 (4.9); HDL 1.48 (0.36) mM and 1.56 (0.35) versus 1.66 (0.43) (Group II versus III not significant but II and III versus I all  $P < 0.05$ , adjusted for age and gender).

**Conclusion:** We conclude that subjects with FPG between 5.6 to 6.0 mM carried certain cardiovascular risk factors similar to those with FPG >6.0 mM.

**MP233**

**Nerve Conduction Tests for the Diagnosis of Carpal Tunnel Syndrome: Results and Recommendations for the Singaporean Population**

**A KANNAN<sup>1</sup>, YC CHAN<sup>2</sup>, BKC ONG<sup>2</sup>, R SEET<sup>2</sup>, E LIM<sup>2</sup>, YH CHAN<sup>3</sup>, EPV WILDER-SMITH<sup>2</sup>**

<sup>1</sup>Medicine, <sup>2</sup>Diabetics, National University Hospital, Singapore, <sup>3</sup>Anaesthesia, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** Nerve conduction tests are standard for supporting a diagnosis of carpal tunnel syndrome (CTS). Standard recommendations for CTS have been published based on international results. However, adequacy of these tests needs to be tested amongst the local CTS population. We investigated usefulness of standard and additional techniques amongst Singaporeans with CTS.

**Methods:** Results are from test series conducted at the Neurology Diagnostic Laboratory, National University Hospital. Patients were prospectively recruited when referred for possible CTS and fulfilling clinical criteria (Hi-Ob scale). Normal values were obtained from patients and hospital employees. Standard CTS nerve conduction included: median motor distal latency, median sensory velocity to third digit and 2nd lumbricales interossei latency difference (2-LINT). Novel tests were comparison of median sensory to palmar cutaneous median sensory conduction velocity, transcarpal motor sensory latency and median to ulnar motor latency difference using the flexor polices brevis (FPB) muscle. Concurrent polyneuropathy resulted in exclusion.

**Results:** Sensitivity and specificity for standard tests in diagnosing CTS were: distal median motor latency 76/95%, distal median sensory latency 78/100%, 2-LINT 84/97%. Comparison of median sensory to palmar cutaneous median sensory conduction velocity 62/96%, transcarpal motor latency 74/97% and transcarpal sensory latency 82/97%. Sensitivity and specificity for the sum of sensory and motor transcarpal latency and FPB latency difference was 90/97% and 84/85%, respectively.

**Conclusion:** Standard tests of CTS show acceptable sensitivity with additional tests yielding even greater sensitivity. The overall best test for supporting CTS was the sum of sensory and motor transcarpal latency, closely followed by 2-LINT.

**MP234**

**Difficulties in Screening and Establishing a Differential Diagnosis in Patients with Primary Hyperaldosteronism: a Review of 38 Cases**

**CM KHOO<sup>1</sup>, CF LIEW<sup>1</sup>, WK CHEAH<sup>2</sup>, TQ NAM<sup>1</sup>, KO LEE<sup>1</sup>, L TAN<sup>3</sup>, JJ MUKHERJEE<sup>1</sup>**

<sup>1</sup>Medicine, <sup>2</sup>Surgery, <sup>3</sup>Diagnostic Imaging, National University Hospital, Singapore

**Aim:** Differentiating an aldosterone-producing adenoma (APA) from idiopathic adrenal hyperplasia (IHA) as a cause of primary hyperaldosteronism (PHA) can occasionally be difficult. We report our collective experience in managing patients with PHA, with special emphasis on establishing a differential diagnosis.

**Methods:** A retrospective review of 38 patients (29 APA, 9 IHA).

**Results:** Six patients (16%) were normokalaemic and 4 (11%) did not satisfy the screening plasma aldosterone concentration (PAC, pmol/L) to renin (ng/mL/hr) ratio (ARR) >550 with a PAC >415. Six patients (21%) suppressed their PAC (<280) during saline loading test. During postural stimulation test (PST), a fall in PAC was seen in 24 (18 APA, 6 IHA) and a >30% rise in 7 patients (4 APA, 3 IHA). CT adrenals detected the adenoma in all patients with APA and a 1.0-cm nodule in one patient with IHA. Adrenal venous sampling (AVS) was attempted in 24 patients (20 APA, 4 IHA). Eleven patients with APA had a normalised aldosterone ratio >4 in the dominant AV, consistent with CT findings. Twenty-six patients with APA underwent surgery. One patient with a 1.0-cm right adrenal nodule and 70% fall in PAC on PST (no AVS done) underwent surgery. Histology revealed hyperplasia.

**Conclusion:** ARR is a good screening test but has its limitations. PST performs poorly in differentiating APA from IHA. CT scan, along with AVS, remains the best discriminatory test. Despite all investigations, the decision to refer patients with PHA for surgery can occasionally be difficult.

**MP235**

**Differential Hs-CRP Levels in Patients Treated with Comparative Statins**

**W SANJAYA<sup>1</sup>, P ROEBIONO<sup>2</sup>, F SUPARI<sup>3</sup>**

<sup>1</sup>Medicine, National University Hospital, Singapore, <sup>2</sup>Cardiology and Vascular Medicine, University of Indonesia, Indonesia, <sup>3</sup>Ministry of Health, Republic of Indonesia, Indonesia

**Aim:** To compare the influence of the 2 statins with comparative dose, simvastatin 10 mg and pravastatin 20 mg daily, to improve the levels of lipid profiles and reduced the levels of hs-CRP in a controlled, open-labelled, and parallel-group of 48 patients with history of hyperlipidaemia.

**Methods:** All eligible and willing subjects were randomised in the open-label manner onto either simvastatin or pravastatin groups, of those receiving wash-out for 1 week and intervention for 3 weeks. Fasting blood samples were drawn in the beginning and final study to measure the levels of lipid profiles and hs-CRP.

**Results:** Subjects had similar baseline characteristics. The changes of all levels of lipid profiles obtained with 2 statins were similar ( $P > 0.05$ ). Hs-CRP levels were also decreased similarly after intervention with simvastatin 0.316 (-0.310 to 2.1) mg/dL and pravastatin 0.09 (-0.28 to 1.358) mg/dL ( $P > 0.05$ , 2-tailed). There were no correlations between the reductions in CRP and changes in lipid profiles ( $r$  were approximately 0,  $P > 0.05$ , 2-tailed).

**Conclusion:** The similar influence of hs-CRP levels were observed by simvastatin and pravastatin in comparative dose, and the anti-inflammatory actions are independent to their lipid altering benefit.

**MP236**

**A Case of Disappearing Glutamic Acid Decarboxylase Antibodies after Immunoglobulin Therapy in a Patient with Type 1 Diabetes Mellitus**

**MJ TAN<sup>1</sup>, CF LIEW<sup>1</sup>, KO LEE<sup>1</sup>**

<sup>1</sup>Medicine, National University Hospital, Singapore

**Aim:** The pathogenesis of type 1 diabetes mellitus (T1DM) involves autoimmune destruction of the  $\beta$  cells by autoantibodies directed against the islet cell antigens. Experimental studies in animals and humans have postulated that utilising immune therapy directed at these autoantibodies can induce cure in selected subjects with T1DM. We present a case of T1DM with Miller-Fischer variant of Guillain Barré syndrome (GBS) who had remission of diabetes after receiving immunotherapy for GBS.

**Methods:** This 16-year-old Chinese female presented with diabetic ketoacidosis (DKA) and positive titers for antibodies against glutamic acid decarboxylase (GAD) at 16.6 U/mL (normal range: 0 to 0.8 U/mL). She subsequently developed Miller Fischer variant of GBS. Insulin was started for diabetes and patient was given intravenous immunoglobulin (IVIg) therapy (300 mg/kg/d for 3 days) for GBS.

**Results:** DKA resolved with hydration and insulin therapy and neurologic deficits disappeared two weeks after IVIg treatment. She was discharged with twice daily subcutaneous insulin injections. Two months after discharge, the patient did not require any insulin or oral hypoglycaemic agents to maintain normoglycaemia. Antibodies to GAD were also undetectable. Her fasting plasma glucose was normal (5.7 mmol/L) without any treatment 16 months after the diagnosis of T1DM was made.

**Conclusion:** This case illustrates that IVIg therapy might play a role in the cure of autoimmune diabetes in selected patients. Additional trials in humans involving more subjects are necessary to further look into the role of immunomodulatory therapy to block the autoimmune diabetes process and to identify the population that might benefit from it.



## MP237

**A Novel Adaptation of the Q-SART, using Dynamometry as Sweat Stimulant: a Pilot Study****Q WANG<sup>1</sup>, K ARAVIND<sup>1</sup>, EP WILDER-SMITH<sup>1</sup>**<sup>1</sup>Medicine, National University Hospital, Singapore

**Aim:** To develop a simple and reliable method for measuring sweat production adapted from the quantitative sudomotor axon reflex test (Q-SART).  
**Hypothesis:** That a dynamometric method can be used to stimulate sweat secretion similar to the standard method employing acetylcholine.

**Methods:** To compare the standard method of Q-SART using acetylcholine stimulation with dynamometric stimulation, we recorded baseline sweat production of healthy subjects at 3 points (thumb, little finger, and distal forearm) on the non-dominant side. The opposite hand gripped a blood pressure sphygmomanometer inflated to 20 mm Hg to levels of 160 mm Hg for 45 seconds. The response to this sympathetic stress was recorded until sweat production returned to base line. This was repeated 3 times and the average response used. Comparison was made to standard iontophoretic acetylcholine sweat activation.

**Results:** Three females and 4 males volunteers were tested. Baseline mean value for thumb, little finger, and distal forearm were 237 (range, 192 to 319), 223 (range, 148 to 275), and 78 (range, 56 to 107) nanoliter/minute (nL/min). With dynamometric stimulation, additional sweat secretion varied depending on the site of sweat measurement. Over the forearm, there was only a 1.17-time mean increase (13 nL/min) compared with the baseline on forearm. The thumb and little finger sites showed mean sweat increases of 1.91 (115 nL/min) and 1.90 times (101 nL/min) compared with baselines respectively. Acetylcholine activation produced a 2.65-times increase (165 nL/min) compared to forearm baseline.

**Conclusion:** These preliminary results suggest that a simple dynamometric method may develop into a useful alternative quantitative method for sweat measurement, which in contrast to acetylcholine iontophoresis can be used at more distal sites of the arm.

## MP238

**Secondary Hyperparathyroidism and Calcium Phosphate Control in Chronic Haemodialysis Patients****S LIM<sup>1</sup>, TG NG<sup>1</sup>, CY CHIONH<sup>1</sup>, A LIEW<sup>1</sup>, SH TAN<sup>1</sup>**<sup>1</sup>Medicine, Tan Tock Seng Hospital, Singapore

**Aim:** Secondary hyperparathyroidism and hyperphosphatemia are common complications in end-stage renal failure. Studies have shown that elevated levels of phosphate and calcium times phosphate (Ca x P) product are associated with an increased risk of death. In the USA, the prevalence of hyperphosphatemia among dialysis patients is very high; over 60% of patients having serum phosphate levels >1.78 mmol/L, but only limited data are available for Asian population, which follows different diet and dialysis schedules.

**Methods:** We evaluated 36 patients, followed at Tan Tock Seng Hospital, who were receiving thrice weekly maintenance haemodialysis for at least 3 months. Patient's weight, length of dialysis session, serum calcium, phosphate, iPTH, and single pool Kt/V were recorded. Mean age was 55 years.

**Results:** The average length of dialysis session was 4 hours and 23 minutes. The average Kt/V was 1.65. Sixteen per cent of the patients had iPTH above 33 pmol/L, while 30% had level below 11 pmol/L. All of the patients were on calcium-based phosphate binder and half of the patients were on vitamin D therapy. Seventy-two per cent of the patients had serum phosphate below 1.78 mmol/L (mean 1.6 mmol/L) and 80% had Ca x P product below 55 mg<sup>2</sup>/dL<sup>2</sup>.

**Conclusion:** Compared to data reported from the USA, mean levels of phosphate, Ca x P product and iPTH seem better controlled in this Asian haemodialysis population. However, a third of patients may have oversuppression of iPTH levels and are at increased risk of developing adynamic bone disease.

## MP239

**Venous Thromboembolism in Pregnancy — Risk Factors and Treatment Outcomes in Singaporean Women****JYL TAN<sup>1</sup>, J GEORGE<sup>1</sup>, GSH YEO<sup>2</sup>**<sup>1</sup>Medicine, Tan Tock Seng Hospital, Singapore, <sup>2</sup>Maternal Fetal Medicine, KK Women's & Children's Hospital, Singapore

**Aim:** To study the risk factors for venous thromboembolism in pregnant Singaporean women and the outcomes of treatment.

**Methods:** This was a retrospective study based on data collected from the medical records of 15 pregnant women with objectively confirmed deep vein thrombosis (DVT)/pulmonary embolism (PE) from 1999 to 2004.

**Results:** Of the 15 pregnant women with DVT/PE, 12 (80%) were Chinese and 2 (20%) were Malay. One woman had history of previous DVT and 2 had positive family history. Ten (66.7%), 3 (20%) and 2 (13.3%) women presented in the first, second and third trimester, respectively. The majority (13 women) presented with DVT (predominantly in the left lower limb) and were treated with subcutaneous low molecular weight heparin (LMWH). Two women presented with massive PE which required thrombolytic therapy. Complications of treatment included cutaneous hypersensitivity reaction in 3 women treated with LMWH, osteopaenia in 1 woman treated with LMWH and pregnancy loss in one woman treated with streptokinase. Pregnancy outcomes included 10 live births, 3 terminations of pregnancy and 2 intrauterine deaths. Identified risk factors associated with DVT/PE included hyperemesis in 3 women, ovarian hyperstimulation syndrome in 1 woman, prolonged bed rest in 1 woman and presence of thrombophilia in 4 women (2 with protein S deficiency, 1 with antithrombin deficiency and 1 with primary antiphospholipid syndrome).

**Conclusion:** Important risk factors for venous thromboembolism in pregnant Singaporean women include thrombophilia and obstetric factors such as hyperemesis gravidarum and ovarian hyperstimulation syndrome. Thrombophilia testing should thus be carried out in pregnant women who develop DVT/PE. Appropriate thromboprophylaxis should also be prescribed for women with known obstetric risk factors.

## MP240

**Correlation of Birth Weight with Different Anthropometric Parameters of Bangladeshi Newborns****NA BEGUM<sup>1</sup>, S MD<sup>2</sup>, Q HASAN<sup>3</sup>, K CA<sup>4</sup>, R JOSEPH<sup>5</sup>**<sup>1</sup>Neonatology, National University Hospital, Singapore, <sup>2</sup>Neonatology, Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh, <sup>3</sup>Paediatrics, Institute of Child and Mother Health, Bangladesh, <sup>4</sup>Paediatrics, Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh, <sup>5</sup>Paediatrics, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** To determine the correlation of birth weight (BW) with different anthropometric parameters of Bangladeshi newborns and thereby identifying a simple and potential alternative to BW.

**Methods:** A cross-sectional study was conducted in 2 hospitals of Dhaka, Bhangabandhu Sheikh Mujib Medical University and Azimpur MCHTI. Five hundred newborn babies were recruited consecutively for a period of 6 months, January to June 1997. Inclusion criteria were babies within 24 hours of birth, gestational age range from 29 to 44 weeks. Exclusion criteria were babies with congenital anomalies, intra uterine growth retardation (IUGR).

**Results:** Correlation coefficient of birth weight with different anthropometric parameters of newborns had shown, all the parameters to be highly correlated to birth weight and also with each other (r value in all cases >0.5) but maximum correlation of BW was found with chest circumference (r value 0.882), followed by calf circumference (r 0.881), mid arm circumference (r 0.868), thigh circumference (r 0.849), supine length (r 0.808), abdominal girth (r 0.785), occipito-frontal circumference (r 0.776) and foot length (r 0.730).

**Conclusion:** All the anthropometrics parameters of the newborns were highly correlated to each other and also with birth weight but maximum

correlation of birth weight was found to be with chest circumference. Therefore, chest circumference stands as a surrogate of birth weight.

#### MP241

### Anthropometric Measurements of Upper and Lower Limb for Chinese, Malay and Indian Term Newborn Babies in Singapore

**A CHINNADURAI<sup>1</sup>, R JOSEPH<sup>1</sup>**

<sup>1</sup>Neonatology, National University Hospital, Singapore

**Aim:** To establish norms for limb measurements for Chinese, Malay and Indian term newborn babies and to determine if race-specific norms are required for Singapore.

**Methods:** A cross-sectional study to measure the arm length, its upper and lower segment, hand length, middle finger length and lower limb length, its upper and lower segment and foot length were performed on 587 full term newborns at the National University Hospital, Singapore and Christian Medical College, Vellore. Among these 195 were Chinese, 189 were Malays and 203 were Indians, 282 males and 305 females. This sample size enabled the demonstration of a standardised difference of 0.5 with a power of 0.9. The methodology and the instruments used for the measurements were in accordance with the recommendations by Feingold and Bergsma (1975). ANOVA and Tukey test for multiple comparisons were used in the analysis.

**Results:** Statistically significant differences ( $P < 0.01-0.001$ ) between the races were found for all the above measurements except the middle finger length, upper segment of the lower limb and foot length. The size of differences between the races was below 0.7 standard deviations (e.g. 5.9 mm for lower limb length) for all the above parameters. No significant differences were noted between the genders. Comparison with the Jews has shown differences of 1.7 and 2 SDs for lower limb length and its lower segment respectively (10.8 and 12.5 mm).

**Conclusion:** Common reference range for limb measurements for the 3 races in Singapore can be adopted for syndromology, in reconstructive surgery and forensic science. Comparison with the Jews has shown that universal norms cannot be adopted.

#### MP242

### Patent Ductus Arteriosus in Very Low Birth Weight Babies: Effectiveness of Indomethacin and Risk of Surgery — The National University Hospital Experience

**A IOBAL<sup>1</sup>, R JOSEPH<sup>2</sup>**

<sup>1</sup>Neonatology, National University Hospital, Singapore, <sup>2</sup>Paediatrics, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** To determine the response rate of patent ductus arteriosus (PDA) closure with indomethacin therapy in premature babies <1500 g and to document the mortality and morbidity associated with surgical closure of PDA in such babies.

**Methods:** We reviewed 37 babies with haemodynamically significant PDA from a prospectively maintained very low birth weight (VLBW) database at National University Hospital in the period July 2002 to July 2004. Surgical complications were identified retrospectively from patients' records.

**Results:** During this period, there were 92 VLBW babies, out of which 37 had haemodynamically significant PDA (40%). Thirty-five babies were treated with intravenous indomethacin (0.2 mg/kg 12 hourly for 3 doses) and PDA was closed in 25 after the 1st course of indomethacin (71%). Ten babies, in which the 1st course of indomethacin was unsuccessful, received a 2nd course of indomethacin and PDA was closed in 3 babies (30%). PDA closure rate is significantly more in >26 week gestational age babies than that of <26 week gestational age babies (90% versus 62%). PDA was ligated in 9 babies (2 primary surgery, in which indomethacin was contraindicated and 7 indomethacin failure babies). Three babies had right upper lobe collapse postoperatively; 1 of these 3 had vocal cord paralysis and another developed chylothorax.

**Conclusion:** PDA closure rate is 80% with indomethacin in our cohort of babies and surgery is not without risk.

#### MP243

### Neonatal Intensive Care Unit (NICU) and Delivery Suite Nurses Underestimate Survival Rates and Overestimate Long-term Disability Rates in Extremely Preterm Infants

**YPM NG<sup>1</sup>, EJS HAN<sup>1</sup>, R JOSEPH<sup>1</sup>**

<sup>1</sup>Neonatology, National University Hospital, Singapore

**Aim:** To assess current knowledge of delivery suite and NICU nurses on survival and long-term outcome of extremely preterm infants. Delivery suite and NICU nurses are essential team members in initial resuscitation of the extremely preterm infant. NICU nurses also play an important role in family-centred neonatal care, providing information and support to the new parents.

**Methods:** An anonymised survey was completed by 15 NICU and 10 delivery suite registered nurses. Nurses were asked to estimate survival and long-term disability rates at each week of gestation from 23 to 28 weeks in an uncomplicated preterm pregnancy, and on the minimum gestation of newborns to be resuscitated. Mean/median values of survival and disability rates were compared with actual rates using *t*-test or Wilcoxon signed rank test. Actual survival rates were from our 1998 to 2004 data, currently used during prenatal counselling by neonatal doctors. Disability rates were derived from combined results of 13 published reports.

**Results:** There were statistically significant underestimates of survival rates for gestational ages 26 to 28 weeks. For example, from our experience, 88% of 26 weekers survived till discharge versus 62.6% (95% CI, 53.5% – 71.7%) estimated by the nurses. There were also statistically significant overestimates of disability rates in all gestational ages. The nurses felt that the minimum gestational age for active resuscitation should be 25.8 weeks (95% CI, 25.3 to 26.3).

**Conclusion:** Nurses involved in the acute and mid-term care of the extremely preterm infant underestimated survival rates and overestimated disability rates.

#### MP244

### Reducing Hospital Stay for Term Newborns Diagnosed with Glucose-6-phosphate Deficiency

**K NIDUVAJE<sup>1</sup>, R JOSEPH<sup>2</sup>**

<sup>1</sup>Neonatology, National University Hospital, Singapore, <sup>2</sup>Paediatrics, NUS – Yong Loo Lin School of Medicine, Singapore

**Aim:** To determine whether a new strategy for early planned discharge of neonates with G6PD deficiency is effective in reducing the duration of hospital stay without increasing the rate of readmission for hyperbilirubinaemia (serum bilirubin >255 umol/L).

**Methods:** All term neonates with G6PD deficiency born between February 2004 and May 2005 in the National University Hospital, Singapore were included in this prospective study. In a low risk infant after observation for 72 hours, if the serum bilirubin was below a predetermined value, discharge to home was allowed. Data on outcome were compared with the outcome of 11 infants born prior (October 2003 to January 2004) to the implementation of the new protocol. Statistical analysis was done by Student *t* test and chi-square test.

**Results:** Among 34 infants with G6PD deficiency, 20 (59%) were discharged by 4th day of birth. The mean duration of hospital stay was 4.1 ( $\pm 1.5$ ) days as compared to 6.4 ( $\pm 0.7$ ) days in infants born during the previous 5 months ( $P < 0.0001$ ). Fifteen infants (44%) in the study group received phototherapy as compared to 4 (36%) in the previous group (RR 1.2; 95% CI 0.5 to 2.9). Three infants (9%) were readmitted with jaundice as compared to 3 (27%) in the previous group. Only one infant had a bilirubin level >255 umol/L and there were no cases of bilirubin encephalopathy.

**Conclusion:** The new strategy is effective and safe in reducing the duration of hospital stay for newborns with G6PD deficiency.

## MP245

**Who are the Main Caregivers for Elderly in Singapore?**YK TAY<sup>1</sup>, AW YEO<sup>1</sup>, R MERCHANT<sup>2</sup><sup>1</sup>Nursing, <sup>2</sup>Medicine, National University Hospital, Singapore

**Aim:** To determine the main caregivers of elderly in Singapore to plan for the future services.

**Methods:** Retrospective chart review of 39 elderly patients above 65 years old admitted to a general hospital with geriatric syndromes and underwent comprehensive geriatric assessment. Data on caregivers was extracted from the assessment form.

**Results:** Of 39 patients, 33 (84.6%) required some forms of caregiving by the caregivers. Of the 33 patients, 18 (46.1%) were being cared for by immediate family members (including spouse, children, son/daughter-in-law). Fifteen (38.5%) of the elderly were being cared for by domestic workers (maids). Current statistics showed that there are 10 working adults supporting 1 elderly person. Being one of the fastest ageing populations in the world, there will be 3 working adults supporting every elderly person in Singapore by 2030. With an increasing trend of women joining the workforce, caring for the elderly at home may no longer be possible. Therefore, it is of great importance for the elderly to remain/maintain a healthy and independent life.

**Conclusion:** Majority of elderly are still cared for by their own family members, including spouse, children, son and daughter-in-law. With falling birth rates and a rising number of elderly in this country, major emphasis will have to be put on preserving function, independence, preventing frailty and management of chronic diseases. It is thus the responsibility of every Singaporean to prepare for an independent and secure old age.

## MP246

**Outcome of Paediatric Liver Transplant — 14 Years of Experience at the Children Medical Institute, Singapore**P KRISHNAN<sup>1</sup>, NG TAN<sup>2</sup>, LSY TAN<sup>3</sup>, DL LOH<sup>1</sup>, SH QUAK<sup>3</sup>, M AW<sup>3</sup><sup>1</sup>Paediatric Surgery, National University Hospital, Singapore, <sup>2</sup>Internal Medicine, Singapore General Hospital, Singapore, <sup>3</sup>Paediatrics, National University Hospital, Singapore

**Aim:** This study summarises the experience of a single centre on 47 pediatric liver transplantations from living and cadaveric donors performed on 44 paediatric patients. The outcome of transplant surgery, and recipient, immunosuppression, rejection, and survival rates were reviewed.

**Methods:** A retrospective case note review of all paediatric patients who received liver transplantation between March 1991 and January 2005 was carried out.

**Results:** Forty-four cases were reviewed, of which 21 were boys (47.7%) and 23 were girls (52.3%). Patients were between 11 months and 14 years of age. The mean age of the recipients at transplant was 35 months, and the median age 21 months. Biliary atresia (72.3%), Alagille syndrome (6.4%) and metabolic liver disease (6.4%) were the most common indications for liver transplant. Biliary atresia was significantly associated with a good post-transplant outcome. ( $P = 0.04$ ). The allografts were distributed as 29 (61.7%) living related, and 18 (38.3%) cadaveric. The retransplant rate was 6.3% and the solely due to hepatic vessel thrombosis. Tacrolimus (FK-506) was the immunosuppressive agent used in 37 (78.7%) patients. The other immunosuppressives utilised were corticosteroids (8.5%) and cyclosporine (8.5%). After transplantation, 37 (78.7%) of the patients, including 3 retransplants, were well. There were 8 deaths and the current survival rate of our series is 83.0%.

**Conclusion:** Liver transplantation is an established form of intervention for end stage liver disease and a variety of extrahepatic metabolic diseases. Good long-term survival rates comparable to most tertiary centres can be expected. Future advances in immunosuppression and organ availability are likely to lead to greater improvements in survival rates.

## MP247

**Choledochal Cysts—Presentation, Symptoms and Related Complications**P KRISHNAN<sup>1</sup>, LSY TAN<sup>2</sup>, NG TAN<sup>3</sup>, DL LOH<sup>1</sup>, SH QUAK<sup>2</sup>, M AW<sup>2</sup><sup>1</sup>Paediatric Surgery, <sup>2</sup>Paediatrics, National University Hospital, Singapore, <sup>3</sup>Internal Medicine, Singapore General Hospital, Singapore

**Aim:** The study aims to compare the presentation, diagnostic evaluation and complications in patients with choledochal cysts in a tertiary hospital.

**Methods:** A retrospective review of case records of 41 patients, between June 1987 and May 2005, with known preoperative diagnosis of choledochal cysts was performed. These patients were operated on by a single surgeon.

**Results:** The median age at presentation was 36 months (range, 19 weeks of gestation to 44 years). 29.3% were male. Six (14.6%) patients were diagnosed antenatally, 3 of whom were asymptomatic at the time of operation. 38 (92.7%) patients had at least 1 presenting symptom; recurrent abdominal pain in 28 (68.3%) and jaundice in 21 (51.2%) of patients. In patients with jaundice, the median age of presentation (30 months) was less than those without jaundice (64 months) ( $P = 0.09$ ). Correspondingly, those with pain as the main complaint, the median age at presentation was significantly higher (40 months versus 8.5 months) ( $P = 0.01$ ). Amylase was raised in those with abdominal pain (median 151 versus 25) ( $P = 0.01$ ). Ultrasound was the most common form of imaging modality, performed in 27 (93.1%) patients. CT scan was used in 38 patients (92.7%) and MRCP in 8 (19.5%). Excision of the extrahepatic cyst was performed in 36 (87.8%) patients. Of the 37 patients with an operation, 33 (89.2%) underwent an uneventful recovery.

**Conclusion:** Obstruction of the biliary system by the choledochal cyst resulting in jaundice allows an earlier age of presentation and diagnosis. Ultrasound is the main modality for diagnosis. In future, antenatal ultrasound will allow a higher detection rate.

## MP248

**Extremely High Exhaled Nitric Oxide Values >100 ppb in Asthmatic Children**SY CHNG<sup>1</sup>, H VAN BEVER<sup>2</sup>, DYT GOH<sup>2</sup><sup>1</sup>Paediatrics, National University Hospital, Singapore, <sup>2</sup>Paediatrics, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** To determine the factors associated with extremely high exhaled nitric oxide (eNO) values in asthmatic children.

**Methods:** Asthmatic children with extremely high eNO values >100 ppb and asthmatic children with normal eNO values <10 ppb were identified. eNO was measured online at a flow rate of 50 mL/s. Clinical symptoms and lung function were compared.

**Results:** There were 24 children with extremely high eNO (median 113.2 ppb, interquartile range 103.6 to 160.9 ppb) and 48 children with low eNO (median 6.5 ppb, interquartile range 5.0 to 8.3 ppb;  $P < 0.001$ ). The children with extremely high eNO values >100 ppb were significantly older (median age 14.3 years, interquartile range 11.5 to 16.4 years) compared to the children with low eNO values (median age 7.0 years, interquartile range 6.0 to 11.0 years;  $P < 0.001$ ). There was no significant lung function difference in percentage predicted FEV1 between the extremely high eNO group (mean 76.5%, SEM 3.6%) compared to the low eNO group (mean 84.0%, SEM 2.7%;  $P = 0.10$ ). The majority with extremely high eNO were surprisingly clinically minimally symptomatic. 95.8% had mild asthma, 4.2% had moderate asthma and none had severe asthma. As these children were minimally symptomatic, only 31.8% were on preventive medication prior to eNO measurement. None were on inhaled steroids >500 mcg/day of equivalent BDP.

**Conclusion:** 1) There exists a group of teenage children with asthma who have significantly elevated eNO levels but remain clinically well with normal lung function. 2) The long-term consequences of elevated eNO are unknown and it is debatable if minimally symptomatic asthmatics with infrequent exacerbations require anti-inflammatory treatment to maintain normal eNO levels.

MP249

**Characterisation of JAG-1 Gene Mutations in Patients with Right-sided Cardiac Defects with and without the Alagille Syndrome Phenotype**

CPP HIA<sup>1</sup>, MM AW<sup>2</sup>, SC QUEK<sup>2</sup>, PS LAI<sup>1</sup>, SH QUAK<sup>2</sup>

<sup>1</sup>Paediatrics, National University Hospital, Singapore, <sup>2</sup>Paediatrics, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** A large percentage of patients with Alagille syndrome (AGS) has associated congenital heart defects (CHD), which are mainly right-sided. Concurrently, right-sided CHD are seen in 82% of children without obvious syndromes. JAG-1 gene mutations have been found in patients with AGS. The aim of this study was to determine the presence of JAG-1 gene mutations in patients with right-sided CHD defects either in isolation or with AGS.

**Methods:** Two cohorts of children were studied; Group 1: 11 patients with phenotypic AGS with CHD. Group 2: 19 patients with isolated right-sided CHD (pulmonary stenosis and Fallot's Tetralogy). Mutation analysis of patient DNA samples was carried out by direct sequencing of all the exons and flanking regions of the JAG-1 gene.

**Results:** Group 1: JAG-1 mutations were identified in 7 patients (63.6%); 6 heterozygotes involving insertion/deletion frameshifts resulting in truncated protein production and 1 nonsense mutation resulting in immediate protein translation termination. Four different single nucleotide polymorphisms (SNPs) of the JAG-1 gene were identified among 5 patients. Group 2: No truncating JAG-1 mutations were identified. Four different SNPs were found among 10 patients (52.6%). Two of these SNPs identified were common in both Group 1 and 2 (C3830T, C3821T).

**Conclusion:** There is clear evidence of association between JAG-1 gene and CHD in AGS, with sequence changes found in 11 (100%) children. However, this association is less clear with isolated CHD. It is possible that some of the SNPs may play a role in the embryogenesis of right-sided CHD.

MP250

**Idiopathic Arterial Pulmonary Hypertension in Children: This Decade and the Past**

CPP HIA<sup>1</sup>, WCL YIP<sup>2</sup>, J YIP<sup>3</sup>, T LIM<sup>1</sup>, SC QUEK<sup>2</sup>

<sup>1</sup>Paediatrics, National University Hospital, Singapore, <sup>2</sup>Paediatrics, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>3</sup>Cardiology, National University Hospital, Singapore

**Aim:** Idiopathic pulmonary arterial hypertension (IPAH) is a rare in children. Most patients present late into the disease with poor prognostic factors. New drugs are now available and may improve the outcome of these patients. Although little published data is available for paediatric patients, these new drugs appear promising.

**Methods:** Patients admitted to the paediatric department from 1990 to 2005 with IPAH were included for study. The diagnosis and management was compared between patients diagnosed before (group 1, n = 5) and after the year 2000 (group 2, n = 9).

**Results:** There were 14 patients (mean age 11.5 years, 3.6 female: 1 male, 64% Chinese, 28% Malay, 7% Filipino). A total of 7 patients (2 in group 1, 5 in group 2) underwent cardiac catheterisation (CC). Mean pulmonary artery pressure was 80 mm Hg. Only 14% responded positively to hyperoxia vasodilator challenge during CC. Only 3 patients in group 2 received inhaled nitric oxide (iNO) vasodilator challenge and 1 (33%) responded positively. Two patients in group 1 received calcium channel blockers (CCB). In group 2, 5 patients received CCBs, prostacyclin analogues, phosphodiesterase-5 inhibitors and dual-endothelin receptor antagonist either alone or as combined therapy. All patients in group 1 died within a year of diagnosis, whereas survival for group 2 was 89% after mean follow-up period of 0.86 years. Three out of 5 patients treated in group 2 experienced symptomatic relief.

**Conclusion:** Newer medications appear to confer symptom relief and improved survival to IPAH patients but their efficacy needs to be further evaluated in larger trials.

MP251

**Exercise Myocardial Perfusion Stress Testing in Children with Kawasaki Disease**

TCW LIM<sup>1</sup>, KT HO<sup>2</sup>, CPP HIA<sup>1</sup>, SC QUEK<sup>1</sup>

<sup>1</sup>Paediatrics, <sup>2</sup>Cardiology, National University Hospital, Singapore

**Aim:** We report the findings of a local pilot study to assess the safety and usefulness of exercise myocardial perfusion stress testing using Technetium Tetrofosmin in children with previous Kawasaki disease (KD).

**Methods:** Fourteen patients (median age 12 years; 10 males, 4 females) with a history of KD underwent Technetium Tetrofosmin myocardial perfusion scan using a specially modified protocol. Ten out of 14 patients had been treated with intravenous immunoglobulin. All were NYHA Class 1 and asymptomatic at time of testing. Eight out of 14 patients had coronary artery (CA) dilatation on echocardiographic examination during the acute KD phase. Out of these, 1 patient had persistently dilated CAs and suffered an acute myocardial infarction (AMI) 6 months after disease onset. Results were compared with clinical and echocardiographic findings.

**Results:** All patients were able to complete the exercise test. Thirteen out of 14 patients, including the patient with AMI, had normal tests. The single patient with an abnormal scan had normal CAs on echocardiography and showed a minimal (2%) fixed defect in the left ventricular wall.

**Conclusion:** While echocardiography is useful in diagnosing coronary artery dilatation, this is restricted to only the proximal segments, and coronary angiography is invasive. Technetium myocardial perfusion exercise stress testing overcomes these limitations and provides an assessment of the functional status of the child. It is a safe and effective method of assessing myocardial perfusion and function in cooperative children with possible CA disease resulting from KD.

MP252

**Intramuscular Botulinum Toxin A Injection for the Treatment of Hamstring Spasticity in Children with Cerebral Palsy**

HT ONG<sup>1</sup>, HN CHONG<sup>2</sup>, KJL LIM<sup>3</sup>, JHP HUI<sup>4</sup>, PS LOW<sup>3</sup>

<sup>1</sup>Paediatrics, <sup>2</sup>Rehabilitation, National University Hospital, Singapore, <sup>3</sup>Paediatrics, <sup>4</sup>Orthopaedic Surgery, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** To assess the degree of efficacy of intramuscular injection of botulinum toxin A (BTX-A) on hamstring muscles in children with cerebral palsy

**Methods:** Children below 13 years with dynamic spasticity of the hamstring muscles were assessed during a 5-year period from 2000 to 2004. Dynamic range of motion in an affected joint was measured using the Modified Tardieu Scale with a hand-held goniometer. The point of resistance or catch to a rapid velocity stretch in the knee is recorded as R1, and the slow passive range of movement is recorded as R2. Muscle tone was assessed clinically using the Modified Ashworth Scale (MAS). Repeat evaluations were performed at intervals of between 4 to 6 weeks, and 3 months post-injection. The BTX-A dose injected complied with the guidelines recommended for paediatric dosing.

**Results:** There were 31 children with a total of 56 hamstring muscle injections administered. After 4 to 6 weeks, there was an average improvement of 12.1° in R1 and 8.0° for R2. For muscle tone, an average improvement of 0.7 on the MAS grade was shown. Three months post-injection, there was an average improvement of 8.9° in R1 and 4.1° for R2. Average improvement for muscle tone was 0.4. There were no significant adverse effects reported besides transient febrile reaction.

**Conclusion:** The beneficial effects of intramuscular BTX-A injection are evident and maximal by 4 to 6 weeks and continued till 3 months post-injection. This provided an important therapeutic window for intensive physical therapy to achieve permanent functional gains.



## MP253

**Interpretation Needs of Non-English Speakers Attending a Hospital Outpatient Clinic****R HAWKINS<sup>1</sup>, PC SOON<sup>2</sup>**<sup>1</sup>Pathology and Laboratory Medicine, <sup>2</sup>Endocrinology, Tan Tock Seng Hospital, Singapore

**Aim:** The multi-language nature of Singapore creates special challenges for health care providers speaking only a single language. This study describes the need for interpretation help during outpatient consultations with a clinician speaking only English and the sources of interpreter used by patients requiring aid.

**Methods:** For 3 months, a log was kept of the interpretation requirements of all patients seen by the first author at the TTSH Diabetic and Endocrine clinic. The patient's age, sex, race, whether they required language assistance during the consultation and the source of interpretation help were noted. No patient identifiers were recorded.

**Results:** One hundred and seventy-seven patients (122 Chinese, 31 Indian, 21 Malay and 3 Eurasian) with average age 54 y (range 16-88) and M:F of 77:100. One hundred and seventy-three were seen for diabetes mellitus and 4 for thyroid disease. Overall, 52% of patients required language assistance (61% of Chinese, 32% of Indians, 33% of Malays and 0% of Eurasians) and the age-related prevalence was <40 y: 21%, 40-49 y: 28%, 50-59 y: 60%, 60-69 y: 63%, >70 y: 93%. For Chinese and Indian patients >70 y, all required language assistance. For patients requiring language help, the clinic assistant was the commonest source (63%), followed by the patient's daughter (24%).

**Conclusion:** Over half of the clinic outpatients require interpretation help when dealing with a health care provider fluent only in English. This interpretation need should be remembered when recruiting staff (especially from overseas), training existing staff and in planning of front-line services in the hospital.

## MP254

**Validation of 14-Carbon Urea Breath Test for the Diagnosis of *Helicobacter pylori* Infection in Alexandra Hospital****J LEONG<sup>1</sup>, E SHEN<sup>2</sup>**<sup>1</sup>Pharmacy, <sup>2</sup>Medicine, Alexandra Hospital, Singapore

**Aim:** *Helicobacter pylori*, a WHO Class I carcinogenic agent, is linked to increased incidence of gastric malignancies, gastroduodenal ulcers and other gastrointestinal disease. Early detection and post treatment outcome confirmation is recommended by many guidelines. The urea breath test (UBT) is generally considered to be an easy, non-invasive accurate test for detecting the bacteria. This study aims to validate the Heliprobe, a 14-carbon UBT machine using Singapore subjects.

**Methods:** About 60 patients indicated for oesophago-gastro-duodenoscopy (OGD) were invited to participate in this prospective study in Alexandra Hospital. Biopsies were obtained during the OGD procedure and sent for biopsy urease test (CLO test) to investigate for *H. pylori*. The test using Heliprobe was carried out immediately after the scope. Breath samples were collected from these patients after they consumed a 14-carbon labelled urea capsule, and were analysed for presence of *H. pylori*. The specificity and sensitivity of the Heliprobe was calculated using the results of the CLO test as the benchmark.

**Results:** In the outpatient setting of Alexandra Hospital, the 14-carbon UBT machine (Heliprobe) has both sensitivity and specificity over 95%, and thus met the minimum requirement for UBT machines as required by local guidelines. The inclusion of this machine will assist physicians in confirming the post-treatment eradication of *H. pylori*, ensuring therapeutic success.

**Conclusion:** The Heliprobe is a convenient UBT machine for pre- and post-treatment detection of *H. pylori*. The confirmation of post-treatment outcomes will allow this machine to be a helpful tool in local clinical practice.

## MP255

**Botulinum Toxin Type A for Refractory Detrusor Overactivity in Spinal Injured Patients: Preliminary Results****A TOW<sup>1</sup>, KL TOH<sup>2</sup>, D CONSIGLIERE<sup>3</sup>**<sup>1</sup>Rehabilitation Medicine, <sup>2</sup>Surgery, Tan Tock Seng Hospital, Singapore, <sup>3</sup>Surgery, National University Hospital, Singapore

**Aim:** To document the efficacy of botulinum toxin type A injection into the detrusor muscle for spinal cord injured (SCI) patients with refractory detrusor overactivity.

**Methods:** Eight patients were prospectively recruited over a 16-month period. All had incontinence despite maximal anti-cholinergic therapy and required clean intermittent catheterisation. Pre-treatment assessment included voiding diary, video-urodynamic studies, upper tract evaluation and plain abdominal radiograph. Each received 300 units of botulinum toxin type A delivered via cystoscopic needle. Post-treatment assessment included voiding diary and video-urodynamic studies scheduled at 6, 26 and 39 weeks after injection.

**Results:** Seven patients completed 6 weeks of follow-up, 3 completed 26 weeks and 1 had completed the study. We report our results at 6 weeks post-injection. Complete continence was achieved in 4 (57.1%) and significant decrease in leakage in 2 (28.6%) with all 6 withdrawing completely from anti-cholinergic medication. Leakages over a 24-hour period declined from  $3.1 \pm 1.9$  to  $1.2 \pm 1.8$  ( $P < 0.1$ ). Maximal catheterisable volume increased from  $346.8 \pm 183.4$  mL to  $478.5 \pm 244.7$  mL ( $P < 0.5$ ). Urodynamics wise, detrusor overactivity was completely abolished in 2 (28.6%). The volume of infusion at which detrusor overactivity first occurs increased from  $130.0 \pm 56.0$  to  $211.1 \pm 137.3$  mL ( $P < 0.1$ ). Maximal detrusor pressure declined from  $63.4 \pm 29.5$  cmH<sub>2</sub>O to  $32.3 \pm 25.3$  ( $P < 0.5$ ). Cystometric capacity increased from  $187.8 \pm 69.2$  to  $305.7 \pm 136.4$  mL ( $P < 0.5$ ). Only 1 developed urinary infection post procedure.

**Conclusion:** Botulinum toxin type A injection into the detrusor is safe and efficacious for SCI patients with refractory detrusor overactivity.

## MP256

**Predictors of Nutrition in Chronic Peritoneal Dialysis (PD) Patients****SH TAN<sup>1</sup>, XH HUANG<sup>1</sup>, YH CHAN<sup>2</sup>, ME TAY<sup>1</sup>, JC VAN DER STRAATEN<sup>1</sup>**<sup>1</sup>Renal, Tan Tock Seng Hospital, Singapore, <sup>2</sup>Medicine, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** To determine the predictors of nutrition in chronic PD patients.

**Methods:** All consecutive end stage renal failure patients enrolled in our PD programme for at least 3 months from March 2001 to June 2005 were included. Baseline demographics and co-morbidities were collected. Serial serum albumin was prospectively measured during the study period on a 2-monthly interval. Patients not reaching albumin target of 32 g/dL in at least 70% of the measurements during the study period were considered to have poor nutrition. Statistical methods were performed with SPSS v11.

**Results:** There were 57 patients during the study period. Mean duration of dialysis was  $24.8 \pm 8.5$  months and mean age was  $65.4 \pm 10.4$  yrs. There were 43.9% male; 84.0% diabetes mellitus; 96.5% hypertension; 15.8% cerebral vascular disease and 57.9% ischaemic heart disease. Multivariate logistic model, adjusting for baseline demographics (gender, age, race and urgency of dialysis initiation) and co-morbidities (diabetes mellitus, ischaemic heart disease, hypertension, cerebrovascular disease and lung disease), was performed as predictors of poor nutrition. Patients with ischaemic heart disease is an independent predictor of poor nutrition ( $P = 0.040$ , OR = 9.461, 95% CI 1.114-80.365). Diabetic patients are at reduced risk of poor nutrition ( $P = 0.042$ , OR 0.076, 95% CI 0.06-0.907).

**Conclusion:** Malnutrition, using low albumin level as a surrogate marker, is associated with poor survival. Non-diabetic PD patients with ischaemic heart disease are at risk of malnutrition in our programme. This may be due to chronic inflammation associated with the MIA syndrome.

**MP257**

**Interleukin-18 (IL-18) in Systemic Lupus Erythematosus (SLE): a Potential Disease-activity Related Proinflammatory Biomarker**

**LC CHEW<sup>1</sup>, KO KONG<sup>1</sup>, BYH THONG<sup>1</sup>, TY LIAN<sup>1</sup>, WH YONG<sup>1</sup>, BPL LEUNG<sup>1</sup>, HS HOWE<sup>1</sup>**

<sup>1</sup>Rheumatology, Allergy and Immunology, Tan Tock Seng Hospital, Singapore

**Aim:** Interleukin-18 (IL-18) has been demonstrated to be an important mediator in regulating immune responses and is associated with a range of autoimmune conditions. We sought to determine the serum levels of IL-18 in an oriental cohort of systemic lupus erythematosus (SLE) patients and to assess its relationship with disease activity and organ manifestations.

**Methods:** Serum IL-18 levels of 891 patients and 50 healthy donors were determined using ELISA. Correlation between serum IL-18 with disease activity as determined by the revised SLE Activity Measure (SLAM-R) and laboratory parameters (anti-dsDNA antibody, C3, C4 and CRP levels) and manifestations were analysed.

**Results:** Serum IL-18 levels (expressed as pg/mL) were significantly higher in SLE patients than in normal controls (311.1 [IQR: 0–969.7] versus 159.6 [IQR: 86.0–217.3]; *P* = 0.03) and positively correlated with disease activity as defined by SLAM-R (inactive: 330.6 [IQR: 0–938.5], mild: 325.6 [IQR: 0–1068.7], moderate: 500.5 [IQR: 175.0–573.6], and severe: 1620.7 [IQR: 243.9–2395.5], *P* = 0.0055). IL-18 also showed significant correlations with ESR and CRP but not with anti-dsDNA antibodies or complement levels. Higher median serum IL-18 levels were found in patients with active neurological (305.7 [IQR: 0–964.1] versus 574.5 [IQR: 186.9–1439.0]; *P* = 0.040) and mucocutaneous (279.1 [IQR: 0–954.1] versus 449.9 [IQR: 0–1136.9]; *P* = 0.036) manifestations, compared to those without.

**Conclusion:** Serum IL-18 levels are increased in SLE and may play a role in its pathology, particularly in neurological and mucocutaneous manifestations. Serum IL-18 is also a serologic marker of disease activity, as defined by SLAM-R, CRP and ESR.

**MP258**

**Interferon-inducible Protein-10 (IP-10) in Systemic Lupus Erythematosus: a Potential Biomarker with Good Correlation with Disease Activity**

**KO KONG<sup>1</sup>, BYH THONG<sup>1</sup>, TY LIAN<sup>1</sup>, HH CHNG<sup>1</sup>, YK CHENG<sup>1</sup>, BPL LEUNG<sup>2</sup>, HS HOWE<sup>1</sup>**

<sup>1</sup>Rheumatology, Allergy and Immunology, Tan Tock Seng Hospital, Singapore,

<sup>2</sup>Biochemistry, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** We sought to determine the serum IP-10 levels in a prospective large systemic lupus erythematosus (SLE) cohort and to assess its relationship with disease activity and organ manifestations.

**Methods:** A total of 774 serum specimens were collected from 424 patients (female: male ratio of 10:1, 80% Chinese) from our center, who fulfilled the 1991 revised ACR classification criteria for SLE. The mean age was 40.1 ± 12.6 (mean ± standard deviation, SD) years, and mean disease duration 112 ± 93 months. Using SLAM-R, disease activity was categorised into inactive (≤5), mild (>5-10), moderate (>10-15) and severe (>15) activity groups. Serum IP-10 levels were determined using ELISA. Controls were 76 randomly selected, unrelated, healthy, subjects.

**Results:** The median SLAM-R score was 2 (interquartile range, IQR: 1–4). 74.0% had inactive, 20.0% mild, 3.9% moderate and 2.1% severe activity. Haematological, renal, mucocutaneous and nervous system involvement was noted in 60.4%, 31.1%, 17.7%, and 4.5% of patients, respectively. IP-10 levels were elevated in all SLE patients compared to normal healthy controls (73.1, IQR: 29.0–187.7 pg/mL vs. 22.1, IQR: 9.4–38.1 pg/mL; *P* < 0.0001), and correlated significantly with the SLAM-R score and severity of disease activity as measured by SLAM-R, levels of anti-dsDNA antibodies, complement levels, and erythrocyte sedimentation rate (all *P* values were 0.0001 or less). Significantly higher median serum levels were found in those with active haematological and mucocutaneous manifestations compared to those without.

**Conclusion:** Serum IP-10 level is markedly increased in SLE and correlates well with disease activity making it a potential biomarker for SLE disease activity.

**MP259**

**Risk Factors that were Associated with Low Bone Mass Density in Patients who had Previous Fragility Fractures**

**TC LAU<sup>1</sup>**

<sup>1</sup>Rheumatology, Allergy and Immunology, Tan Tock Seng Hospital, Singapore

**Aim:** To examine the risk factors which were associated with low bone mass density (BMD) in patients with previous fragility fractures.

**Methods:** Patients with previous fragility fracture were invited to join the HSDP osteoporosis treatment program unless contraindicated. Baseline data pertaining to demographics and other risk factors associated with osteoporosis were collected. BMD of the vertebra and hip were done.

**Results:** Out of a total of 984 participants recruited between August 2002 to January 2005, 262 (26.6%) were patients with only hip fractures, 640 (65.0%) with only vertebra fractures and 82 (8.3%) with both hip and vertebra fractures. Their mean age was 73 years (45-92, SD 10.2), with a female preponderance (877 vs 106). There were 898 (91.5%) Chinese, 44 (4.5%) Malays, 32 (3.3%) Indians. Majority has no formal education (68%) or only primary education (15.9%). Amongst participants who have only vertebra fracture, vertebra and hip BMD was osteoporotic (T score < -2.5) in only 51% and 55%, respectively. Amongst participants with hip fracture, vertebra and hip BMD was osteoporotic (T score < -2.5) in 36% and 67% respectively. Risk factors associated with lower BMD were age, female gender, Chinese and Malay ethnicity, lower education level, smoking history, and maternal history of fracture.

**Conclusion:** Amongst patients with fragility fracture, risk factors for osteoporosis were associated with lower BMD. However, the BMD were in the osteoporotic range in only 36% to 67% of patients, therefore other risk factors for fractures must be evaluated.

**MP260**

**Factors that were Associated with Need for Carers amongst Patients with Fragility Fractures**

**TC LAU<sup>1</sup>**

<sup>1</sup>Rheumatology, Allergy and Immunology, Tan Tock Seng Hospital, Singapore

**Aim:** This paper examined the factors which were associated with need for carers amongst patients with fragility hip or spine fractures

**Methods:** Patients with previous vertebra or hip fragility fracture were invited to join the program unless they were bed ridden or have a history of oesophagitis or moderate renal impairment. Baseline data pertaining to demographics, mobility status, comorbidities, and need for carers were collected. Statistical analysis was done using multivariate logistic regression modeling.

**Results:** Out of a total of 984 participants recruited between August 2002 to January 2005, 262 (26.6%) were patients with only hip fractures, 640 (65.0%) with only vertebra fractures and 82 (8.3%) with both hip and vertebra fractures. Their mean age was 73 years (45-92, SD 10.2), with a female preponderance (877 vs 106). There were 898 (91.5%) Chinese, 44 (4.5%) Malays, 32 (3.3%) Indians. Majority has no formal education (68%) or only primary education (15.9%). 96% of the participants were staying at home. Only 51% of participants were ambulant without aid. 58% of the participants were independent with self-care, the remainder required care by maid (20%), relative (19%) or others (3%). Factors associated with need for carers were increasing age, falls, reduced mobility, stroke, diabetes mellitus, renal disease and hip fracture.

**Conclusion:** Amongst patients who with fragility fracture, only 58% were independent with self-care. Knowing the factors associated with need for carers might help to predict the health care needs of the patients.

## MP261

**Downregulation of Interferon Inducible Protein-10 (IP-10) by Statins in Patients with Systemic Lupus Erythematosus (SLE) is Associated with Better Control of Lupus Disease Activity****WG LAW<sup>1</sup>, KO KONG<sup>1</sup>, HH CHNG<sup>1</sup>, TY LIAN<sup>1</sup>, BPL LEUNG<sup>2</sup>, HS HOWE<sup>1</sup>**<sup>1</sup>Rheumatology, Allergy and Immunology, Tan Tock Seng Hospital, Singapore, <sup>2</sup>Physiology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore**Aim:** To investigate the effects of 3-hydroxy-3methylglutaryl-CoA(HMG-CoA) reductase inhibitors (statins) treatment on disease activity and immune profiles of SLE patients.**Methods:** Eighteen SLE patients who had received statin therapy 10 to 20 mg daily for at least 3 months and 13 non-statin treated SLE patients were recruited. Demographic data, SLE Disease Activity Index (SLEDAI) and Systemic Lupus Activity Measure (SLAM) were documented. Complement C3, C4, anti-dsDNA antibodies (antidsDNA) and highly sensitive C-reactive protein (hsCRP) were collected. Serum IL6, IL8, IL10, IL15, and IP10 were assayed by ELISA. T-lymphocytes activation markers including CD3/HLA-DR and CD3/CD45RO were studied by flow cytometry.**Results:** There were no statistical significant differences between the non-statin control and statin-treated groups in gender, ethnic distribution, mean age at disease onset (control: 35.5 ± 8.1 years; statin: 36.2 ± 17.1 years,  $P = 0.18$ ), disease duration (control: 54.2 ± 43.6 months; statin: 111.0 ± 105 months,  $P = 0.27$ ) and the use of corticosteroids and immunosuppressive agents ( $P > 0.05$ ). Disease activity was significantly lower in the statin-treated group as measured by mean SLEDAI (control: 3.4 ± 4.4, statin: 1.2 ± 3.5,  $P = 0.03$ ) and mean SLAM scores (control: 6 ± 2.8, statin: 3.54 ± 2.3,  $P = 0.03$ ). C3, C4 and antidsDNA levels were similar in both groups. HsCRP was markedly reduced (control: 6.39 ± 8.34 mg/L; statin: 2.33 ± 2.35 mg/L) but not statistically significant ( $P = 0.45$ ). Statin-treated SLE patients had significantly reduced mean levels of IP10 (control: 190.52 ± 117.06 pg/mL; statin: 61.07 ± 56.69 pg/mL,  $P < 0.001$ ) and IL15 (control: 208.65 ± 100.23 pg/mL; statin: 75.40 ± 78.74 pg/mL,  $P < 0.001$ ). Percentages of early activated peripheral blood T cells (CD3/HLA-DR) in statin-treated patients were reduced (control: 28.3 ± 11.1; statin: 14.39 ± 4.14,  $P < 0.001$ ) while the percentage expression levels of CD3/CD45RO T memory cells were similar (control: 42.7 ± 12.2; statin: 35.76 ± 7.71,  $P = 0.066$ ).**Conclusion:** Our preliminary results suggest that the immuno-modulative effects of statins may contribute to improved control of SLE disease activity. Use of statins was associated with lower levels of serum IP10, IL15 and reduced percentages of activated T cells.

## MP262

**Early Rheumatoid Arthritis: Clinical Characteristics and Outcomes of an Oriental Cohort****WG LAW<sup>1</sup>, KO KONG<sup>1</sup>, BYH THONG<sup>1</sup>, TY LIAN<sup>1</sup>, HH CHNG<sup>1</sup>, ET KOH<sup>1</sup>**<sup>1</sup>Rheumatology, Allergy and Immunology, Tan Tock Seng Hospital, Singapore**Aim:** To describe the demographic, clinical characteristics, treatments and outcomes of a cohort of Asian patients with early rheumatoid arthritis (ERA).**Methods:** An ERA registry was established in September 2001. All consented patients with rheumatoid arthritis (RA) fulfilling 1987 American College of Rheumatology (ACR) criteria, with <2 years disease duration were recruited. Demographic, clinical characteristics, treatments, disease activity score (DAS 28), ACR Functional Class, Health Assessment Questionnaire score (HAQ), and Short form-36 (SF-36) were collected using standard protocol.**Results:** Two hundred and sixty-three patients had been recruited in April 2005; 80.7% were female, with the majority being Chinese (72.7%). Mean symptom duration prior to first presentation and diagnosis was 6.0 ± 4.2 and 5.9 ± 5.1 months respectively, with mean age (49.0 ± 12.8 years) at diagnosis. Mean disease duration at baseline visit was 4.7 ± 4.9 months and duration of follow up was (mean: 19.4 ± 12.9 months). Mean lag time from diagnosis to disease modifying anti-rheumatic drug (DMARD) initiation was 1.2 ±1.5 months and mean lag time from symptom to DMARD initiation was 6.9 ± 5.1 months. At the last visit, 93.6% patients were taking at least 1 DMARD. There was statistically significant improvement ( $P < 0.0001$ ) in the disease activity in term of number of tender and swollen joints, duration of early morning stiffness, physician's and patient's global assessment of disease activity, VAS of pain assessment, DAS 28 and erythrocyte sedimentation rate, ACR functional class, HAQ and SF-36.**Conclusion:** Majority of our patients are taking DMARD and there are significant improvements in clinical disease activity as well as functional status and quality of life. There is a delay in DMARD initiation that is associated with a delay in presentation and diagnosis.

## MP263

**Reasons for the Discordant Assessment of Lupus Activity by Patients and their Physicians****KP LEONG<sup>1</sup>, E CHONG<sup>1</sup>, KO KONG<sup>1</sup>, WG LAW<sup>1</sup>, HS HOWE<sup>1</sup>**<sup>1</sup>Rheumatology, Allergy and Immunology, Tan Tock Seng Hospital, Singapore**Aim:** Patients with systemic lupus erythematosus (SLE) often assess their disease differently from their physicians, resulting in therapeutic non-adherence. It is useful to study the reasons that lead to this in order to reduce the problem.**Methods:** We analysed cross-sectional data obtained from a cohort of 275 SLE patients. We compared the physicians' assessment of lupus activity versus patients' assessment of their general health, both based on a VAS scale. We divided the cases into 2 using the median value. Using logistic regression, we identified the factors that are associated with a poor assessment by the patients and by their physicians.**Results:** Patients tend to have a worse assessment of their condition than their physicians. Factors associated with poor patient assessment are difficulty with walking outdoors, sex, sore mouth, irreversible organ dysfunction, and general health and vitality as assessed by the SF-36. The physicians assess disease activity based on the objective clinical laboratory findings, in concert with the activity and damage scores of SLICC, SLAM and SLEDAI.**Conclusion:** Patients and physicians view disease severity differently. The factors that are associated with patients' poorer assessment are activities of daily living quality of life while physicians tend to base their judgment on objective parameters.

## MP264

**Establishment of an Early Arthritis Clinic in a Tertiary Referral Centre: Challenges and Patients Characteristics****TLIAN<sup>1</sup>, KO KONG<sup>1</sup>, WHYONG<sup>1</sup>, B THONG<sup>1</sup>, ET KOH<sup>1</sup>, YK CHENG<sup>1</sup>, HH CHNG<sup>1</sup>**<sup>1</sup>Rheumatology, Allergy and Immunology, Tan Tock Seng Hospital, Singapore**Aim:** While the concept of early arthritis clinics (EAC) is well accepted in Europe, this is not as well established in Asia. However, with the paradigm shift in treatment of rheumatoid arthritis (RA) focussing on early aggressive control of disease activity, seeing patients as early as possible after symptom onset potentially offers improved long-term outcomes. We report the challenges of setting this service up and the characteristics of patients seen.**Methods:** An EAC was initiated in January 2005. All referrals were reviewed by 4 rheumatologists and patients with "apparent" recent onset of inflammatory joint pains were selected. All patients had to fulfill 5 criteria: symptoms <2 years duration, non bony joint swelling, significant early morning stiffness >1 hour, inadequate response to NSAIDs and exclusion on osteoarthritis/crystal arthropathy. The aim was to see patients within 2 weeks of referral and the clinics were run by rheumatologists or trainees under supervision of rheumatologists.**Results:** A total of 106 patients were seen from January to April 2005, all seen within 2 weeks of referrals with a no-show rate was 14.8%. The mean age was 45.2 y (range 15 to 74 y), predominantly Chinese (61%) females (70%). Of those evaluated, 44/106 (42%) had a significant rheumatological condition: RA (36.4%), reactive arthritis (11.4%), undifferentiated arthritides (27.3%),

connective tissue disease (10%) and palindromic rheumatism (3%).

**Conclusion:** Our EAC has been successful with a significant proportion of rheumatological conditions being diagnosed. The aim is to follow these patients up looking at their long-term outcome.

#### MP265

##### Characteristics of Positive Drug Provocation Tests among Adults from a Clinical Immunology/Allergy Centre in Singapore

**BYH THONG<sup>1</sup>, YK CHENG<sup>1</sup>, KP LEONG<sup>1</sup>, CY TANG<sup>1</sup>, HH CHNG<sup>1</sup>**  
*<sup>1</sup>Rheumatology, Allergy and Immunology, Tan Tock Seng Hospital, Singapore*

**Aim:** To describe the characteristics of positive drug provocation tests (DPTs) among adults from a Clinical Immunology/Allergy centre in Singapore.

**Methods:** Consecutive positive DPTs during the period 1 January 2000 to 31 December 2003 were retrospectively studied.

**Results:** A total of 152 adults underwent 185 episodes of supervised DPTs. There were 21 (11.3%) positive DPTs. Of the 20 patients with 21 episodes of positive DPTs, mean age was 39 ± 12 years (range, 20-57). There were 12 (60%) males and 8 (40%) females. The most common indications among those with positive challenges were to exclude hypersensitivity (non-suggestive history/non-specific symptoms) (11, 52.4%), provide safe pharmacologically/structurally non-related drugs in proven hypersensitivity (2, 9.5%) and definitive diagnosis in suggestive history with negative, non-conclusive or non-available allergological tests (8, 38.1%). The most commonly tested drugs were antibiotics (11, 52.4%) and non-steroidal anti-inflammatory drugs (4, 19.0%). Among the 21 positive challenges, 16 (76.2%) were mild cutaneous, 4 (19%) moderately severe systemic, and 1 (4.8%) severe systemic reaction. DPT was positive within 1 hour in 11 (52.4%) and beyond 1 hour in 10 (47.6%) challenges. Positive DPT occurred after a mean of 166 ± 174 (range, 10-720) minutes after completion of the last provocation dose, and upon completing a cumulative average of 0.72 ± 0.38 of the final target dose of challenge drug.

**Conclusion:** The majority of positive DPTs were treated as outpatients without a need for hospitalisation. The severity of a positive reaction may be minimised with careful monitoring and the use of appropriate in-vitro/in-vivo tests before DPT, where available.

#### MP266

##### Adult Food Allergy to Limpet

**BYH THONG<sup>1</sup>, YK CHENG<sup>1</sup>, KP LEONG<sup>1</sup>, CY TANG<sup>1</sup>, HH CHNG<sup>1</sup>**  
*<sup>1</sup>Rheumatology, Allergy and Immunology, Tan Tock Seng Hospital, Singapore*

**Aim:** Immediate hypersensitivity reaction following ingestion of limpet, a gastropod mollusc, is the second most common cause of food allergy among adults attending our Clinical Immunology/Allergy clinic. The aim of this study is to describe the clinical features and outcome among adults with food allergy to limpet.

**Methods:** Consecutive patients attending our Clinical Immunology/Allergy Clinic during the study period 1 July 1994 to 31 April 2002 who had allergic reactions following ingestion of limpet were retrospectively studied.

**Results:** There were 13 patients of whom 11 (85%) were males. All were Singaporean Chinese. Their mean age was 33 ± 14 (range, 18-55) years. A median of 2 episodes (range, 1-7) of acute reactions occurred before patients realised that limpet was a possible putative food and was referred for evaluation and management. The most common manifestations were periorbital/lip angioedema (9, 69%), nasal congestion (9, 69%), dyspnoea/ wheeze (7, 54%) and urticaria (5, 38%). Only 1 (8%) developed hypotension. The reaction in 9 (69%) patients was considered severe enough to be classified as anaphylaxis. Eight (62%) patients were atopic, of whom 6 (75%) had asthma, 6 (75%) allergic rhinitis, and 2 (25%) atopic eczema. Of 10 patients who had skin prick-prick tests done using the canned food products, 9 (90%) were positive to limpet, 1 (10%) to pacific clam, 3 (30%) to abalone. The patient who tested negative to limpet developed periorbital angioedema following open provocation testing.

**Conclusion:** Limpet, a common food allergen among Chinese adults in Singapore, is often unsuspected during the initial reaction.

#### MP267

##### A Study of Drug Provocation Tests in Adults from a Clinical Immunology/Allergy Centre in Singapore

**BYH THONG<sup>1</sup>, YK CHENG<sup>1</sup>, KP LEONG<sup>1</sup>, CY TANG<sup>1</sup>, HH CHNG<sup>1</sup>**  
*<sup>1</sup>Rheumatology, Allergy and Immunology, Tan Tock Seng Hospital, Singapore*

**Aim:** To describe the characteristics and outcomes of drug provocation tests (DPTs) in adults from a Clinical Immunology/Allergy centre in Singapore.

**Methods:** Patient and drug characteristics, indications for, methods and outcomes of consecutive DPTs during the period 1 January 2000 to 31 December 2003 were retrospectively studied.

**Results:** A total of 152 adults underwent 185 episodes of supervised DPTs. There were 175 (94.6%) open challenges and 10 (5.4%) blinded placebo-control challenges. All patients received the maximum single dose of the drug during each DPT, with oral administration being the commonest (91.9%). The main indications for DPT were to exclude hypersensitivity (non-suggestive history/non-specific symptoms, 54.6%), provide safe pharmacologically and/or structurally non-related drugs in patients with proven hypersensitivity (28.1%) and definitive diagnosis where there were negative, non-conclusive or non-available allergological tests (15.7%). Antibiotics (42.2%) and selective cyclooxygenase-2 (COX-2) inhibitors (25.9%) were the most commonly tested drugs. Twenty patients developed 21 (11.3%) episodes of positive DPT. Of these, 16 (76.2%) were mild cutaneous, 4 (19%) moderately severe systemic, and 1 (4.8%) anaphylactic/anaphylactoid reaction requiring hospitalisation. DPT was positive within 1 hour in 11 (52.4%) and beyond 1 hour in 10 (47.6%) challenges. Positive DPTs occurred after a mean of 166 ± 174 (range, 10-720) minutes after completion of the last provocation dose, and upon completing a cumulative average of 0.72 ± 0.38 of the final target dose of challenge drug.

**Conclusion:** DPTs are clinically useful, diagnostic and safe when carried out with careful patient selection and according to established guidelines.

#### MP268

##### Pattern of Aeroallergen Sensitisation in Adults with Allergic Rhinitis and Asthma in an Adult Clinical Immunology/Allergy Service in Singapore

**BYH THONG<sup>1</sup>, CY TANG<sup>1</sup>, YK CHENG<sup>1</sup>, KP LEONG<sup>1</sup>, HH CHNG<sup>1</sup>**  
*<sup>1</sup>Rheumatology, Allergy and Immunology, Tan Tock Seng Hospital, Singapore*

**Aim:** To describe the pattern of aeroallergen sensitisation among adults with allergic rhinitis and asthma in a Clinical Immunology/Allergy clinic in Singapore.

**Methods:** The skin prick tests (SPT) results using a standard panel of local aeroallergens were studied retrospectively in 123 consecutive patients between 1 January 2003 and 31 October 2004. A positive SPT was defined as mean wheal diameter 3 mm more than the negative control.

**Results:** The mean age was 34 ± 13 years, of whom the male to female ratio was 1.2:1. These adults with inhalant allergies comprised 95.3% with allergic rhinitis, 19.6% asthma and 16.8% atopic eczema. Eighty-four per cent of patients lived in high-rise apartments, including 75% in public housing. The most common aeroallergens to which patients were sensitised were Dermatophagoides spp. (70%), Blomia tropicalis (69.2%), cockroach (40.2%), cat dander (12.1%), Bermuda grass (10.3%), dog (7.5%) and oil palm pollen (8.2%). Sixty-seven (62.5%) patients were sensitised to both Dermatophagoides spp and Blomia tropicalis. Sensitisation to Curvularia spp (6.1%), moulds (4.7%) and resam-fern spores, Dicranopteris linearis (2%) were uncommon. Sensitisation to cat dander was more common in females ( $P = 0.02$ ), and Dermatophagoides ( $P = 0.001$ ) and Blomia tropicalis in males ( $P = 0.006$ ). There was no statistically significant differences in the type of housing, residential locality and occupation among patients with the same type of aeroallergen sensitisations.

**Conclusion:** The pattern of aeroallergen sensitisation is representative of that seen in a tropical, urban environment. However, the frequency of sensitisation to Dermatophagoides spp and tropical airspora of Southeast Asia (Elaeis guineensis, Curvularia spp and Dicranopteris linearis) was much lower than previously reported.



## MP269

**Outcomes of Allopurinol Desensitisation in Gout Patients with Allopurinol Hypersensitivity****BYH THONG<sup>1</sup>, YK CHENG<sup>1</sup>, KP LEONG<sup>1</sup>, CY TANG<sup>1</sup>, HH CHNG<sup>1</sup>**  
*<sup>1</sup>Rheumatology, Allergy and Immunology, Tan Tock Seng Hospital, Singapore***Aim:** To describe the long-term outcomes of allopurinol desensitisation in 9 consecutive patients with chronic tophaceous or recurrent gout and allopurinol hypersensitivity.**Methods:** Patients with previous allopurinol-related delayed cutaneous reactions in the absence of suitable alternative urate-lowering drugs were desensitised during the period 1 January 1996 to 31 May 2005. Patients with severe systemic or immunobullous skin eruptions were excluded. Using a standardised protocol, all patients were given allopurinol starting at 50 mcg/day, progressively increasing to 100 mcg/day by day 28. Further dose increments were aimed at maintaining serum urate concentrations below 350 mcg/L.**Results:** There were 6 males and 3 females with mean age  $47 \pm 17$  (range, 27-73) years. Six patients (66.7%) had pre-existing chronic renal insufficiency (CRI) with mean serum creatinine 191  $\mu\text{mol/L}$  (range, 112-291), including 1 patient on chronic haemodialysis. Six (66.7%) patients completed desensitisation to a target allopurinol dose of 100 mg/day without serious hypersensitivity reactions. Of these, 4 (44.4%) remained on allopurinol 100 to 300 mcg/day up to 4 to 9 years later. Of the remaining 5 (55.6%) in whom desensitisation failed, all had CRI, of whom 2 refused to continue following first occurrence of late rash (day 56) and pruritus (day 22) respectively. Desensitisation was terminated by the allergist in 3 cases because of eosinophilia (suggestive of potential flare of reaction), elevated serum creatinine  $>1.5$  times baseline without rash (day 24) and with rash (day 42) in 2 patients, and intractable rash (day 56) in the remaining patient respectively.**Conclusion:** Desensitisation was successful in 44% of patients. CRI appeared to be associated with desensitisation failure.

## MP270

**Outcomes in Adults with Hypogammaglobulinaemia Following Monthly Intravenous Immunoglobulin Replacement Therapy****BYH THONG<sup>1</sup>, YK CHENG<sup>1</sup>, KP LEONG<sup>1</sup>, CY TANG<sup>1</sup>, HH CHNG<sup>1</sup>**  
*<sup>1</sup>Rheumatology, Allergy and Immunology, Tan Tock Seng Hospital, Singapore***Aim:** To describe the outcomes of adults with hypogammaglobulinaemia from primary immunodeficiency disease (PID) who received monthly IVIG in our centre.**Methods:** Retrospective review of the frequency, severity and types of recurrent major infections and outcomes among adults who received monthly IVIG 400 mg/kg/month during the study period 1 January 1991 to 31 May 2005.**Results:** There were 9 adults with mean age at diagnosis  $49 \pm 19$  years (range, 18-69), among whom 5 (56%) were females. These comprised 4 patients with thymoma and immunodeficiency, 4 common variable immunodeficiency and 1 hypogammaglobulinaemia with ring chromosome 18. The average time from onset of recurrent infections to diagnosis of PID was  $44 \pm 37$  months (range, 1-106). Seven (77.8%) received monthly IVIG, achieving mean serum trough IgG levels of  $7.3 \pm 0.7$  g/L (range, 6.2-8.3). Prior to initiation of IVIG, 3 (33.3%) patients had bronchiectasis, 3 (33.3%) had chronic sinusitis and 1 (11.1%) had both. Of 2 patients with thymoma and immunodeficiency, 1 developed recurrence of malignant thymoma with metastatic disease and opted for cessation of IVIG after 5 years. The other developed infections from associated T-cell defects (cytomegalovirus colitis and retinitis, disseminated *Candida* oesophagitis and hepatitis, ocular toxoplasmosis) and colorectal carcinoma. There was only 1 death: a 64-year-old woman with pre-existing bronchiectasis who died from chronic type 2 respiratory failure after 5.6 years of monthly IVIG. Of the remaining 2 patients who did not receive monthly IVIG, 1 refused and subsequently died of septic shock, and the other received 2-monthly infusions for financial reasons.**Conclusion:** Monthly IVIG replacement resulted in good outcomes in the majority of patients.

## MP271

**Non-specific Colitis in Diarrhoeal Disease: A New Entity?****WH GAN<sup>1</sup>, M SALTO-TELLEZ<sup>2</sup>, E SHEN<sup>1</sup>***<sup>1</sup>Medicine, Alexandra Hospital, Singapore, <sup>2</sup>Pathology, National University Hospital, Singapore***Aim:** To date, histopathological causes of chronic diarrhoea included Crohn's disease, ulcerative colitis, indeterminate colitis and microscopic colitis. However, in a proportion of patients with chronic diarrhoea, no underlying cause is found. We present a retrospective study of patients with diarrhoea and colonoscopic biopsies showing non-specific colitis in an Asian population.**Methods:** A retrospective study was conducted via a database search of 75 hospital patients who had undergone colonoscopy for diarrhoea as the primary indication between August 2002 and March 2005. Exclusion criteria before diagnosis of non-specific colitis included abnormal colonoscopic findings of polyp, malignancy or severe inflammation and/or histopathological findings of mitotic lesions, inflammatory bowel disease and microscopic colitis.**Results:** Twenty-six of the 75 patients (34.7%) were excluded on the basis of colonoscopic and histopathological findings. Of the remaining 49 patients, all but 4 presented with chronic diarrhoea. The mean age of presentation was 43.2 years (range, 22-77 years) with slight male preponderance (57.1%). There were 22 cases of non-specific colitis, giving a point prevalence of 44.9% in our series. Only 2 patients with non-specific colitis had colonoscopic features of inflammation, whilst the rest had normal colonoscopic findings. On follow-up, 12 out of the 22 patients (54.5%) showed resolution of the diarrhoea.**Conclusion:** Non-specific colitis may be a new entity in the causation of chronic diarrhoea. In our patients, there was a higher than expected incidence of abnormal histopathological findings in spite of normal colonoscopy. Preliminary data suggest that resolution of diarrhoea can be expected in greater than 50% of these patients.

## MP272

**Coronary Angiography via the Radial Route is a Safe Alternative to Femoral Route and is Easily Performed in a District Hospital****CH TAN<sup>1</sup>, J LINGAMANAICKER<sup>1</sup>, PP GOH<sup>1</sup>, V LIM<sup>1</sup>, G LEONG<sup>1</sup>, BC CHANG<sup>1</sup>***<sup>1</sup>Cardiology, Changi General Hospital, Singapore***Aim:** Coronary angiography can be performed via the radial route. It is technically demanding. However, immobilisation is not mandatory after the procedure. Our institution recently started this programme. We aimed to determine if angiography via the new approach will incur longer procedural time, radiation and contrast used, for either cardiologists and fellows.**Methods:** We examined 738 cases of coronary angiography. Bypass graft and interventional cases were excluded. Records were obtained retrospectively for 504 cases of femoral and 234 cases of radial angiography.**Results:** For femoral route approach, 374 were done by cardiologists and 130 by fellows. For the radial cases, 215 were done by cardiologists and 19 by fellows. Mean time taken by cardiologists was 13.0 min via femoral and 15.5 min via radial ( $P < 0.005$ ). The fellows took 15.2 min and 18.8 min respectively ( $P = 0.23$ ). The fluoroscopy time for cardiologists was 3.1 min for femoral and 4.6 min for radial ( $P < 0.005$ ). Fellows took 4.5 min and 6.4 min respectively. The contrast used by cardiologists was 48.2 mL for femoral and 48.5 mL for radial routes ( $P = 0.23$ ). While the contrast used by fellows were 49.7 mL and 50 mL. Prolongation of procedural time was due mainly to arterial access. The access time was 11 min for cardiologists and 12 min for fellows. The overall radial failure rate was 13%.**Conclusion:** Although the procedural and fluoroscopy time is longer for the radial route, it is not different from those of the fellows via femoral route. The contrast used for either approach is the same. It is a beneficial alternative route for angiography with a slightly steeper learning curve.

**MP273**

**Cutaneous Adverse Drug Reactions in a Hospital Setting: a One-year Retrospective Analysis**

**RYL TEO<sup>1</sup>, YK TAY<sup>1</sup>**

<sup>1</sup>*Dermatology, Changi General Hospital, Singapore*

**Aim:** Rashes are the most common adverse reaction to drugs. We aim to describe the (i) prevalence of cutaneous adverse drug reactions (ADR) in hospitalised patients over a 1-year period in a general hospital; (ii) variety of adverse cutaneous reactions; (iii) characteristics of patients with cutaneous drug reactions and (iv) drugs implicated.

**Method:** A retrospective analysis of all ADR from the pharmacists' database in 2003 was conducted. Patients whose adverse reactions did not have a cutaneous component and outpatients were excluded. Patients' records were reviewed to extract demographic data, drug implicated and route of administration, drug allergy history, type of cutaneous reaction and severity and presence of underlying chronic disease.

**Results:** Sixty-five patients met our inclusion criteria, giving an estimated prevalence of 1.8/1000 among hospitalised patients. The cases were mostly from the general medical department (64.6%), with a slight male predominance (males, 53.8%; females 46.2%). The mean age was 41.6 years (range, 13 to 85 years). Principal drugs implicated were antibiotics (43.2%), mainly penicillins and cephalosporins and non-steroidal anti-inflammatory agents (NSAIDs) (16.9%). Urticarial (46.1%) and maculopapular eruptions (40.0%) were the most common. Others included Stevens-Johnson syndrome/toxic epidermal necrolysis (3.3%), drug reaction with eosinophilia and systemic symptoms (DRESS) (0.7%) and erythroderma (0.7%). 29.2% were considered to be severe. 44.6% had an associated chronic disease and 24.6% had a previous documented drug allergy

**Conclusion:** Antibiotics and NSAIDs were the major drugs involved. The commonest cutaneous manifestations were urticarial and maculopapular eruptions. A high proportion of reactions were considered severe and almost one-quarter had a previous drug allergy.

**MP274**

**Prescribing Pattern and Bill Size for Short-stay Asthma Patients**

**MN IMRAN<sup>1</sup>, K NARENDRA<sup>1</sup>**

<sup>1</sup>*General Medicine, Changi General Hospital, Singapore*

**Aim:** A retrospective study of patients who presented to evaluate bill size for short-stay asthma patients and its relationship to prescriptions given on discharge.

**Methods:** A retrospective study of C-class patients aged 12 years and above, admitted for not more than 48 hours to the Department of Medicine, at Changi General Hospital for acute exacerbation of asthma, over a period of 6 months from January 2004. Patients admitted for not more than 2 days were selected, so as to minimise the impact of co-morbidities on the bill size, and we compared the inpatient cost for male and female patients.

**Results:** A total of 44 patients were hospitalised during the 6-month study period. There were 20 males and 24 females. The mean ages were 26.4 years ± 8.2 SD for males, and 28.4 years ± 10.9 SD for females. The average bill was S\$166.58 ± 5.84 SD for males and S\$306 ± 167.85 for females. The hospitalisation cost was significantly higher for females (*P* = 0.03). Thirteen females were prescribed a combination of LABA and ICS in single inhaler as opposed to 6 males, on the day of discharge from the hospital. All patients were given a review appointment within 4 weeks of discharge and none were readmitted within 30 days of discharge from the hospital.

**Conclusion:** It is recommended that patients admitted for acute exacerbation of asthma should be reviewed within 4 weeks of discharge from the hospital. As 30-day readmission is unlikely for short-stay asthma patients, a prudent prescription policy will help to reduce hospitalisation cost for such patients.

**MP275**

**Cough with no Characteristic Features: Diagnostic Outcome**

**MN IMRAN<sup>1</sup>, V POULOSE<sup>1</sup>**

<sup>1</sup>*General Medicine, Changi General Hospital, Singapore*

**Aim:** A retrospective study of patients with non-characteristic chronic cough presenting to Changi General Hospital between May 2002 and April 2005 was performed. Their records were reviewed and diagnostic outcomes were studied.

**Methods:** We performed a retrospective study of patients referred to respiratory clinic with chronic cough of 3 weeks duration. Inclusion criteria include non-smoker with normal chest X-ray, absence of ACE-inhibitor use and normal physical examination. The clinical features were non-suggestive of any specific aetiology. This includes the absence of dyspnoea, wheezing, rhinorrhoea, blocked nose, throat itchiness, constant throat clearing, heartburn, regurgitation and dysphagia. The diagnostic and clinical outcomes were looked at. Methacholine challenge test (MCT) was performed on all patients. Patients with negative MCT were referred for otolaryngology evaluation.

**Results:** Twenty-nine patients were enrolled. All had negative methacholine challenge tests. This included 17 males and 12 females. Their mean age was 39.55 years ± 14.93 SD and the mean duration of cough was 9.03 months ± 14.17 SD. Twenty-one patients (72.4%) had formal assessments by otolaryngology. Of those seen by an otolaryngologist, 9 improved with therapy for allergic rhinitis (AR) while 6 improved with therapy for gastro-oesophageal reflux disease (GERD). One was diagnosed with post-viral cough while no diagnosis was made in the remaining 5. Of those with no formal otolaryngology referral, 1 improved with therapy for AR and 1 improved with weight loss. Seven patients, 3 of which were reviewed by otolaryngologists, resolved spontaneously on their second visit. They were likely to have post-viral bronchitis. Three patients remained undiagnosed.

**Conclusion:** The 3 likely causes of non-characteristic chronic cough are allergic rhinitis, gastro-oesophageal reflux disease and post-viral bronchitis. Despite extensive evaluation, a few remain undiagnosed.

**MP276**

**Clinical Profile of Patients with Probable Flatbush Diabetes**

**J KHOO<sup>1</sup>, HS LIM<sup>2</sup>, V AU<sup>2</sup>, R CHEN<sup>2</sup>**

<sup>1</sup>*General Medicine, <sup>2</sup>Endocrinology, Changi General Hospital, Singapore*

**Aim:** The heterogeneity of diabetes is increasingly being recognised. Lifelong insulin treatment is commonly required for classic type 1 diabetes, whereas type 2 diabetes does not usually require insulin at diagnosis. Flatbush diabetes is an atypical subclass of diabetes for which insulin is initially required, but glycaemic control is subsequently achieved with oral hypoglycaemics or diet alone. Our study aimed to identify such patients in the local population.

**Methods:** Clinical records of diabetic patients seen by the authors were examined to identify patients with probable Flatbush diabetes.

**Results:** Nine patients (7 males, 2 females) had clinical features suggesting atypical diabetes. Eight tested negative for glutamic acid decarboxylase (GAD) and/or islet cell (ICA) antibodies. Average age at diagnosis was 27.0 years (range, 16-40), with mean body mass index 25.7 (19-34). Severe hyperglycaemia was present at diagnosis, with average HbA1c 13.1% (range, 9.3%-16.6%) and serum glucose 33.5 mmol/L (14-84.2 mmol/L). All were started on insulin at diagnosis. Four patients (44.4%) had ketoacidosis at presentation, with 3 having a precipitating event. Insulin was discontinued after 3 to 18 months of treatment (mean, 10 months), over a follow-up period averaging 49.7 months (range, 24-168 months). Glycaemic control is satisfactory on oral hypoglycaemics (7 patients) and diet alone (2 patients), with latest mean HbA1c 6.7% (range, 5.3%-8.5%).

**Conclusion:** It is useful to identify insulin-requiring diabetic patients with probable Flatbush diabetes, since they may not depend on insulin for life. The absence of antibodies and the relatively older age of onset are strong clues.

## MP277

**Seroprevalence of *Chlamydia pneumoniae* and *Mycoplasma pneumoniae* among Children in a Multi-Ethnic Population of Singapore**H OH<sup>1</sup>, SJ THAM<sup>1</sup>, S DHAMODARAN<sup>2</sup>, KT GOH<sup>3</sup><sup>1</sup>General Medicine, <sup>2</sup>Clinical Trials and Research Unit, Changi General Hospital, Singapore, <sup>3</sup>Communicable Disease Division, Ministry of Health, Singapore, Singapore

**Aim:** To analyse the seroprevalence of immunoglobins G (IgG) and M (IgM) antibodies of *Chlamydia pneumoniae* and *Mycoplasma pneumoniae* in Singapore children. In Singapore, no study on seroprevalence of *C. pneumoniae* and *M. pneumoniae* in childhood population has been conducted.

**Methods:** Serum samples from 154 healthy children aged 1 to 8 years who participated in a serological survey on vaccine-preventable diseases in 1992/1993 and 1995 were tested. *C. pneumoniae* and *M. pneumoniae* antibodies were determined using a quantitative EIA kit (Ani Labssystem, Finland and IBL Germany respectively).

**Results:** The overall prevalence of *C. pneumoniae* IgG and IgM antibodies were 25.3% and 4.5% respectively. The prevalence of *M. pneumoniae* IgG and IgM antibodies were 39% and 37.7% respectively. For both genders, 26.7% of Chinese, 27.6% of Malay and 14.3% of Indians were seropositive for *C. pneumoniae* IgG. For both genders, 44% of Chinese, 19.3% of Malays and 42.9% of Indians were seropositive for *M. pneumoniae* IgG. The racial differences in seropositivity between Malay and Chinese had an odds ratio 0.306 (95% C.I. 0.117-0.802). The prevalence of *C. pneumoniae* IgG antibodies was high among children aged 1 year (37.9%), 2 years (28.6%) and 8 years (32.7%). The prevalence of *M. pneumoniae* IgG antibodies was significantly higher in the 5 to 8 years age group compared to the younger age group ( $P = 0.001$ ).

**Conclusion:** The survey showed that a large proportion of the childhood population in Singapore have serologic evidence of asymptomatic or previous *C. pneumoniae* and *M. pneumoniae* infections.

## MP278

**High Troponin Levels in Critically Ill Patients with Renal Failure and no Acute Coronary Syndrome: Incidence and Impact on Mortality**C SIAU<sup>1</sup>, ACY NG<sup>1</sup>, CH TAN<sup>2</sup>, V POULOSE<sup>1</sup><sup>1</sup>General Medicine, <sup>2</sup>Cardiology, Changi General Hospital, Singapore

**Aim:** Raised troponin levels in stable patients with renal failure has been shown to be an independent predictor of increased mortality. Elevated cardiac troponin levels are frequently seen in medical intensive care (MICU) patients with renal failure but no clinical evidence of acute coronary syndrome (ACS). We looked at the incidence of elevated troponin levels in this group of patients and the impact on mortality.

**Methods:** Data was collected prospectively on all MICU patients who met the following criteria: a) renal failure – defined as serum creatinine  $>140 \mu\text{mol/L}$ ; b) no evidence of ACS. These patients had a troponin T level done within the first 24 hours of ICU admission. Troponin T levels  $>0.1 \text{ ng/mL}$  were considered high. Our primary outcome was the 28-day all cause mortality. We also looked at the correlation between the troponin levels and creatinine clearance as calculated from the Cockcroft-Gault equation.

**Results:** Fifty-one patients met the study criteria. Twenty-two patients (43%) had elevated troponin T levels. Six of these 22 patients died (mortality rate 27%). The mortality rate in the 29 patients with normal troponin levels was 34%. The severity of illness (using the Logistic Organ Dysfunction Score) was similar in both groups. The troponin levels poorly correlated with the levels of creatinine clearance ( $r^2 = 0.005$ ).

**Conclusion:** In the absence of ACS, elevated troponin T levels in MICU patients with renal insufficiency do not appear to confer an increased mortality. Larger studies are needed to validate this finding.

## MP279

**Evaluation of Continuous Renal Replacement Therapy in a “Closed” Intensive Care Unit**A TEE<sup>1</sup>, A NG<sup>1</sup>, S KOH<sup>1</sup>, M CHEN<sup>1</sup>, V POULOSE<sup>1</sup><sup>1</sup>General Medicine, Changi General Hospital, Singapore

**Aim:** Acute renal failure (ARF) is common in the medical intensive care unit (MICU). However, the effectiveness of continuous renal replacement therapy (CRRT) in the “closed” ICU, involving an ICU team looking after all aspects of patient management, including dialysis without routine nephrologist input, is less well studied. We aimed to audit characteristics of ARF in a “closed” MICU, evaluate differences between survivors and non-survivors and assess the effectiveness of CRRT in our unit.

**Methods:** Retrospective case record analysis of all patients requiring use of CRRT in Changi General Hospital MICU from 1 November 2003 to 31 October 2004.

**Results:** One hundred and fifteen CRRT episodes were performed in 100 patients (47 males); 13 patients had more than 1 episode. Top 3 indications were fluid overload ( $n = 38$ ), acidosis ( $n = 17$ ) and ARF ( $n = 17$ ). Survivors ( $n = 74$ ) were largely similar to non-survivors (age, sex, pre-CRRT serum creatinine) and had no difference in mean ICU length of stay (LOS) (4.9 vs 5.9 days,  $P = 0.243$ ) but significantly longer hospital LOS (16 vs 9.1 days,  $P = 0.008$ ). ICU and hospital mortality were 26% and 40% respectively. Mean APACHE II score was 26 with predicted death rate of 48.2%. In the Victorian severe ARF study (Cole et al. 2000), hospital mortality was 49.2% (mean APACHE II score, 27). ICU LOS was shorter in our study, 5.1 vs 10.9 days.

**Conclusion:** CRRT is effective in a “closed” MICU. Mortality rates were comparable to literature and APACHE II predicted death rate. ICU survivors were similar to non-survivors, except for longer hospital LOS.

## MP280

**Extracorporeal Shockwave Therapy for the Treatment of Painful Musculoskeletal Conditions**BCL TAN<sup>1</sup>, J CHIA<sup>1</sup><sup>1</sup>Sports Medicine, Changi General Hospital, Singapore

**Aim:** To establish the efficacy and safety of extracorporeal shock wave therapy (ESWT) in the treatment of musculoskeletal injuries.

**Methods:** This is a retrospective study on the patients who were treated with ESWT between April 2004 to February 2005. The indications included plantar fasciitis, lateral and medial epicondylitis, patellar tendinopathy, supraspinatus tendinitis and Achilles enthesiopathy. Patients with ultrasound-confirmed lesions were administered shock waves over 2 sessions, 1 week apart. At each session, 2000 pulses were administered under ultrasound guidance at increasing energy flux densities of between 0.03 mJ/mm and 0.28 mJ/mm. No sedation or anaesthetic was used and non-steroidal anti-inflammatories were prescribed over the course of the treatment. Pain was measured on the Visual Analogue Scale (VAS) before each treatment and at 2-week and 3-month post-treatment follow-up.

**Results:** A total of 191 cases were treated, with a mean age of 42.4 years and a male preponderance of 62.3%. Of the indications, plantar fasciitis was the most common, accounting for 47.6% of the cases. Of 442 ESWT treatments performed, 15.7% and 3.1% were second and third repeat courses respectively. The mean VAS prior to the first and second treatments, and at 2-week and 3-month follow-up was 5.5, 3.8, 3.0 and 2.6 (out of 10.0) respectively. For plantar fasciitis, where the swelling could be quantitatively measured using ultrasound sonography, there was statistically significant improvement of the proximal plantar fascia swelling from 5.7 mm to 4.5 mm over 2 weeks. No adverse reactions were reported.

**Conclusion:** ESWT is an effective and safe treatment modality for chronic and painful lesions at bone-tendon junctions.

**MP281**

**Factors that Influence School Readiness Recommendations**

**MSM LIM<sup>1</sup>, PC TAN<sup>1</sup>, WB LIAN<sup>1</sup>**

<sup>1</sup>Child Development Unit, KK Women's & Children's Hospital, Singapore

**Aim:** As repetition of primary school grades is not currently an option in Singapore, healthcare professionals in the Child Developmental Unit (CDU) often recommend retention in kindergarten for children assessed to have poor school readiness skills (SRS) based on a checklist developed by the team. For the same children, their pre-school teachers tend to encourage on-time enrollment into primary school, resulting in confusion amongst parents. This study sought to determine differences in perceptions on SRS and knowledge on recent grade repetition policies in primary school.

**Methods:** A survey of 71 pre-school and primary school teachers was carried out.

**Results:** There was no significant difference between pre-school and primary school teachers in their rating scores on the importance of specific SRS. Moreover, most teachers agreed that all skills listed are somewhat important. The teachers rated these skills to be less important: difficulty with academic concepts, time, and pencil and paper skills. A significant number of preschool teachers are unaware that grade retention in primary school is not permitted.

**Conclusion:** Similar rating scores between the 2 groups of teachers on the importance of specific SRS implied similar levels of expectation of level of skills for children entering primary school. Most teachers appeared to have similar perceptions of a child's readiness for school as healthcare professions. However, professionals may need to reconsider their expectations in assessing children in the areas considered less important by the teachers. In view of their lack of awareness regarding school retention, our team may need to work closer with these teachers when making recommendations for children at risk of school failure.

**MP282**

**Superior Mesenteric Artery Syndrome: a Review of Five Cases in Seven Years**

**JHY CHUA<sup>1</sup>, CEL TAN<sup>1</sup>, CH CHUI<sup>1</sup>, AS JACOBSEN<sup>1</sup>**

<sup>1</sup>General Paediatric Surgery, KK Women's & Children's Hospital, Singapore

**Aim:** Superior mesenteric artery (SMA) syndrome describes a condition of obstruction at the level of the duodenum as a result of entrapment between the aorta and the superior mesenteric artery. It is an uncommon cause of upper abdominal discomfort associated with bilious vomiting, and is a rare complication following corrective surgery for scoliosis.

**Methods:** We describe 5 patients diagnosed with superior mesenteric artery syndrome in our hospital between 1 June 1997 and 31 May 2004.

**Results:** The patients were between 8.7 and 15.6 years of age. Three of the patients were male. Their body mass indexes (BMIs) ranged from 12.6 to 17.3 at the time of diagnosis. Two of these patients had undergone recent spinal fusion and instrumentation for correction of scoliosis. All 5 patients presented with bilious vomiting and/or gastric aspirates. The diagnosis of SMA syndrome was made on upper gastrointestinal tract contrast studies. All but 1 patient were successfully managed conservatively. Three of them received high caloric enteral nutrition via transpyloric jejunal feeding tubes; 1 patient received an intravenous drip while he tried small oral feeds. All patients had complete resolution of their symptoms within 8 weeks of diagnosis, after consistent weight gain was achieved. The last patient underwent laparotomy and duodeno-jejunostomy.

**Conclusion:** SMA syndrome can result in significant morbidity and a protracted hospital stay. Persistent vomiting and upper abdominal discomfort in patients who had suffered significant weight loss, and/or those who had undergone corrective surgery for scoliosis should be investigated. Early diagnosis of this condition will minimise further wasting and prevent unnecessary surgery.

**MP283**

**Comparison of Bedside Test Kits for Prediction of Preterm Delivery: Actim Partus versus Fibronectin**

**HS TING<sup>1</sup>, K KWEK<sup>2</sup>**

<sup>1</sup>Gynaecology - Minimally Invasive Surgery, <sup>2</sup>Maternal Fetal Medicine, KK Women's & Children's Hospital, Singapore

**Aim:** The objective of the study was to compare the effectiveness of bedside Actim Partus test versus Fibronectin test in predicting preterm delivery.

**Methods:** Patients with preterm labour between 24 to 34 weeks of gestation were recruited. Both Actim Partus and fibronectin bedside tests were performed. Tocolysis and steroid therapy were administered to all the recruited patients. Outcome data were collected after delivery.

**Results:** One hundred and eight patients were recruited into the study. Ninety-six patients had complete data for analysis. Among those with negative Actim Partus and fibronectin results, the mean ( $\pm$  standard deviation) gestational ages at delivery were 37.1 weeks ( $\pm$  2.1 weeks) and 36.9 weeks ( $\pm$  2.4 weeks), respectively. Among those with positive Actim Partus and Fibronectin results, the mean ( $\pm$  standard deviation) gestational ages at delivery were 33.2 weeks ( $\pm$  4.0 weeks) and 33.8 weeks ( $\pm$  4.2 weeks), respectively ( $P < 0.001$  for both Actim Partus and fibronectin). The admission-to-delivery interval was 2.5 weeks shorter in the group with positive Actim Partus results (3.1 weeks compared with 5.6 weeks) ( $P < 0.001$ ). It is 2 weeks shorter in the groups with positive fibronectin results (3.4 weeks compared with 5.4 weeks) ( $P = 0.005$ ). Both Actim Partus and fibronectin tests have high negative predictive value in predicting risk of delivery within 48 hours, 7 days or 14 days (0.97; 0.90; 0.90 and 0.94; 0.87; 0.87 respectively).

**Conclusion:** Both Actim Partus and fibronectin tests are effective adjuvant bedside test kit for the prediction of preterm delivery in patients presenting with signs or symptoms of preterm delivery.

**MP284**

**Recurrent Der(21;21) Down Syndrome Found in a Family**

**KF CHEONG<sup>1</sup>, L KNIGHT<sup>1</sup>, A LAP<sup>1</sup>, R PHUA<sup>1</sup>**

<sup>1</sup>Laboratory, <sup>2</sup>Paediatrics - Genetics, KK Women's & Children's Hospital, Singapore

**Aim:** To investigate a family with 2 consecutive Down pregnancies. The first pregnancy was terminated due to der(21;21) Down syndrome. The second pregnancy resulted in a der(21;21) Down syndrome baby.

**Methods:** Chromosomal analysis was performed on metaphases obtained from phytohemagglutinin-stimulated lymphocytes from the parents' peripheral blood samples. Metaphases were G-banded using trypsin followed by Giemsa.

**Results:** The father has a normal karyotype of 46,XY. The mother's chromosome analysis showed 49 cells with an apparently normal female karyotype 46,XX. However, 1 cell showed an unbalanced der(21;21) similar to what had been observed in the 2 Down pregnancies. This low level mosaicism present in the mother provides an explanation for the recurrence of Down pregnancies.

**Conclusion:** It is important to perform parents' chromosome studies on cases with recurrent Down pregnancies. A higher number of cells need to be analysed in order to detect the presence of low-percentage mosaicism.

**MP285**

**Central Nervous System Disease Associated with *Mycoplasma pneumoniae* Infections**

**NWS TEE<sup>1</sup>, CY CHONG<sup>2</sup>, Z MUTTAKIN<sup>2</sup>, LH LOO<sup>1</sup>, R LIN<sup>3</sup>**

<sup>1</sup>Laboratory, <sup>2</sup>Paediatrics - Infectious Diseases, KK Women's & Children's Hospital, Singapore, <sup>3</sup>Laboratory Medicine, National University Hospital, Singapore

**Aim:** The pathologic mechanism associated with neurological complications due to *Mycoplasma pneumoniae* infections is thought to be either a parainfectious immune-mediated process or as a result of direct invasion. We conducted a study to detect evidence of *M. pneumoniae* infection in our



paediatric population presenting with acute central nervous system (CNS) disease.

**Methods:** After informed consent, each patient's cerebrospinal fluid, serum and throat swab were tested by polymerase chain reaction for *M. pneumoniae*. Total antibodies were determined by *M. pneumoniae* particle agglutination test.

**Results:** Seven patients were recruited, 5 were males. The mean age was 7.6 years, range: 2 to 13 years. All patients presented with fever. Five had prior respiratory symptoms. For the CNS presentation, 1 had changes in mental state, 3 had seizures, 1 presented with hemiparesis and 2 with headache. The diagnosis for 5 patients was meningitis. The other 2 diagnoses were acute disseminated encephalomyelitis and complex febrile seizures. The CSF profile was normal for the 2 non-meningitic cases. *M. pneumoniae* titres were raised to more than 640 for 2 patients with meningitis. PCR was negative in all samples except from the throat swab of the patient with high *M. pneumoniae* titre (>640 titres). The study numbers were too small to allow us to reach any conclusion.

**Conclusion:** We did not detect any evidence of direct CNS invasion. In 2 cases of meningitis, the association with *M. pneumoniae* infection was highly probable. We could speculate that it was due to an immune-mediated process. A larger study is essential to confirm these findings.

### MP286

#### Assessment of Methylation Status Using Bisulfite Treatment for Testing of Diseases Involving Abnormal Genomic Imprinting

CS YOON<sup>1</sup>, M CHEE<sup>2</sup>, ES TAN<sup>2</sup>, HY LAW<sup>2</sup>, A LAI<sup>2</sup>, I NG<sup>2</sup>

<sup>1</sup>National Thalassemia Registry, <sup>2</sup>Paediatrics - Genetics, KK Women's & Children's Hospital, Singapore

**Aim:** To establish a test to analyse the methylation status of small nuclear ribonucleoprotein-associated polypeptide N (SNRPN) gene. Inappropriate imprinting of this gene through abnormal methylation causes Prader-Willi syndrome (PWS) and Angelman syndrome (AS).

**Methods:** Sodium bisulfite treatment of DNA selectively converts unmethylated cytosines to uracil. 5-methylcytosine is resistant to bisulfite and remains unchanged. Thirteen samples suspected to have PWS/AS, with or without microdeletion detected by FISH analysis, were studied. Sodium bisulfite treatment was carried out for DNA according to established protocols before subjecting them to PCR using 2 sets of primers: 1 specific for methylated (maternal homologue) and the other unmethylated (paternal homologue) DNA.

**Results:** PCR generated a 100 bp product for unmethylated paternal DNA and a 174 bp product for methylated maternal DNA in normal individuals. No PCR product was detected in untreated DNA. PWS patient showed only the 174 bp PCR product and AS patient showed only the 100 bp PCR product. Three patients were found to have AS and 1 who was FISH-negative had PWS.

**Conclusion:** Methylation-specific PCR provides a reliable diagnostic method for all PWS and AS patients who show abnormal methylation at SNRPN. The major advantage of this PCR is its rapidity, which may have important implications for early diagnosis or management. The ease and cost-effectiveness of the bisulfite method makes it conceivable that a genome-wide assay for imprinting disorders could be developed.

### MP287

#### Cerebral Palsy in Children if Birthweight <1250 g: Risk Factors and Co-existing Handicaps

LM DANIEL<sup>1</sup>, P AGARWAL<sup>1</sup>, SB LIM<sup>2</sup>

<sup>1</sup>Neonatology, KK Women's & Children's Hospital, Singapore

**Aim:** To determine the incidence of cerebral palsy (CP) in children born with birthweight <1250 g, evaluate perinatal factors and developmental problems at 2 years of age.

**Methods:** Perinatal factors and developmental outcome were analysed in children born between 1990 and 1992. Data was prospectively collected at the baby's hospital discharge and at 2 years of age.

**Results:** 184/1175 (15.6%) died or left the country. Of the 818 children with known CP status, 62/818 (7.6%) had CP. Thirty (48.4%) were diplegic, 12 (19.4%) hemiplegic and 13(21.0%) quadriplegic. Of 38 perinatal factors studied, only 1-minute Apgar scores (OR 0.1, CI 0.662 – 0.998) and white matter injury (OR 4.3, CI 7.56 – 817.86) were significant on multivariate analysis. 47(75.8%) were ambulant. Forty-three (69.3%) had at least 1 coexisting handicap (39 had MDI <70, 2 had hearing loss requiring amplification and 2 had severe visual loss). Forty-five (72.6%) required rehabilitative services (42 in special programmes and 3 in KKH).

**Conclusion:** The incidence of CP in this population was 76 per 1000 children. The 2 identified risk factors, Apgar scores at 1 minute and the presence of white matter injury, can be identified after birth. An intensive early intervention programme can be planned for infants who have these risk factors. The majority had at least one other handicap and 68% required special rehabilitative programmes. However, international data have shown that the severity of the handicaps may not persist into later life.

### MP288

#### Primary School Leaving Examination (PSLE) Results of Very Low Birthweight Infants Born in KK Hospital

JJY ONG<sup>1</sup>, SB LIM<sup>2</sup>, LM DANIEL<sup>2</sup>

<sup>1</sup>Paediatrics, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Neonatology, KK Women's & Children's Hospital, Singapore

**Aim:** To determine the Primary School Leaving Examination (PSLE) outcome of premature babies weighing <1500 g born between 1990 and 1992 and the correlation with later cognitive assessments.

**Method:** Perinatal data and results of the cognitive scores at 2, 5 and 8 years of age were obtained prospectively. PSLE results were obtained via telephone interviews with parents and children at 12-14 years of age.

**Results:** A response rate of 65.3% from 202 survivors was obtained. One hundred and fifteen (87.1%) children were in mainstream schools. One hundred and two (88.7%) were in full PSLE programmes. Their mean PSLE aggregate was  $187.6 \pm 33.9$  with no significant difference between students with birthweights <1 kg and those weighing 1 to 1.5 kg. Ninety-three (91.2%) proceeded to secondary school. Thirteen (11.3%) attended a partial PSLE programme. Students faced the greatest difficulties with mathematics and science, compared to second language ( $P < 0.001$ ). No significant differences were observed in individual subjects grades between students in the 2 weight groups. Students whose cognitive scores in the Wechsler Intelligence Scale for Children - Version III at age 8 were  $\geq 85$  had a higher mean PSLE aggregate than those whose scores were 70-84 and  $\leq 69$  ( $P = 0.01$ ). Seventeen (12.9%) of the responders were in alternative school placements.

**Conclusion:** The majority of babies with birthweights <1500 g attended mainstream primary education and undertook a full PSLE programme before proceeding to secondary school. Mathematics and science were difficult subjects for these students. Higher cognitive scores at 8 years of age correlated with better PSLE scores.

### MP289

#### Hearing Loss Diagnosed through the Universal Newborn Hearing Screening Programme

KY HOW<sup>1</sup>, LM DANIEL<sup>2</sup>, SB LIM<sup>2</sup>

<sup>1</sup>Paediatrics, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Neonatology, KK Women's & Children's Hospital, Singapore

**Aim:** To analyse the characteristics and management of infants diagnosed to have hearing loss (HL) through the Universal Newborn Hearing Screening Programme (UNHS).

**Methods:** The UNHS began in KK Women's and Children's Hospital in 2002. The infants were screened at birth using the Automated Auditory Brainstem Response. Failure to pass this first screen warranted a second screen at 4 to 6 weeks of life. Infants who could not pass the second screen were referred to the ENT department. This paper analyses the results of

screening between 1 April 2003 and 31 March 2004.

**Results:** Of 13,505 infants screened, 57 (4 per 1000) infants were found to have HL of the following types: sensorineural 41%, conductive 46%, mixed 9%, permanent conductive 4%. 54% had bilateral HL. 1.5 per 1000 infants had severe-profound HL and 65% had at least 1 risk factor for HL. The median ages of diagnosis and intervention were 3.9 months (range, 0.1 to 13.7 months) and 8.8 months (range, 3.2 to 14.8 months) respectively. 39% of the infants with pure sensorineural HL and 67% of the infants with conductive or mixed HL required intervention. Of these, 68% were already in intervention programmes.

**Conclusion:** The UNHS has allowed early diagnosis and intervention for infants with HL, thus increasing the possibility of normal speech development. 35% of the infants diagnosed with HL had no risk factors. This suggests that targeted screening based on risk factors may result in late detection of hearing loss in a significant number of patients.

### MP290

#### Outcomes of Antenatally Diagnosed Echogenic Fetal Lung in a Tertiary Centre in Singapore

NA EPTON<sup>1</sup>, B SRIRAM<sup>1</sup>, SH YEO<sup>2</sup>

<sup>1</sup>Neonatology, <sup>2</sup>Maternal Fetal Medicine, KK Women's & Children's Hospital, Singapore

**Aim:** Echogenic fetal lung may be indicative of congenital cystic adenomatoid malformation (CCAM), bronchopulmonary sequestration (BPS), or congenital lobar emphysema. In utero (hydrops; polyhydramnios; pulmonary hypoplasia) and postnatal (respiratory distress; respiratory infections; risk of occult malignancy) complications may occur. We wanted to determine outcomes of antenatally diagnosed echogenic fetal lung in KK Hospital (KKH) during a 3-year period from November 2000 to November 2003.

**Method:** All cases of antenatally diagnosed echogenic fetal lung were identified from the Hospital Birth Defect Registry. Pregnancy outcomes, postnatal investigations and management were reviewed.

**Results:** Thirty-three cases were identified. Eight cases were excluded due to incomplete follow-up data. Ten (30%) women opted for mid-trimester termination of pregnancy (MTPT). Only 2 cases underwent postmortem examination; only 3 had postnatal examination by a neonatologist. Antenatally diagnosed CCAM: 4 MTPT; 2 postnatal resolution on CT scan; 1 surgery; 1 defaulted follow up. Antenatally diagnosed BPS: 2 MTPT; 1 postnatal resolution; 1 postnatal BPS on CT scan but defaulted follow-up; 1 refused CT scan; 1 defaulted follow-up. Indeterminate group: 1 MTPT, 2 postnatal resolution; 2 surgeries for postnatally diagnosed BPS; 1 incompletely investigated; 1 defaulted follow-up. Of the 14 live births, most were asymptomatic at birth. Notably, 5 cases with normal CXR had abnormal CT scans.

**Conclusion:** The findings of a high spontaneous resolution rate, and low rate of progression to fetal hydrops by mid-trimester in this cohort may be useful in antenatal counselling, and assist in reducing the number of terminations for echogenic fetal lung.

### MP291

#### The Ages and Stages Questionnaire — A New Developmental Assessment Tool for Very Low Birth Weight Infants <1250 g

S GOH<sup>1</sup>, P AGARWAL<sup>1</sup>

<sup>1</sup>Neonatology, KK Women's & Children's Hospital, Singapore

**Aim:** Improved neonatal care has resulted in greater survival of very low birth weight (VLBW) babies, who are at a higher risk of developmental delay. Early identification facilitates early intervention; therefore a reliable screening tool is advantageous. The Ages and Stages Questionnaire (ASQ) is a comprehensive, parent-completed developmental screening tool, which has high specificity and sensitivity. **Objectives:** 1) To compare local VLBW ( $\leq 1250$  g) infants' 8-month ASQ scores with ASQ norms. 2) To determine impact of morbidity (chronic lung disease, severe intraventricular haemorrhage (IVH), necrotising enterocolitis and severe retinopathy of prematurity (ROP) on ASQ scores. 3) To compare ASQ scores of extremely LBW infants

$\leq 750$  g with non-ELBW infants.

**Methods:** A prospective cohort study involving VLBW infants born in KK Hospital between January 2003 and May 2004 was done. Relevant data from a prospectively maintained database and 8-month ASQ scores obtained were analysed using SPSS.

**Results:** One hundred and fifty-two VLBW infants were born within that time; 37 died (23.6%); the follow-up default rate was 26.3% (n = 40), leaving 75 (65.2%) eligible infants. Their mean ASQ scores for 5 variables were: (ASQ norms) communication, 45.6 (36.7); gross motor, 42.3 (24.3); fine motor, 50.3 (36.8); problem solving, 45.6 (32.3); personal-social, 41.2 (30.5). Presence of morbidity correlated with lower ASQ scores ( $P < 0.01$ ). Lower gross motor scores were associated with birthweight  $\leq 750$  g ( $P = 0.023$ ), prolonged hospital stay ( $P = 0.037$ ), severe ROP ( $P = 0.046$ ) and severe IVH ( $P = 0.031$ ).

**Conclusion:** 52% of infants assessed at 8 months had all normal ASQ scores. Lower scores were seen in those with  $\geq 1$  morbidity.

### MP292

#### Renal Tubular Dysgenesis with Hirschsprung's Disease: A Case Report and Review

S GOH<sup>1</sup>, A NARAYANAN<sup>1</sup>, M AKHILESH<sup>2</sup>, B SRIRAM<sup>1</sup>

<sup>1</sup>Neonatology, <sup>2</sup>Laboratory, KK Women's & Children's Hospital, Singapore

**Case Report:** A premature 34 weeks' gestation male infant (birthweight 2480 g) had renal tubular dysgenesis (RTD), calvarial hypoplasia and Hirschsprung's disease. Severe oligohydramnios developed from the 23rd week, with macroscopically normal kidneys on antenatal ultrasound, and normal renal artery Doppler. The infant had severe pulmonary hypoplasia with refractory pulmonary hypertension, and died after 3 hours despite maximal support. Autopsy confirmed pulmonary hypoplasia; histology demonstrated characteristic paucity of proximal renal tubules and absence of proximal tubular differentiation. There was also a dilated and aganglionic segment of the sigmoid colon and rectum, confirming Hirschsprung's disease.

**Discussion:** RTD is a lethal condition with late oligohydramnios but ultrasonographically normal kidneys, without intrauterine growth restriction. In the neonatal period, it presents with respiratory failure secondary to pulmonary hypoplasia. Familial RTD has an autosomal recessive mode of inheritance. Sporadic cases may occur with in utero exposure to non-steroidal anti-inflammatory agents, angiotensin-converting enzyme inhibitors and cocaine. Intrauterine ischaemia from twin-to-twin transfusion syndrome, and renal ischaemia from renal artery stenosis can also contribute. There is an association between RTD and calvarial hypoplasia. There have not been previous reports of the association with Hirschsprung's disease, as seen in our case.

**Conclusion:** The diagnosis of RTD should be considered in the presence of severe second trimester oligohydramnios with antenatal ultrasound evidence of normal kidneys. A family history would also be vital in elucidating the cause, as well as for planning future pregnancies. Definitive diagnosis can only be established by autopsy; hence a detailed postmortem examination is mandatory.

### MP293

#### Audit of Umbilical Catheter Measurement and Position in Infants Admitted to the Neonatal Intensive Care Unit

A NARAYANAN<sup>1</sup>, B SRIRAM<sup>1</sup>, M MANMOHAN<sup>1</sup>, U SIVAN<sup>1</sup>

<sup>1</sup>Neonatology, KK Women's & Children's Hospital, Singapore

**Introduction:** Umbilical arterial and venous catheters are routinely used in the management of sick neonates. These central catheters are not without complications, including septicaemia, liver abscess and thrombosis. Apart from employing sterile technique during insertion to minimise risk of infection, it is vital to ensure correct positioning of the line at the time of insertion. Failure to do this would necessitate readjustment and hence potential introduction of infection.

**Methods:** A preliminary audit of umbilical catheter positions was carried out on the NICU in 2004. It revealed that nearly 40% of umbilical catheters were readjusted after initial insertion. Following this, a detailed guideline for measuring catheter length was instituted. This guideline was audited by retrospective case note review on all NICU admissions between 1 September 2004 to 31 October 2004.

**Results:** A total of 14 umbilical arterial catheters were inserted in this period. Two (14%) needed adjustment and 1 (7%) required removal. As for umbilical venous catheters, 26 were inserted, out of which 8 (31%) needed readjustment and 4 (15%) were removed immediately after insertion.

**Conclusion:** The improvement did not prove to be statistically significant. The guidelines were therefore reviewed and modified. In addition, a second method for calculating catheter length was introduced. This method, based on the infants' birthweight, has been shown to be more reliable and accurate than other methods.

#### MP294

##### Intestinal Perforation with Candidal Invasion of Intestinal Mucosa in Extremely Low Birthweight Infants

**A NARAYANAN<sup>1</sup>, J LEE<sup>1</sup>, M AKILESH<sup>2</sup>, WS HWANG<sup>2</sup>**

<sup>1</sup>Neonatology, <sup>2</sup>Pathology, KK Women's & Children's Hospital, Singapore

**Introduction:** Intestinal perforations are a known complication of extreme prematurity. These are often associated with necrotising enterocolitis. Isolated perforations are also seen in this cohort of infants. Meta-analysis has also shown that indomethacin combined with steroid treatment increases the risk of intestinal perforations. Intestinal perforation associated with fungal infiltration of the mucosa is rare.

**Cases:** Two cases of extremely premature infants are presented here. Both had intestinal perforation with candida invasion of the intestinal wall at the site of perforation. Both received indomethacin for treatment of patent ductus arteriosus. The first infant received multiple broad-spectrum antibiotics in the first few days of life. He succumbed to necrotising enterocolitis and fungal sepsis and died at 37 days of life. The second infant received hydrocortisone for hypotension. He had a stormy postoperative course complicated by fungal sepsis but recovered from this and is currently progressing well at 12 months of age.

**Discussion:** Indomethacin treatment of patent ductus arteriosus is essential in preventing long-term morbidities in very low birthweight infants but it carries a small risk of intestinal perforation. Similarly, hydrocortisone has also been shown to cause these perforations. Broad-spectrum antibiotics and hydrocortisone also increase the risks of fungal sepsis. Previously described cases of intestinal perforations in premature infants, which were related to invasion of the intestinal wall with *Candida* species showed fatal outcomes.

**Conclusion:** Due to the serious complications described here, the combination of treatments which are associated with intestinal perforations and fungal infection should be avoided in extremely premature infants.

#### MP295

##### Factors Affecting Successful Treatment of Patent Ductus Arteriosus in Extremely Low Birthweight Neonates

**BH QUEK<sup>1</sup>, CZ YANG<sup>2</sup>, J LEE<sup>1</sup>**

<sup>1</sup>Neonatology, KK Women's & Children's Hospital, Singapore, <sup>2</sup>Neonatology, Maternal and Child Health Hospital of Shenzhen, China

**Introduction:** Patent ductus arteriosus (PDA) remains a significant cause of morbidity in premature infants, especially extremely low birthweight (ELBW) infants. Indomethacin has been used successfully to close a PDA. Success of treatment, however, is dependent on many factors. **Objective:** To identify factors that affect closure rates for treatment of PDA with indomethacin in ELBWs. Factors studied included gestational age, birth weight, SGA, gender, size of duct, and timing of first dose of indomethacin.

**Methods:** Retrospective analysis of a cohort ELBW infants who received indomethacin for PDA during a period from September 2000 to December 2003.

**Results:** One hundred and thirty-nine ELBW infants were studied. Overall

closure rate after the 1st course of indomethacin was 77.7%. There was no significant relationship between closure of PDA and gestational age, gender and size of duct. Early administration of indomethacin (800 g correlated significantly with success of treatment. Eventual surgical ligation rates were significantly in those treated early [8/68 (11.8%), compared with 19/71 (26.8%);  $P = 0.025$ ]. Side effects of indomethacin such as oliguria and hyponatraemia were transient, and did not differ in those who were treated early. Major morbidities such as necrotising enterocolitis, grade 3 and 4 intraventricular haemorrhage, chronic lung disease and retinopathy of prematurity were also not significantly different.

**Conclusion:** Early treatment with indomethacin for PDA resulted in better success rates and lower rates of surgical ligation. Side effects and major morbidities were not different in those treated earlier. We thus recommend early screening of ELBW infants and treatment with indomethacin for a significant PDA.

#### MP296

##### Follow-up of Clicky Hips: Is it a Predictor of Developmental Dysplasia of the Hip?

**BH QUEK<sup>1</sup>, JJ WANG<sup>2</sup>, S RAJADURAI<sup>1</sup>**

<sup>1</sup>Neonatology, KK Women's & Children's Hospital, Singapore, <sup>2</sup>Medicine, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** Early diagnosis and treatment of developmental dysplasia of the hip (DDH) is important for prognosis and eventual outcome. Routine newborn screening is done for babies to detect unstable hips. Ultrasonography is a sensitive test for DDH, but it is not practical for routine screening for all babies. Ultrasound is instead done for babies at-risk for DDH or with unstable hips detected at newborn screening.

**Methods:** We followed a cohort of babies born in the year 2003 diagnosed with clicky hips on routine newborn screening. Hip ultrasound was then done 6 to 8 weeks of age.

**Results:** One hundred and six babies were diagnosed with clicky hips at birth, 74 female (69.8%), 32 male (30.2%). Seventeen patients defaulted follow-up, making the follow-up rate 84%. The 6-week hip ultrasound was normal in 96.6%. Only 3 patients had abnormal hip ultrasound. They had persistent click on examination. Management was expectant, and the abnormality resolved by 3 to 6 months. Gait was also normal at 1 year of age.

**Conclusion:** Isolated clicks in the hip joint at birth are not a strong predictor of DDH. However, they should still be screened at 6 weeks of age. If the clicks persist, a hip ultrasound can then be done. This information may be helpful in revising guidelines for follow-up of clicky hips.

#### MP297

##### Neonatal Jaundice Pathway — Experience with New Guidelines from Ward 31 Nursery, KK Hospital

**P RAUT<sup>1</sup>**

<sup>1</sup>Neonatology, KK Women's & Children's Hospital, Singapore

**Aim:** Neonatal jaundice (NNJ) is a continuing problem for paediatricians and neonatologists and is observed in more than 60% of well babies. The benign experience of NNJ may be unsafe for some babies, especially with early discharge at 24 hours of life. Great variation was observed in management. The NNJ pathway was developed to identify high-risk criteria and evidence-based management guidelines. 1) Earlier identification and treatment of at-risk babies to prevent need for exchange transfusion (ET). 2) Avoidance of unnecessary admission and treatment of "low risk" babies. 3) Audit of need for phototherapy and ET with new criteria in comparison with the old guidelines.

**Methods:** Retrospective case sheet review from 01 February 2005 to 1 July 2005. Comparison of the old and new guidelines in management of NNJ was made.

**Results:** Admissions = 355; 257 (72.4%) low risk and 98 (27.6%) high risk [ABO incompatibility titres >128 (63), prematurity 35 to 36 weeks (30) and

cephalohematoma (5)]. Based on new guidelines: 68 (19%) admissions were avoidable as >day 5, mean SB 264 and no risk factors. Average duration of treatment was 1.7 days [2.1 days (old guidelines)]. Three exchange transfusions were avoided and intensity of treatment moved from intense to double blue phototherapy in 13 (3.7%), double blue to single blue phototherapy in 20 (5.6%). Fifteen (4.2%) babies were identified and treated early in the course. Only 1 baby needed exchange transfusion. None of the babies discharged after phototherapy needed readmission. There was no bilirubin-induced neurological dysfunction (BIND).

**Conclusion:** The NNJ clinical pathway has helped to streamline intradepartmental management of the NNJ without increase in BIND. Stratification of risk criteria has enabled appropriate treatment of the NNJ early discharges and has great potential in reducing costs.

### MP298

#### Should We Worry about Isolated Single Umbilical Artery? A Case Series from 2002 to 2005

MC TAN<sup>1</sup>, LY LEE<sup>1</sup>, B SRIRAM<sup>1</sup>, SH YEO<sup>2</sup>

<sup>1</sup>Neonatology, <sup>2</sup>Maternal Fetal Medicine, KK Women's & Children's Hospital, Singapore

**Aim:** Single umbilical arteries (SUA) is a recognised soft marker for congenital anomalies including cardiac and renal malformation, aneuploidy, preterm delivery and low birthweight. Several early studies have demonstrated an association with renal malformations and postnatal renal evaluation is recommended. However, with the advent in antenatal diagnosis, an isolated SUA with no obvious visceral malformation, makes antenatal counseling difficult. We aim to establish if routine postnatal renal ultrasound was necessary if antenatal ultrasound was normal.

**Methods:** A retrospective case review of all infants born from January 2002 to March 2005 was performed. Cases that were terminated antenatally were excluded.

**Results:** Eighty-three cases were identified, giving an incidence of 1.84 cases per 1000 total births. Postnatal examination was performed in all and 80 were confirmed to have 2 vessels giving a specificity of detection of SUA as 96%. Of the 80 cases, 2 cases were antenatally diagnosed to have renal pelvis dilation and 2 with solitary kidney. Majority (87.5%) had postnatal follow-up. All the postnatal ultrasounds were normal in those with a normal antenatal scan. The postnatal ultrasound correlated with the antenatal findings. Birthweight and gestation were appropriate.

**Conclusion:** The incidence of isolated SUA is 0.184% from our study compared with incidence of 0.2% to 1.9% in previous studies. The antenatal ultrasound is sensitive, unlike previous studies where false positive rates can range from 8% to 35%. This however is dependent on the sonographer. Finally, we conclude that isolated SUA is not associated with significant renal malformation if the antenatal ultrasound is normal, and routine postnatal renal ultrasound is not warranted.

### MP299

#### Morbidity of Parainfluenza 3 Outbreak in a Neonatal Unit — KK Hospital's Experience

WY TEO<sup>1</sup>, MZ HAN<sup>1</sup>, B SRIRAM<sup>1</sup>, VS RAJADURAI<sup>1</sup>

<sup>1</sup>Neonatology, KK Women's & Children's Hospital, Singapore

**Aim:** Parainfluenza type 3 virus (PIV-3) is an important nosocomial pathogen causing pneumonia and bronchiolitis in infants. We report an outbreak of PIV-3 respiratory infection in the Department of Neonatology of KKH in June 2005. This is the second PIV-3 outbreak in our unit after the first in December 1994.

**Methods:** Retrospective review of the clinical characteristics and outcome of 7 infants tested positive for PIV-3 on nasopharyngeal aspirate in June 2005.

**Results:** Seven cases were infected with PIV-3 during this outbreak. Mean birthweight of affected infants was 1370 g (range, 740 g to 2585 g), mean gestational age was 29 weeks (range, 24 to 35 weeks). Apnoeas and bradycardias were the significant symptoms in 3 infants. 5 infants had

progressive respiratory distress while 2 had flu-like illness. Five infants required ventilatory support. There were no deaths. The index case was an infant with chronic lung disease who was on oxygen supplementation and subsequently required ventilatory support with nasal CPAP +6 with increasing oxygen requirements. She continues to have severe post-viral hyper-reactivity and is still hospitalised. Early identification with strict cohorting of infected cases was implemented. Contact tracing and screening of contact cases was done. Hand hygiene precautions were reinforced.

**Conclusion:** PIV-3 respiratory infections in infants can present with non-specific symptoms, leading to significant morbidity. Early recognition of symptoms and detection is necessary to limit extent of infection, institute ventilatory support promptly and avoid unnecessary investigations and treatment. Though infrequent, nosocomial respiratory infection is a significant cause of morbidity in infants, especially in those with underlying pulmonary pathology.

### MP300

#### Positive Maternal VDRL Serologies: Indications for Neonatal Treatment

P WONG<sup>1</sup>, MJP BATILANDO<sup>1</sup>

<sup>1</sup>Neonatology, KK Women's & Children's Hospital, Singapore

**Aim:** Congenital syphilis, a disease that can be easily diagnosed and treated at little cost by giving penicillin antenatally to the mother, infects almost 500,000 infants yearly. An apparent surge in positive maternal syphilis serologies in our hospital prompted this review. Our aim was to look at the profiles of VDRL-positive mothers and their babies, treatment strategies utilised, delays in initiation of treatment, and the impact on length of hospital stay.

**Method:** Medical records of infants born to VDRL-positive mothers from January to July 2005 were reviewed. Maternal and infant demographics, neonatal presentation, investigations, treatment regimes, and length of hospital stay were studied.

**Results:** Fifteen babies were born to 13 VDRL-positive mothers; there were 9 girls and 6 boys and included 2 sets of twins. Three mothers were untreated and diagnosis was made only postnatally. Only 5 mothers (38%) had documented HIV results. None of the infants had features of congenital syphilis; none tested positive on line immunoassay IgM. Five babies (33%) were not treated because adequate antenatal maternal treatment was demonstrated. Ten (67%) were considered probable cases (WHO definition) and received penicillin. Initiation of treatment was delayed in 3 cases while waiting for infant serologies. Subsequent follow-ups were to either Kelantan clinic or neonatology clinic to repeat serology.

**Conclusion:** Infants with "probable syphilis" received appropriate therapy when required. A delay in initiating treatment was demonstrated in 3 cases despite an obvious need for treatment based on maternal history, resulting in a longer than expected hospital stay.

### MP301

#### Monkey Bars are for Monkeys: a Study on the Pattern of Playground Related Injuries In Singapore

A MAHADEV<sup>1</sup>, M SOON<sup>2</sup>, KS LAM<sup>3</sup>

<sup>1</sup>Orthopaedic Surgery, KK Women's & Children's Hospital, Singapore,

<sup>2</sup>Orthopaedic Surgery, Alexandra Hospital, Singapore, <sup>3</sup>Orthopaedic Surgery, Changi General Hospital, Singapore

**Aim:** Studies in Caucasian populations have shown that a significant percentage of childhood extremity fractures occur at the playground. There are no comparable studies in Asian populations. Thus, this study sets out to determine the pattern of playground-related extremity fractures in Asian populations and to suggest modifications to prevent or reduce these injuries.

**Methods:** This study involved a retrospective review of 390 patients with these fractures who visited our department from May 1997 to December 1998. This accounted for 19.5% of all fractures seen in the same period.

**Results:** The largest age group affected were the 5- through 12-year-old



patients with a male to female ratio of 2:1. Monkey bars or upper body devices were the most common cause (66%). The most common fracture was supracondylar fractures (43%).

**Conclusion:** After a review of the guidelines by the National Parks Board and the above findings, we concluded that monkey bars should be excluded from playgrounds or at least the height limit reduced to 1.5 m or lower in order to reduce the occurrence of these fractures.

### MP302

#### Normative Neonatal Cord Blood IgE Level in Singapore

**WC CHIANG<sup>1</sup>, WK LIEW<sup>1</sup>, VS RAJADURAI<sup>2</sup>, B SRIRAM<sup>2</sup>, M IANCOVICI KIDON<sup>1</sup>**

<sup>1</sup>Paediatrics, <sup>2</sup>Neonatology, KK Women's & Children's Hospital, Singapore

**Aim:** We aimed to study the normative values of cIgE in a group of healthy Singaporean newborns and define the correlation of cIgE with familial and environmental factors.

**Methods:** From October 2003 to April 2004, 150 cord blood samples were obtained from normal singleton livebirths, recruited consecutively, delivered in KK Women's and Children's Hospital after informed consent was obtained. An interviewer-led standard questionnaire on familial and environmental risk factors of atopic disease was completed by both parents. Detection of IgE antibodies in cord blood samples were determined by UNiCAP Total IgE Low Range assay system (Pharmacia & Upjohn Diagnostics, Uppsalam Sweden). The results of these were log-transformed to values ranging from 0.02 to 18.8 KU/L in this population.

**Results:** A total of 150 full term neonates were consecutively recruited. The neonatal cord blood IgE levels were between 0.02 to 18.8 KU/L, median 0.42 KU/L. 26.7% of the population had cord blood IgE >0.9 KU/L. Using binary logistic regression analysis, maternal history for asthma was a strong predictor of high cord blood IgE levels (OR 6.67, 95% CI 1.81-24.57,  $P < 0.004$ ). Maternal history of allergic rhinitis showed a tendency to significance at the 0.1 cutoff. However, if multi-variant logistic regression was performed, only maternal asthma remained significant. Interestingly, we found that the household with English as the only language spoken at home was predictive of the risk of high cord blood IgE.

**Conclusion:** 26.7% of our population of well newborns in Singapore, show cIgE levels higher than 0.9 KU/L. This correlates well with maternal atopy but not with other familial or environmental risk factors.

### MP303

#### Extracorporeal Membranous Oxygenation (ECMO) in Children with Acute Fulminant Myocarditis

**JTL CHOO<sup>1</sup>, S SHANKAR<sup>2</sup>, KY WONG<sup>2</sup>, K KRISHNAGOPAL<sup>2</sup>, YP LIM<sup>2</sup>, TH TAN<sup>2</sup>, TF LOH<sup>2</sup>**

<sup>1</sup>Paediatrics, <sup>2</sup>Cardiothoracic Surgery, KK Women's & Children's Hospital, Singapore

**Aim:** Acute myocarditis can take a rapidly fulminant course with an associated high mortality. However, a proportion of children with myocarditis show return of native ventricular function. Extracorporeal membranous oxygenation (ECMO) has been used as a means of mechanical circulatory support while allowing return of intrinsic myocardial function.

**Methods:** From January 2002 to September 2004, 4 children with acute fulminant myocarditis and hypotension were supported with ECMO in our hospital. These cases were retrospectively reviewed.

**Results:** All 4 were female. Their ages ranged from 4.5 years to 10 years. The diagnosis of myocarditis was made based on the clinical presentation of the patients, elevated cardiac enzymes and echocardiographic abnormalities. All had severely depressed fractional shortening requiring inotropic support and were intubated and ventilated prior to the commencement of ECMO. The average duration of ECMO therapy was 170 hours. Three patients were placed on veno-arterial ECMO with cannulation of the right common carotid artery and the right internal jugular vein. One patient was placed on full cardiopulmonary bypass with cannulation of the aorta and the atrial appendage.

Two patients died. Both patients died of multi-organ failure, but in the other 2 patients, there was improvement of cardiac function and they were successfully weaned off ECMO. The fractional shortening was 27.9% at 3 months follow-up.

**Conclusion:** ECMO can be a life-saving means of circulatory support in children with acute fulminant myocarditis.

### MP304

#### Coconut Allergy in Two Children of Asian Origins and Identification of the IgE Binding Component

**MI KIDON<sup>1</sup>, SH LIM<sup>1</sup>, ASH WEE<sup>2</sup>, SSM LING<sup>2</sup>, WK LIEW<sup>1</sup>, WC CHIANG<sup>1</sup>, FT CHEW<sup>2</sup>**

<sup>1</sup>Paediatric Medicine, KK Women's and Children's Hospital, Singapore, <sup>2</sup>Biological Sciences, National University of Singapore, Singapore

**Aim:** The coconut is a tropical fruit that is commonly used in food preparation locally. Reactions to coconut priorly reported are largely due to primary sensitisation to other tree nuts. The reactions are due to cross-allergenicity of the plant proteins. We describe 2 children who developed primary coconut (*Cocos nucifera*) hypersensitivity and characterise the IgE binding components.

**Methods:** Two children with histories of systemic allergic reactions to coconut (fresh and cooked) without previous tree nut exposure were subjected to prick-prick test with fresh coconut endosperm and the routine full panel (food and aero-allergens). Serum from each patient was tested for specific IgE. Western blotting and mass spectrometric analysis were performed to identify the IgE binding components.

**Results:** Patient 1 tested positive for egg white, *Dematophagoides* mix and *Blomia tropicalis*. Patient 2 tested negative to all allergen extracts tested. With the fresh endosperm, Patient 1 exhibited a huge wheal and flare reaction, with the wheal measuring 24.5 mm in excess of negative. Patient 2 demonstrated an even more extensive reaction with the wheal measuring 20 mm and pseudopods observed extending from the forearm to the axilla. IgE from sera of both patients were found to bind the endosperm and coconut milk (*santan*) but not the coconut water. Western blotting (patient 2) showed at least 8 IgE binding components with molecular weights ranging from 15 kD to above 80 kD (the major band at approximately 25 kD). Sera from patient 1 bound only to 3 major components between 20-25 kD. Mass spectrometric analysis of the trypsin-digested 25 kD major band suggested that the major allergen was a glycinin-like allergen.

**Conclusion:** We report 2 Asian patients with primary coconut allergy, with no previous sensitisation to other tree nuts. Specific anti-IgE to 8 new coconut antigens was also detected.

### MP305

#### Juvenile Behçet's Disease in Singapore

**SH LIM<sup>1</sup>, Y SEE<sup>1</sup>**

<sup>1</sup>Paediatric Medicine, KK Women's and Children's Hospital, Singapore

**Aim:** To describe a small series of paediatric patients with juvenile Behçet's disease, a rare vasculitis.

**Methods:** Retrospective review of patients' case sheets from the time of diagnosis up to present.

**Results:** We report 3 children (2 females, 1 male) with juvenile Behçet's disease seen in the Paediatric Rheumatology unit of Singapore's largest children's hospital since its inception. The ages of presentation were 10.8 years and 14.2 years for the 2 girls and 3 years for the boy. The girls presented with recurrent painful orogenital ulcers. One girl's mother also reported recurrent painful orogenital ulcers. The boy presented at 3 years with oligoarthritis. It was only 5 years later when he developed abdominal pain, gastrointestinal bleed, orogenital ulcers, pathergy and biopsy proven vasculitis on gut resection specimen that diagnosis was made. He subsequently developed central nervous system manifestation with choreoathetosis. The 2 girls responded to colchicine and prednisolone. One of them is disease-free now without medication but the other has recurrent flares and has had methotrexate

added. The boy had more severe multisystemic disease, and required steroid pulses. Trials of IV cyclophosphamide and azathioprine were ineffective and subcutaneous methotrexate has not fully controlled his disease. He is now on etanercept with improvement. Interestingly, none of these Oriental children had eye involvement.

**Conclusion:** Juvenile Behçet's disease is rare amongst Singaporean children and manifests with widely varying severity. Disease can be difficult to control requiring multiple changes of steroid sparing agents. Ocular involvement is rare.

### MP306

#### Report on a Human Rotavirus Vaccine Study Conducted in Singapore

**KB PHUA<sup>1</sup>, SH QUAK<sup>2</sup>, S EMMANUEL<sup>3</sup>, PSC GOH<sup>4</sup>, BC OOI<sup>1</sup>, SFE SHERIF<sup>1</sup>, HL BOCK<sup>5</sup>**

<sup>1</sup>Paediatrics, KK Women's & Children's Hospital, Singapore, <sup>2</sup>Paediatrics, National University Hospital, Singapore, <sup>3</sup>Medical, NHG Polyclinics, Singapore, <sup>4</sup> Medical, SingHealth Polyclinics, Singapore, <sup>5</sup>Medical, GlaxoSmithKline Biologicals, Singapore

**Aim:** To evaluate the immunogenicity, reactogenicity and safety of a live attenuated human monovalent G1P8 rotavirus (HRV), strain RIX4414, vaccine developed by GlaxoSmithKline in a phase II randomised, double-blind, placebo-controlled, dose ranging study in Singapore.

**Methods:** A total of 2464 healthy infants were randomised to receive 2 oral doses of HRV vaccine at a concentration of 10<sup>4.7</sup>, 10<sup>5.2</sup>, or 10<sup>6.1</sup> ffu or placebo at 3 and 4 months concomitantly with routine DTPa-IPV-Hib vaccinations. Solicited symptoms were noted for 15 days after each dose. Serum anti-RV IgA concentrations were measured at baseline and after each dose in a subset of subjects.

**Results:** Six hundred and thirty-eight subjects were included in the immunogenicity study and rotavirus shedding in the stool was measured in a subset of 115 to assess the "vaccine take", defined as the percentage of subjects displaying either a serological response and/or with rotavirus shedding in any stool sample. Anti-RV IgA seroconversion at 1 month post dose 2 was 76%, 91% and 88%, and "vaccine take" on doses 1 and 2 combined was 100%, 98% and 98% in the 104.7, 105.2, 106.1 vaccine groups respectively. No interference was observed for any of the vaccine antigens co-administered with the candidate rotavirus vaccine. The reactogenicity profile and serious adverse events of each HRV vaccine group was similar to the placebo. The rate of intussusception was not different to that of Singaporean babies below 2 years old.

**Conclusion:** Two doses of RIX4414 HRV vaccine was well tolerated, highly immunogenic and did not interfere with concomitantly administered routine immunisations.

### MP307

#### Myocarditis in Children — The KK Hospital's Experience

**CK CHEN<sup>1</sup>, KC THOON<sup>2</sup>, TH TAN<sup>1</sup>, KY WONG<sup>1</sup>**

<sup>1</sup>Paediatrics - Cardiology, <sup>2</sup>Paediatrics - Infectious Diseases, KK Women's & Children's Hospital, Singapore

**Aim:** Myocarditis is the inflammation of the myocardium associated with cardiac dysfunction. It has an insidious nature, and presentation is variable. We report a retrospective series of cases of myocarditis in KK Women's and Children's Hospital.

**Methods:** Between January 1997 and November 2004, 28 patients with myocarditis were identified. The case records were reviewed.

**Results:** The patients ranged in age from 2 months to 14 years 5 months, with equal number of boys and girls. The initial diagnosis of myocarditis was based on history and physical examination. Chest radiographs showed cardiomegaly (54%), and pulmonary oedema (32%). ST-T wave changes were seen in 61% of patients. 2D echocardiography findings included reduced fractional shortening (FS), valve incompetence, wall motion abnormalities and pericardial effusion. 77% showed elevated serum creatinine

kinase (CK), and 84% had raised CK-MB. 71% of patients required admission into the Children's ICU. Treatment was mainly supportive. However, 4 patients required extracorporeal membrane oxygenation (ECMO) — 2 survived, with 1 having reduced cardiac function. Six patients needed cardiac pacing for atrioventricular block — only 1 required permanent pacemaker subsequently. Mortality rate was 30%, and 75% of survivors went on to have normal cardiac function upon recovery.

**Conclusion:** Myocarditis could be missed as patients who present with viral illness or non-specific symptoms could lead clinicians astray. Hence, it should be considered in the differential diagnosis, to avoid delay in diagnosis and treatment. Children who presented with sudden cardiorespiratory collapse have poor outcomes. Approximately half of our patients experienced a complete recovery of normal cardiac function.

### MP308

#### A Triad of Congenital Hypothyroidism, Neonatal Respiratory Distress and Neurological Deficits

**SNH BUANG<sup>1</sup>, F YAP<sup>2</sup>, PC KHOO<sup>3</sup>, VS RAJADURAI<sup>3</sup>**

<sup>1</sup>Paediatrics - Children's Intensive Care, <sup>2</sup>Paediatrics - Endocrinology, <sup>3</sup>Neonatology, KK Women's & Children's Hospital, Singapore

**Aim:** An increasing number of reports in recent literature describe the occurrence of a triad of defects in thyroid, respiratory and neurological functions. These deficits mainly manifest as congenital hypothyroidism, neonatal respiratory distress or frequent severe pulmonary infections and neurological abnormalities including movement disorders, hypotonia, and mental retardation.

**Methods:** An association with the NKX2-1 gene has been identified. It is believed that this gene on chromosome 14q13 plays an important part in embryogenic development of thyroid gland, lungs and ventral forebrain. Thus, it can be hypothesised that mutations in this gene could result in a complex disease affecting all 3 organs.

**Results:** We present a pair of premature dichorionic, diamniotic twin boys who suffered similar symptoms. Both had initial respiratory distress followed by a prolonged need for ventilatory support. They had primary hypothyroidism, requiring thyroxine replacement. They were noted to be hypotonic with abnormal jerky, tremulous movements. These dystonic movements were associated with tonic posturing and severe oropharyngeal dysphagia. The twins were microcephalic with similar facial dysmorphism. The first twin also had a posterior cleft palate. Investigations have produced normal findings. The NKX2-1 gene deletion test is outstanding.

**Conclusion:** It is important to begin recognising the NKX2-1 deletion syndrome. This syndrome can occur as a random mutation, or inherited as an autosomal dominant disorder. In the latter instance, the family would benefit from genetic counselling. This diagnosis can also help explain cases where children with congenital hypothyroidism develop neurological deficits despite treatment, thus allaying concerns regarding inadequate therapy or non-compliance.

### MP309

#### Are Post-extubation Chest X-rays in the Paediatric ICU Necessary?

**TF LOH<sup>1</sup>**

<sup>1</sup>Paediatrics - Children's Intensive Care, KK Women's & Children's Hospital, Singapore

**Aim:** We hypothesise that routine chest x-rays are unnecessary because these complications of extubation can be detected clinically.

**Methods:** We conducted a prospective study on all children staying in the paediatric ICU who were extubated between 25 April and 22 May 2005. The patient was managed according to the unit's protocol, including the timing for clinical examination and radiological investigations to be carried out. The clinical team, based on the infant's clinical conditions and blood gas results, made decision to extubate. Routine chest films were taken 4 hours after extubation. ICU doctor conducted clinical examination while the radiologist

interpreted the chest film without prior knowledge of the patient's clinical signs and symptoms. Data were collected pre- and post-extubation. The patient's primary diagnosis was noted, together with any associated conditions. Any complications that took place during the procedure was also be recorded.

**Results:** A total of 17 patients were analysed. Ten were postoperative cases, 3 had pneumonia, 3 had CNS infections and 1 had trauma. Mean duration of ventilation was 4.5 days. No patient requires re-intubation. Post-extubation, 2 patients had changes in chest films consistent with atelectasis, of which 1 had clinical symptoms but both did not require further intervention. Both patients were less than 1 year old.

**Conclusion:** Post-extubation atelectasis is seen in 11% of our cohort. These patients were less than 1 year of age and 50% had clinical symptoms. Routine post-extubation chest film may be indicated only in young patients with symptoms.

### MP310

#### The Children's Hospital Emergency Transport Service

**J PUTHUCHEARY<sup>1</sup>, I CHAN<sup>1</sup>, TF LOH<sup>1</sup>, M DANIEL<sup>2</sup>, J LEE<sup>2</sup>, S BHAVANI<sup>2</sup>, YH CHAN<sup>1</sup>**

<sup>1</sup>Paediatrics - Children's Intensive Care, <sup>2</sup>Neonatology, KK Women's & Children's Hospital, Singapore

**Aim:** KK Children's Hospital provides tertiary paediatric services. Since January 2002, the Emergency Transport Service used standardised protocols and procedures covering staff, equipment, communication, documentation, standards, and patient care. The service performs local and international critical care transfers for neonatal and paediatric patients. The objective of this study was to review the workload, details, and transport-related outcomes of the service from January 2002 to July 2005.

**Methods:** Data were collected prospectively using standardised documentation for every transfer, which also served as the clinical record. This was continuously audited for adverse outcomes or incidents, and staff were debriefed.

**Results:** Over the course of 42 months, the service performed a total of 198 transfers, of which 157 were within Singapore, and 41 were international, using air ambulances, scheduled flights, a custom-adapted road ambulance and boats. There were no deaths, injuries or adverse events in transit. There was no equipment failure, loss of power, gas supply or monitoring. Two deaths occurred before the team arrived at the referring centre, 1 death occurred after the team arrived at the patient, but before the transfer could be effected, and 3 deaths occurred within 2 hours after the end of the transfer.

**Conclusion:** The service has been able to safely and rapidly transfer critically ill children within, to and from Singapore.

### MP311

#### Treatment of Childhood Hyperlipidaemia at KK Children's Hospital

**WWR LEE<sup>1</sup>, FKP YAP<sup>1</sup>, VBN OH<sup>1</sup>, JST LIM<sup>1</sup>, PK LIM<sup>1</sup>, WC LIM<sup>1</sup>**

<sup>1</sup>Paediatrics - Endocrinology, KK Women's & Children's Hospital, Singapore

**Aim:** To review the pattern of use of lipid lowering agents in childhood in KK Women's and Children's Hospital with a view to rationalising the use of such agents.

**Methods:** Retrospective review of clinical data using electronic and paper-based records.

**Results:** In May 2005, there were 42 patients (age range, 3 to 21 years, 22 males and 20 females) who were being treated with cholestyramine and simvastatin between 2000 and 2004. Of 22 children on cholestyramine, 6 or 27% had been switched to simvastatin at an average of 53.2 months (range, 1 to 146, SD = 59.3 months). Indications were poor compliance and lack of efficacy as measured by fasting lipids. One girl was put on both cholestyramine and simvastatin. Of the group of 14 who remained on cholestyramine alone, the mean duration of treatment was 27 months, SD 41.5 months. Of the 22 children on simvastatin, reasons to treat included: familial (8 girls, 5 boys),

diabetes mellitus (2 girls, 2 boys), renal (1 girl, 2 boys), other hyperlipidaemia (2 boys). No child had treatment with simvastatin stopped because of adverse drug reactions.

**Conclusion:** In our 42 patients, about half were on cholestyramine and half on simvastatin. Simvastatin appears to be safe, effective and better tolerated than cholestyramine for treating paediatric hyperlipidaemia.

### MP312

#### Idiopathic Combined Growth Hormone Deficiency and Central Diabetes Insipidus: Prevalence and Long-term Follow-up

**V OH<sup>1</sup>, DA BOWLBY<sup>2</sup>, R RAPAPORT<sup>2</sup>**

<sup>1</sup>Paediatrics - Endocrinology, KK Women's & Children's Hospital, Singapore, <sup>2</sup>New York, Mount Sinai Medical Center, USA

**Aim:** Coexistence of anterior and posterior pituitary defects often suggest lesions affecting both pituitary lobes; absence of demonstrable pathology is rare. The objective of the study was to describe the prevalence of idiopathic combined growth hormone deficiency and central diabetes insipidus (ICGHDI) and long-term follow-up of 2 patients.

**Methods:** The GeNeSIS (Lilly) database was searched for patients with ICGHDI.

**Results:** Five patients with ICGHDI were identified among 4476 GH-treated patients. Four were males from the United States and 1 a female from Japan. Two were patients from our institution diagnosed by the water deprivation test with central diabetes insipidus at 6.7 years (patient A) and 5.7 years of age (patient B). MRIs showed absence of the PP bright spot. They were noted subsequently to have low growth velocities, IGF-1 levels and peak stimulated GH levels (patient A 1.8 ng/mL; B 2.2 ng/mL). They were treated with GH in addition to desmopressin. Other endocrine studies were normal. DNA analyses of PROP1, PIT1 and HESX1 were normal. Patient A was followed for 9 years, patient B for 8 years. With GH therapy, near-adult heights were 1SD in excess of target heights. Multiple MRIs (patient A 5; patient B 7) have shown continued absence of PP signal and small AP without any other abnormalities.

**Conclusion:** Combined anterior and posterior pituitary defects occur rarely. Our experience suggests that ICGHDI may represent a unique entity that could be due to defects in as yet unelucidated gene(s) involved in the function of both the anterior and posterior gland.

### MP313

#### First-year Carbimazole Dose Thyroid Function Relationship in Children with Newly Diagnosed Graves' Disease (GD)

**F YAP<sup>1</sup>, V OH<sup>1</sup>, W LEE<sup>1</sup>**

<sup>1</sup>Paediatrics - Endocrinology, KK Women's & Children's Hospital, Singapore

**Aim:** This study describes changes in thyroid function during the first year of treatment with carbimazole in children with newly diagnosed Grave's disease (GD) and examines the dose-effect on TSH and T4.

**Methods:** Twenty children who completed 1 year of treatment and follow-up were studied retrospectively. Children treated with propylthiouracil, with diabetes or Down's syndrome were excluded. Free T4, TSH and carbimazole doses at 0, 1, 3, 6, 9 and 12 months were noted.

**Results:** Subjects (19 females, 1 male) were aged 11.3 years (range, 3-15) at diagnosis; free T4 was 60.5 (21.3) pmol/L. All had undetectable TSH and elevated thyroid receptor antibodies (TRAb). They received carbimazole 0.69 (0.34) mg/kg/day from diagnosis, 0.71 (0.31) from 1 month, 0.53 (0.22) from 3 months, 0.4 (0.19) from 6 months and 0.32 (0.2) from 9 to 12 months. At 1 month, all remained TSH-suppressed; free T4 remained elevated in 63%. At 3 months, 53% remained TSH-suppressed; free T4 remained elevated in 16%. At 6 months, 40% who remained TSH-suppressed (group A, n = 6) were compared to those unsuppressed (group B, n = 9). Both groups were similar in age ( $P = 0.30$ ), free T4 ( $P = 0.440$ ) and TRAb ( $P = 0.310$ ) at diagnosis. However, group A received significantly lower carbimazole doses at diagnosis [0.45 (0.28) vs 0.90 (0.25),  $P = 0.005$ ] and lower cumulative doses over the first 6 months [0.51 (0.20) vs 0.69 (0.33),  $P < 0.001$ ] than group B.

**Conclusion:** Children with newly diagnosed GD require high carbimazole doses to normalise T4 and TSH. At 6 months, TSH remains suppressed in 40% of children receiving an average carbimazole dose of 0.5 mg/kg/day.

#### MP314

##### **KK Hospital's First Capsule Endoscopy: a Rare Case of Jejunal Angiodysplasia**

**KH LIM<sup>1</sup>, KB PHUA<sup>1</sup>, TL YAP<sup>2</sup>, TS PRASAD<sup>2</sup>, KH LIM<sup>3</sup>, NM LAU<sup>4</sup>**  
<sup>1</sup>Paediatrics - Gastroenterology, <sup>2</sup>General Paediatric Surgery, <sup>3</sup>Pathology, KK Women's & Children's Hospital, Singapore, <sup>4</sup>Internal Medicine, Singapore General Hospital, Singapore

**Aim:** We describe our first capsule endoscopy on an 11-year-old patient who presented with severe anaemia secondary to acute gastrointestinal haemorrhage.

**Methods:** A capsule endoscopy over 8 hours was performed which revealed a bleeding polyp at mid-jejunum. No other abnormalities were noted throughout the rest of the small intestine.

**Results:** Our patient subsequently underwent a laparoscopic assisted mini-laparotomy wedge resection of this polyp. Histological examination reported the polyp as a rare form of jejunal angiodysplasia which had perforated through to the bowel mucosa. There was surrounding thrombosis around the blood vessel giving rise to the polyp macroscopically.

**Conclusion:** Children presenting with gastrointestinal bleeding of unknown aetiology with a normal upper and lower endoscopic study should routinely undergo a capsule endoscopy study.

#### MP315

##### **Does Turbidity Correlate with Serum Triglyceride Levels in Babies on Total Parenteral Nutrition?**

**KH LIM<sup>1</sup>, WB LIAN<sup>2</sup>, CL YEO<sup>2</sup>**

<sup>1</sup>Paediatrics - Gastroenterology, KK Women's & Children's Hospital, Singapore, <sup>2</sup>Neonatology and Developmental Medicine, Singapore General Hospital, Singapore

**Aim:** Intravenous lipid is commonly used as part of total parenteral nutrition (TPN) in premature babies. The gold standard of measuring lipid tolerance involves measuring serum triglyceride levels. Many hospitals in Asia do not have this facility and rely on visual turbidity to titrate rate of lipid infusion. This study aimed to determine if visual turbidity correlates with serum triglyceride levels.

**Methods:** Twenty-seven samples were taken from 8 babies on IV lipid infusion for serum triglyceride levels and visual turbidity as assessed by 2 senior neonatologists independently. Serum turbidity was classified either as clear or turbid. Lipid intolerance was defined as triglyceride levels greater than 200 mg/dL (2.25 mmol/L).

**Results:** Both neonatologists similarly classified 20 out of 27 specimens. Clear samples (n = 10) were significantly lower when compared with turbid samples (n = 10) ( $P < 0.01$ ). The clear specimens all had normal serum triglyceride levels [mean: 1.16 mmol/L (0.43 mmol/L - 1.96 mmol/L)]. Not all turbid specimens had unacceptable serum triglyceride levels [mean: 2.37 mmol/L (1.37 mmol/L - 5.75 mmol/L)]. In the remaining 7 specimens, there was a difference in opinion regarding serum turbidity. The triglyceride levels for these 7 samples were all normal (mean, 1.17; range, 0.66 - 1.72).

**Conclusion:** Serum turbidity may be used as a screening tool in assessing lipid tolerance in babies on TPN as all clear samples had acceptable serum triglyceride level. Patients with turbid samples should ideally have their serum triglyceride taken to confirm lipid intolerance before altering their lipid infusion rate as they may have acceptable triglyceride levels.

#### MP316

##### **Oesophageal pH Probe Monitoring: Clinical Indications and Test Outcome**

**SFE SHERIF<sup>1</sup>, KB PHUA<sup>1</sup>, KH LIM<sup>2</sup>**

<sup>1</sup>Paediatrics - Gastroenterology, <sup>2</sup>Paediatrics - General and Ambulatory Paediatrics, KK Women's & Children's Hospital, Singapore

**Aim:** Gastroesophageal reflux disease (GERD) is manifested by gastrointestinal and extraesophageal manifestations (e.g., pulmonary, laryngeal, neurobehavioural). Establishing GERD as a causative or exacerbating factor in patients with extraesophageal manifestations is a diagnostic challenge. Oesophageal pH monitoring is the gold standard for GERD diagnosis. The aim of the study was to detect any relationship between the presumed reflux symptoms (clinical indications for pH monitoring) and GERD, as well as to assess the accuracy of clinical diagnosis of GERD in patients with prior anti-reflux therapy.

**Method:** Patients who underwent 24-hour oesophageal pH monitoring from November 2003 to April 2005 were included in the study. Age, medical problems, clinical indications for pH monitoring and prior anti-reflux therapy (stopped 3 days before the test) recorded. The test was considered positive if the percentage of oesophageal acidification (pH <4) was >5% of the total recording time (reflux index >5%).

**Results:** Sixty-four patients underwent 66 pH probe testing. 4.6% of patients had gastrointestinal symptoms, 85.95% had extraesophageal symptoms and 9.3% had combinations of both. 71.8% of patients had positive test, 36.5% had negative test, and 1.5% had unsuccessful test. High rates of positive pH probe testing detected in patients with gastrointestinal, laryngeal and pulmonary symptoms but not with apnoea, ALTE, seizures or neck arching. Thirty-one patients received anti-reflux therapy prior to testing, out of them 32.3% had negative test.

**Conclusion:** Strong relation was determined between GERD and gastrointestinal, pulmonary, laryngeal symptoms but not with apnoea, ALTE, seizures and neck arching. Clinical diagnosis of GERD needs confirmatory tests before commencing anti-reflux therapy.

#### MP317

##### **Perceptions of Overweight Children and Childhood Obesity in Singapore: Findings from a Survey of Health Care Professionals**

**JY OH<sup>1</sup>, E TAY<sup>1</sup>, J TANG<sup>1</sup>, F YAP<sup>2</sup>**

<sup>1</sup>Paediatrics - General and Ambulatory Paediatrics, <sup>2</sup>Paediatrics - Endocrinology, KK Women's & Children's Hospital, Singapore

**Aim:** In Singapore, 13.1% to 14.7% of children and adolescents between the ages 12 to 16 years are obese. The prevalence is increasing and health care professionals must be aware and concerned about the risks associated with childhood obesity. Health care workers should also be proficient in providing care to overweight children and adolescents. The objective of this study was to examine health care professionals' perceptions on the importance, prevalence, related complications and the management of childhood obesity.

**Methods:** A group of 208 health care professionals were given a questionnaire to answer. They were then given a short talk on childhood obesity and its related problems. After the lecture, they were surveyed again with the same questionnaire. One hundred and ten of the medical personnel completed the second survey.

**Results:** The majority of respondents were aware of the growing incidence of childhood obesity and understood that it is associated with chronic health risk and psychosocial problems. Although there was a general agreement that behavioural modification was essential to effective weight management, there was an inadequate emphasis on the role of exercise. As expected, there was an improved knowledge score after education.

**Conclusion:** Health care professionals should be concerned about the growing epidemic of childhood obesity and that intervention is important. There needs to be greater awareness of associated disease risk and emphasis on a combined approach to weight management. This may provide guidelines for training and education for our health care providers in the screening, prevention and management of children and adolescents with obesity.

## MP318

**Hypokalaemia in Children Treated with Intravenous Amphotericin B: Are We Giving Enough Potassium Supplementation?****PCY WONG<sup>1</sup>, FKP YAP<sup>2</sup>**<sup>1</sup>Paediatrics - General and Ambulatory Paediatrics, <sup>2</sup>Paediatrics - Endocrinology, KK Women's & Children's Hospital, Singapore

**Aim:** To determine the incidence and severity of hypokalaemia in our department's paediatric patients treated with intravenous amphotericin B deoxycholate, and to review the current practice of potassium supplementation for these patients.

**Methods:** We retrospectively studied 30 oncology patients aged 1 to 15 years who had febrile neutropenia and received aqueous amphotericin B deoxycholate intravenously for between 5 and 21 days (total cumulative dose 3.4 mg/kg to 19.8 mg/kg bodyweight). Data on their serum potassium levels and the potassium supplementation they received was analysed.

**Results:** After starting amphotericin B therapy, 25 patients (83%) experienced a fall in serum potassium level, the fall ranging from 0.3 to 1.8 mmol/L (mean, 0.88 mmol/L). The lowest serum potassium level reached ranged from 2.2 to 3.8 mmol/L (mean, 3.0 mmol/L). Serum potassium levels fell to below 3.5 mmol/L in 24 patients (80%), and below 3.0 mmol/L in 16 patients (53%). This high incidence of hypokalaemia occurred despite the patients receiving a mean potassium supplementation of 2.24 mmol/kg/day (S.D. = 0.77) during the duration of amphotericin B therapy. No adverse clinical effects of hypokalaemia were documented in these patients. This may reflect the difficulty of detecting subtle signs such as muscle weakness.

**Conclusion:** We recommend that children on intravenous amphotericin B deoxycholate therapy receive potassium supplementation of at least 2.2 mmol/kg/day from the outset, making adjustments guided by frequent serum potassium level measurements. These patients should also be monitored for adverse clinical effects of hypokalaemia, such as muscle weakness, through directed questioning and examination.

## MP319

**Severe Cranial Ultrasound Abnormalities: Risk Factors in Very Low Birthweight (VLBW) Babies****JG YEO<sup>1</sup>, P AGARWAL<sup>2</sup>, B SRIRAM<sup>2</sup>, M DANIEL<sup>2</sup>**<sup>1</sup>Paediatrics - General and Ambulatory Paediatrics, <sup>2</sup>Neonatology, KK Women's & Children's Hospital, Singapore

**Aim:** Grade III and IV intraventricular haemorrhage (IVH) and white matter injury (WMI) are an important cause of long-term neurological morbidity in VLBW infants. Our aims were to determine the rates and to identify factors (modifiable and non-modifiable) that affect IVH/WMI.

**Methods:** A retrospective cohort study from a prospectively maintained VLBW database. Selected risk factors (hypocarbica, hypercarbia, endotracheal suctioning and bicarbonate therapy) were further evaluated by comparative case-control analysis.

**Results:** Thirty-three out of 340 (9.7%) VLBW infants studied between 1 January 2002 and 31 December 2003 had severe IVH/WMI. On univariate analysis, risk factors associated with IVH/WMI included lower gestation age (26.6 ± 2 weeks vs 28.8 ± 2.9 weeks  $P < 0.001$ ); lower birthweight (918 ± 247 grams vs 1097 ± 273 grams,  $P < 0.001$ ); hypothermia at admission (76% vs 56%,  $P = 0.03$ ); 5-minute APGAR score <7 (36% vs 15%,  $P = 0.002$ ), neonatal resuscitation (external cardiac massage/drugs) (15% vs 5%,  $P = 0.042$ ); lower first mean pH (7.18 ± 0.15 vs 7.24 ± 0.12;  $P = 0.01$ ) and higher maximum base excess (-10.2 ± 5.5 vs. -7.1 ± 6.4,  $P = 0.008$ ); hypernatraemia (27% vs 7%,  $P = 0.001$ ), hypotension requiring inotropes (48% vs 14%,  $P < 0.001$ ); air leaks (21% vs 7%,  $P = 0.01$ ). On logistic regression, use of antenatal steroids was a protective factor ( $P = 0.007$ ; OR 0.32, 95% C.I. 0.14 to 0.73) while hypotension was a risk factor ( $P = 0.04$ ; OR 2.7, 95% CI 1.02 to 7.4).

**Conclusion:** Optimising obstetric perinatal care and improving neonatal resuscitation and care in the first 12 hours of life have a potential to decrease incidence of severe IVH/WMI.

## MP320

**Screening of Alpha-globin Gene Mutations in Microcytic Patients Using Denaturing High-performance Liquid Chromatography****M CHEE<sup>1</sup>, E TAN<sup>2</sup>, HY LAW<sup>1</sup>, LK CHING<sup>3</sup>, I NG<sup>1</sup>**<sup>1</sup>Paediatrics - Genetics, <sup>2</sup>National Thalassaemia Registry, <sup>3</sup>DNA Diagnostic and Research Laboratory, KK Women's & Children's Hospital, Singapore

**Aim:** To determine the incidence of point mutations in  $\alpha$ -globin gene in patients with mean corpuscular volume (MCV) less than 85 fL.

**Method:** Patients who came to the National Thalassaemia Registry for screening and who had MCV less than 85 fL were first screened for the 5 most common deletion type mutations. When no mutation was found or when the blood indices were indicative of additional mutations, screening for point mutations in the  $\alpha$ -globin gene using denaturing high-performance liquid chromatography (dHPLC) were carried out. Detected heteroduplexes were subsequently subjected to other confirmatory tests to identify the mutation. A total of 217 unrelated samples were analysed in this study.

**Results:** The screening of 217 samples found 5 cases of HbQS, 2 cases of Cd59, 3 cases of Hb Westmead and 1 case of suspected novel mutation which involved the deletion of 24 nucleotides near the start of the intron 1 gene. This made up a total of 5.07%. There were also 4 other possible single nucleotide polymorphisms (SNPs) detected. They were +14 (C/G), 212, IVSIIInt55 (T/G) and IVSIIIInt107 (C/G), which made up a total of 5.53%. However, whether these mutations were truly SNPs or not requires further investigations to confirm.

**Conclusion:** In patients with MCV less than 85 fL who were negative for the 5 most common  $\alpha$ -thalassaemia mutations, the possibility of detecting mutations/polymorphism with subsequent dHPLC screening was found to be around 10.6%, among which 5.07% were known to cause  $\alpha$ -thalassaemia or structural variants while the remaining 5.53% may be SNPs.

## MP321

**Detection of Point Mutations Causing Alpha-Thalassaemia Using Amplification Refractory Mutation System (ARMS)****LK CHING<sup>1</sup>, GP TAN<sup>2</sup>, M CHEE<sup>2</sup>, HY LAW<sup>1</sup>, I NG<sup>1</sup>**<sup>1</sup>Paediatrics - Genetics, <sup>2</sup>National Thalassaemia Registry, KK Women's & Children's Hospital, Singapore

**Aim:** Alpha thalassaemia is one of the most common genetic diseases estimated to afflict ~3% of our population. Although most  $\alpha$ -thalassaemias are caused by deletional mutations, some point mutations are known to lead to severe phenotypes. Detection of point mutations using reverse dot blot (RDB) hybridisation is inexpensive but cumbersome for mass screening. The aim of this study is to establish ARMS methods for efficient detection of point mutations causing  $\alpha$ -thalassaemia.

**Methods:** Three multiplex ARMS were established to detect mutations found in local population based on published protocol with modification. ARMS1 detected 6 mutations in  $\alpha 2$ -globin gene (Start Cd (ATG/AG), Cd30 (-GAG), Cd35 (TCC/CCC), Cd59 (GGC/GAC), Hb Quong Sze (Cd125 CTG/CCG), Hb Constant Spring (Term Cd TAA/CAA) and IVSI nt117 (C/G) in  $\alpha 1$ -globin gene. ARMS2 detected 3 mutations in the  $\alpha 2$ -globin gene (IVSI (-5nt AGGTG), Hb Pakse (Term Cd TAA/TAT) and Poly A (AATAAA/AATGAA)). ARMS3 detected HbQ variant in  $\alpha 1$ -globin gene. DNA samples from 379 patients suspected to have  $\alpha$ -thalassaemia were screened for deletional mutation before ARMS screening for point mutations.

**Results:** Mutations were identified in 79, 22 of which carried point mutations: 5 had Cd 59 (GGC/GAC), 7 had Hb Constant Spring and 9 had Hb Quong Sze. A Cd19 (GCG/GC) mutation was identified in 2 patients by sequencing.

**Conclusion:** The ARMS procedure for point mutation detection is faster and more cost-effective than RDB. It also allows more mutations to be detected in less hands-on time. This greatly improves efficiency of screening.



**MP322**

**Magnetic Resonance T2\* Evaluation of Myocardial Iron in Thalassaemia Major: Initial Singapore Experience**

**A LAI<sup>1</sup>, R STAN<sup>2</sup>, ING<sup>1</sup>, L ANDERSON<sup>3</sup>, T HE<sup>3</sup>, K CHEN<sup>4</sup>, D PENNELL<sup>3</sup>**  
<sup>1</sup>Paediatrics - Genetics, KK Women's & Children's Hospital, Singapore, <sup>2</sup>Cardiology, National Heart Centre, Singapore, <sup>3</sup>Cardiovascular Magnetic Resonance Unit, Royal Brompton Hospital (RBH) and Imperial College, UK, <sup>4</sup>Diagnostic Radiology, Singapore General Hospital, Singapore

**Background:** Haemosiderotic cardiomyopathy is the leading cause of death in thalassaemia major (TM). Hitherto it has not been possible to measure myocardial iron reliably. Left ventricular ejection fraction (LVEF) and clinical deterioration appear late. Recently, Anderson et al determined that the tissue magnetic resonance (MR) relaxation parameter, T2\* (ms), is inversely related to tissue iron concentration, and that MR T2\* imaging may be used to monitor myocardial and liver iron load in TM patients.

**Aims:** To assess LVEF, myocardial and liver iron in local beta-TM patients.

**Methods:** Ten patients underwent heart and liver MR T2\* scans in SGH and repeat scans in RBH a week later. Myocardial and liver T2\* were measured using proprietary software.

**Results:** There were 10 TM patients, aged 18 to 30 years; all received regular transfusions and chelation therapy; serum ferritin ranged from 308 to 8459 mg/L. Five had moderate to severe myocardial iron overload (T2\* <12 ms); of these, 2 had mildly impaired LVEF. Eight had severe liver iron overload (T2\* <6.3 ms); of these, 4 had significant myocardial iron overload. No correlation exists between myocardial T2\*, liver T2\* and serum ferritin. Comparing with RBH scans, SGH scans distinguished all cases of significant myocardial iron overload.

**Conclusion:** MR T2\* scans showed significant myocardial iron overload in half the patients. LVEF reduction is insensitive for myocardial iron overload diagnosis. Liver T2\* and serum ferritin do not correlate with myocardial T2\*, and cannot be used to assess myocardial iron load. We recommend MR T2\* scans for monitoring myocardial iron in all TM patients.

**MP323**

**DNA Extraction using Saliva Samples**

**ES TAN<sup>1</sup>, CS YOON<sup>2</sup>, KS AUNG<sup>2</sup>, HY LAW<sup>1</sup>, A LAI<sup>1</sup>, ISL NG<sup>1</sup>**  
<sup>1</sup>Paediatrics - Genetics, <sup>2</sup>DNA Laboratory, KK Women's and Children's Hospital, Singapore

**Aim:** Our objectives are to determine the quality and quantity of DNA extracted from adult and paediatric saliva samples and to assess the acceptance of this method of collection.

**Methods:** Saliva samples were collected from 18 volunteers and DNA was extracted using the Oragene purification protocol. Quantification of absorbance at 260 nm A260 and 320 nm A320 was performed. Estimated purity A260/A320 >1.6 is acceptable. Polymerase chain reaction (PCR) for Southeast Asian deletion of the alpha-globin gene was performed to assess the suitability of the samples for diagnostic tests. A written survey was used to assess the acceptance of this method of collection.

**Results:** Spectrophotometry confirmed successful DNA extraction from all adult samples with a mean DNA yield of 280 ug/mL (range, 106-645). The mean A260/A320 ratio was 1.74 (SD 0.13). As for the paediatric samples, the mean DNA yield was 85.17 ug/mL (range, 53.8-161.2) and the A260/A320 ratio 1.82 (SD 0.26). PCR was successful for all adult samples and in half of the paediatric samples.

**Conclusion:** The DNA yield from all the adult and half of the paediatric samples was sufficient to run a diagnostic test. All volunteers felt that this was a good method of collection. Therefore, saliva sampling as a method of DNA collection may be a good alternative to blood sampling. However, the technique of obtaining the sample must be further optimised for the paediatric group of patients.

**MP324**

**Typhlitis versus Appendicitis in Immunocompromised Children**

**MY CHAN<sup>1</sup>, TW YU<sup>2</sup>, CH CHU<sup>3</sup>, AM TAN<sup>1</sup>**  
<sup>1</sup>Paediatrics - Haematology/Oncology, KK Women's & Children's Hospital, Singapore, <sup>2</sup>Clinical Departments - Radiation Oncology, National Cancer Centre, Singapore, <sup>3</sup>General Paediatric Surgery, KK Women's & Children's Hospital, Singapore

**Aim:** To review the incidence, diagnostic and prognostic features, treatment and outcome of typhlitis and appendicitis in immunocompromised children in our institution.

**Methods:** A retrospective review from April 1997, when our institution started, to April 2005. All cases of appendicitis are confirmed histologically and all cases of typhlitis have the characteristic CT findings. Immunocompromised children include children with malignancy or primary bone marrow failure.

**Results:** Seventeen children were identified – 8 with typhlitis and 9 with appendicitis. One child with AML had typhlitis and then appendicitis 5 months later. The main underlying diagnosis was haematological malignancy (4 AML, 9 ALL, 1 CML). There were 2 children with SAA and 1 with cerebral rhabdoid tumour. Almost all had severe neutropenia (ANC <0.5). All children presented with fever and abdominal pain. 62% of the children with typhlitis presented with RIF pain, rebound tenderness and guarding. Children with typhlitis were treated with antibiotics, bowel rest and parenteral nutrition. The majority did not grow a causative organism. Only 1 child with typhlitis died. All children with appendicitis had an appendectomy (4 laparoscopic, 3 open and 2 laparoscopic converted to open). Two died of overwhelming *Pseudomonas* sepsis, despite appendectomy and antibiotics.

**Conclusion:** Gastrointestinal (GI) complications of typhlitis and appendicitis are not uncommon in immunocompromised children. They are often difficult to distinguish as they can present in the same way. CT scans are useful and may prevent unnecessary surgery. It is important to recognise GI complications as early institution of the appropriate antibiotics and, where necessary, early surgical intervention, may prevent overwhelming sepsis.

**MP325**

**Expansion of Childhood Cancer Registry in Singapore**

**C HA<sup>1</sup>, AM TAN<sup>1</sup>, MY CHAN<sup>1</sup>, J LOU<sup>1</sup>, CL TAN<sup>1</sup>**  
<sup>1</sup>Paediatrics - Haematology/Oncology, KK Women's & Children's Hospital, Singapore

**Aim:** To use epidemiological studies to identify the trends and outcome of childhood cancer.

**Methods:** All childhood cancers were notified to the Childhood Cancer Registry (CCR) by KK Women's and Children's hospital and National University Hospital, and these 2 institutions dominate 98% of all childhood cancer cases. CCR has been funded by the Children's Cancer Foundation and the Singapore Cancer Syndicate.

**Results:** A total of 925 cases were registered in Singapore between January 1997 and December 2004, of which 75% are local cases. This averages to be 120 cases per year. The incidence of cancer was 12.8 per 100,000 children (below 15 years of age) in Singapore. The most common malignancies in children are leukaemia (40%), central nervous system (CNS) tumours (18%), lymphomas (10%) and germ cell tumours (GCT) (8%). 44% of all cases occur in children below 5 years of age. Amongst childhood cancers, remarkable improvements were seen in the 5-year survival rate of acute lymphoblastic leukaemia patients where survivals in local population were 20% in the 1970s to 40% in 1980s and 60% in the 1990s. It has now reached over 80%. Hodgkin's and non-Hodgkin's lymphoma have similar 5-year OS of 91% and 88%, respectively. CNS tumours such as CNS GCT and astrocytoma have 5-year OS of 88% and 79%, respectively. CCR intends to expand its role in research particularly in the epidemiological aspect and outcomes of brain tumour and leukaemia, as well as late effects of childhood cancer survivors.

**Conclusion:** The results in this study will serve as a reference for future researches in different childhood cancer treatments and the way in which these patients and their families are managed.

## MP326

**Umbilical Cord Blood Transplants in Children: Experiences in a Children's Hospital****JCM LAM<sup>1</sup>, AM TAN<sup>1</sup>, K VIJAYA<sup>1</sup>, MY CHAN<sup>1</sup>**<sup>1</sup>Paediatrics - Haematology/Oncology, KK Women's & Children's Hospital, Singapore

**Aim:** Marrow and peripheral stem cell transplants from histocompatible locus antigen (HLA)-matched donors have been a successful form of curative treatment for malignant and non-malignant blood disorders. Since the 1990s, umbilical cord blood (UCB) transplants have emerged as an alternative mode of haematopoietic stem cell transplant. We present our experience with UCB transplants in a children's hospital.

**Methods:** We performed 6 UCB transplants over a 2-year period from 2002 to 2005. Two were from related matched UCB and 3 unrelated 1-Ag MM UCB. The median age was 8.3 years (range 3.8 to 17.7). All were done for leukaemia. The nucleated cell dose infused ranged from 2.5 to 3.4 x 10<sup>7</sup>/kg.

**Results:** The median number of days to neutrophil engraftment was 26 (range, 21 to 35). The median number of days to platelet engraftment was 41 (range, 25 to 50). Outcome was good: 4/5 (80%) survived. The first case of UCBT died at day 25 from *Candida* sepsis before engraftment. Median follow-up of survivors was 383.5 days (range, 126 to 850). All survivors are disease-free.

**Conclusion:** Our limited experience shows that UCB is a good alternative source of stem cells. The results of UCBT is promising and better than BMT despite the delay in neutrophil engraftment.

## MP327

**The Hong Kong-Singapore Acute Lymphoblastic Leukemia 97 Protocol — Results from a Single Centre****AM TAN<sup>1</sup>, SY SOH<sup>1</sup>, MY CHAN<sup>1</sup>, J LOU<sup>1</sup>**<sup>1</sup>Paediatrics - Haematology/Oncology, KK Women's & Children's Hospital, Singapore

**Aim:** Our centre has been using the Hong Kong-Singapore Acute Lymphoblastic Leukemia 97 (HK-SG ALL 97) protocol since June 2000. This protocol was based on the BFM 95 Study with modification. The aim of the study is to analyse characteristics and outcomes of acute lymphoblastic leukaemia (ALL) treated with the HK-SG ALL 97 protocol in a single centre.

**Methods:** We reviewed ALL patients diagnosed in a 4-year period (June 2000 to May 2004).

**Results:** There were 92 patients, 76% Chinese, 14% Malay, 7% Indian and 3% others. There were 52 (57%) boys. The median age at diagnosis was 4.6 years (range 1.2 - 13.7). The median duration of follow-up was 32.3 months (range 13 - 57). Cytogenetic studies were successful in 86/92 (93.5%) - hyperdiploidy 19.8%, t(9;22) 4.7% and t(4;11) 2.3%. The patients were stratified into 3 groups: 42.4% standard risk (SR), 43.5% intermediate risk (IR), and 14.1% high risk (HR). To date, there were 14 (15.2%) relapses, 53.8% of which were from the HR group. Bone marrow was commonest relapse site while CNS site alone formed only 3%. There were 6 deaths from relapse - 1 from IR and 5 from HR. There was no treatment-related mortality. The global 5-year overall survival (OS) and event-free survival (EFS) were 91.9% and 79.7% respectively. When risk groups were compared, the OS were 100%, 94.1% and 61.5%; the EFS were 89.6%, 79.6% and 44.9% for SR, IR and HR respectively.

**Conclusion:** Our data showed promising results with the HK-SG ALL 97 protocol, comparable to other groups using similar protocols.

## MP328

**Langerhan's Cell Histiocytosis — A Great Mimicker of Tuberculosis of the Spine****WY TEO<sup>1</sup>, AM TAN<sup>1</sup>**<sup>1</sup>Paediatrics - Haematology/Oncology, KK Women's & Children's Hospital, Singapore

**Aim:** Langerhan's cell histiocytosis (LCH) and tuberculosis have long been recognised to be great mimickers of each other when they present in the bone, lungs or skin. The ability to differentiate tuberculosis, especially in the spine, from a recurrence of LCH in a case of previously diagnosed LCH poses a greater diagnostic challenge. Clinicians have been entangled in this diagnostic dilemma from the 1960s till today.

**Methods:** We present an interesting case of eosinophilic granuloma of the thoracic spine in an 8-year-old Indonesian Chinese boy who underwent posterior instrumentation and fusion of T10 spine for compression fracture of T10 which re-presented 3 years later with (R) neck pain, (R) shoulder pain associated with limited abduction of (R) arm and weakness. With a positive contact of pulmonary tuberculosis, a positive mantoux test and imaging studies, he was diagnosed with tuberculosis of the cervical spine and was treated with anti-tuberculous therapy and laminectomy/drainage of cervical spine abscess, but it later unveiled itself to be a true recurrence of LCH in the cervical spine.

**Results:** The authors re-challenge this diagnostic difficulty by re-examining the clues which LCH used to disguise itself as tuberculosis in this case, as well as previous limited literature, to provide important learning points to clinicians who continue to face this difficulty.

**Conclusion:** This article highlights the pitfalls in the diagnosis of LCH versus tuberculosis, especially in the spine. Clinicians today must have a high index of suspicion when dealing with either 1 of these 2 great mimickers.

## MP329

**Clinical Pathway for Community-acquired Pneumonia in Children****CY CHONG<sup>1</sup>, J TANG<sup>2</sup>, A GOH<sup>2</sup>**<sup>1</sup>Paediatrics - Infectious Diseases, <sup>2</sup>Paediatrics - Respiratory Medicine, KK Women's & Children's Hospital, Singapore

**Aim:** Since July 2004, KK Women's and Children's Hospital, Paediatric Medicine has embarked on a clinical pathway (CP) for community-acquired pneumonia to standardise patient management. CPs standardise clinical processes via implementation of evidence-based practices to improve outcome. The objectives of this study are to determine adherence to the pathway, patient outcome and to compare the average length of stay (ALOS), profit and loss (P&L) before and after CP implementation.

**Methods:** The outcome and variance (O&V) forms for each patient enrolled were collected for the 6 months post-CP implementation from July to December 2004 and compared with the pre-CP period from July to December 2003. The P&L data were obtained from Finance using the DRG 172 and 171.

**Results:** Of the 263 patients enrolled, 66 were excluded for the wrong diagnosis, leaving 97 analysable patients. The mean age was 4.5 years (range, 1 month to 19 years). The majority of patients received empiric IV ampicillin/oral amoxicillin followed by oral erythromycin. Response to empiric antibiotics was found in 86.4%, whereas 34% (67) had the antibiotic changed for which 31 (15.7%) were due to clinical progress/lack of improvement. The ALOS was 3.32 days post-CP vs 3.4 days pre-CP. The P&L data showed an average profit of \$105 per patient post-CP vs \$14 pre-CP.

**Conclusion:** The pneumonia CP has helped to streamline the hospital management of children with community-acquired pneumonia. In addition, enrollment of patients into the CP managed to increase profitability. CPs are useful for standardising patient care and should be implemented for patients admitted for common conditions.

MP330

**Skin Manifestation of *Stenotrophomonas maltophilia* Infection — A Case Report and Review of Literature**

WY TEO<sup>1</sup>, MY CHAN<sup>1</sup>, J LAM<sup>1</sup>, CY CHONG<sup>1</sup>

<sup>1</sup>Paediatrics – Infectious Diseases, KK Women's & Children's Hospital, Singapore

**Aim:** *Stenotrophomonas maltophilia* is an aerobic gram-negative bacillus that is a frequent coloniser of fluids used in the hospital setting. It causes infection in immunosuppressed hosts, especially those who are neutropenic, on chemotherapy and broad-spectrum antibiotics. Skin and soft tissue manifestations of *S. maltophilia* infection are becoming an increasingly recognised entity; the clinical spectrum ranges from mucocutaneous, skin to soft tissue infections.

**Methods:** We present a case of an 8-year-old girl with acute myeloid leukaemia who developed metastatic skin lesions secondary to *S. maltophilia* bacteraemia. The authors reviewed a total of 24 reported cases of mucocutaneous, skin and soft tissue infections by *S. maltophilia*. The presentations include metastatic cellulitis, primary cellulitis and infected mucocutaneous ulcers.

**Results:** This is the first locally reported case of metastatic nodular skin lesions caused by *S. maltophilia* bacteraemia. This is also the first locally reported paediatric case of embolic skin lesions caused by *S. maltophilia* reported. Of the 6 cases of *S. maltophilia* bacteraemia seen in the paediatric oncology patients from year 2000 to 2004 at our hospital, only 1 case developed metastatic skin lesions.

**Conclusion:** *S. maltophilia* skin infection should be included in the list of differential diagnoses for metastatic skin lesions in neutropenic patients, especially with an underlying haematologic malignancy who has received recent chemotherapy and broad-spectrum antibiotics. Haematologic malignancy, transplantation, neutropenia, immunosuppressive therapy and a high severity of illness score were important prognostic factors.

MP331

**Human Metapneumovirus and Asthma**

A GOH<sup>1</sup>, N TEE<sup>2</sup>, R LIN<sup>2</sup>, LH LOO<sup>2</sup>, OM CHAY<sup>3</sup>, J TANG<sup>3</sup>, KC NG<sup>4</sup>

<sup>1</sup>Paediatrics - Nephrology, <sup>2</sup>Laboratory, <sup>3</sup>Paediatrics - Respiratory Medicine, <sup>4</sup>Emergency Medicine, KK Women's & Children's Hospital, Singapore

**Aim:** To determine the frequency of metapneumovirus infection in children presenting with an asthma exacerbation.

**Methods:** Children presenting to the Children's Emergency or admitted with an asthma exacerbation were enrolled after informed consent was taken. An asthma exacerbation was defined as the presence of wheeze in a child with physician-diagnosed asthma or a past history of at least 3 previous episodes of wheeze. A nasopharyngeal swab was taken and sent for identification of metapneumovirus and rhinovirus by PCR and respiratory viruses by immunofluorescence.

**Results:** Two hundred and ninety-eight children were enrolled, of which 200 were inpatients and 98 outpatients. The mean age was 6.44 years (range, 0.78 to 18.97 y). 62.4% were boys. 61.7% of the children had intermittent asthma while 38.3% had persistent asthma. Children with persistent asthma were more likely to be admitted during an asthma exacerbation ( $P < 0.001$ , OR = 126.0, 95% CI 17.2-129.5). Viruses were detected in 50.3% of children. Human metapneumovirus was present in 5% of children. The commonest virus isolated was rhinovirus (39.2%). Coinfection with 2 viruses was present in 4 children. Mean duration of hospital stay was 3 days (range, 1 to 6 days). Those with dual infections did not stay longer.

**Conclusion:** Human metapneumovirus infection was identified in children presenting with asthma exacerbations and may have a role as a viral trigger. Rhinoviruses remain the main viral agent identified in asthma exacerbations.

MP332

**Distal Tubular Dysfunction in an Adolescent with Lupus Nephritis**

YH NG<sup>1</sup>, SM CHAO<sup>1</sup>

<sup>1</sup>Paediatrics - Nephrology, KK Women's & Children's Hospital, Singapore

**Introduction:** Renal tubular dysfunction is a known complication of lupus nephritis and has been reported to be present in up to 60% of adult lupus patients. This condition is however, rare among paediatric lupus patients with only a handful of reported cases to date. We describe a case of hyporeninemic hypoaldosteronism in an adolescent with lupus nephritis.

**Case Discussion:** The patient is an 11-year-old Chinese girl with systemic lupus erythematosus (SLE) since the age of 9 and who has been treated with prednisolone. She developed lupus nephritis a year later. This was treated with intravenous (IV) pulsed methylprednisolone followed by oral prednisolone. She was readmitted a year later for an acute flare of lupus nephritis and noted to have hyponatraemia (121 mmol/L) with hyperkalaemia (6.2 mmol/L) on admission (serum creatinine 92 mmol/L, bicarbonate 17.5 mmol/L and urine pH 6.0). Hyperkalaemia was managed with resonium. Further tests revealed the presence of hyporeninaemic hypoaldosteronism (serum renin 0.22 µg/L/hour, aldosterone 58.2 pmol/L). She was started on a course of fludrocortisone. Hypertension was controlled with enalapril and nifedipine. Renal biopsy revealed WHO Class IV lupus nephritis. The patient was started on pulsed methylprednisolone followed by IV cyclophosphamide with good response. Peak serum creatinine during the admission was 220 mmol/L. She has since been on monthly IV cyclophosphamide and remains well with normal renal function.

**Conclusion:** Renal tubular dysfunction in paediatric SLE patients is rare. The aetiology of hyporeninaemic hypoaldosteronism in SLE patients with lupus nephritis remains unknown. Volume-dependent suppression of renin by atrial natriuretic peptide has been suggested as a possible cause.

MP333

**Quality of Life of Morbidly Obese Children with Obstructive Sleep Apnoea/Hypopnoea Syndrome**

J TANG<sup>1</sup>, J YAP<sup>2</sup>, F YAP<sup>2</sup>, A GOH<sup>1</sup>, OM CHAY<sup>1</sup>

<sup>1</sup>Paediatrics - Respiratory Medicine, <sup>2</sup>Psychology Service, KK Women's & Children's Hospital, Singapore

**Aim:** To determine the quality of life (QoL) of morbidly obese children with obstructive sleep apnoea/hypopnoea syndrome (OSAHS) and the effect of intervention on QoL.

**Methods:** Prospective review of 142 patients recruited from an obesity clinic. All patients had a baseline evaluation with a generic health-related questionnaire (CHQ-PF50). Patients with OSAHS received a repeat evaluation 1 year after intervention for obesity, OSAHS and co-morbid.

**Results:** Median age of patients was 12.7 years (range, 6-17) with 55% being male. Racial distribution was 48%, 43%, 8% and 1% of Chinese, Malays, Indians and Others respectively. Median ideal body weight for height was 186% (159-346). 55% had OSAHS and 38% had at least 2 comorbidities. QoL of obese children with or without OSAHS was significantly worse compared to healthy children in the subscale parental impact – emotional (PE). Mean scores of other subscales including general health, self-esteem and many other psychosocial subscales were also lower though not significantly different. These scores were also worse with increasing severity of OSAHS comparable with children with B asthma and juvenile rheumatoid arthritis. Amongst children with moderate to severe OSAHS, behaviour was strongly correlated with PE, mental health and family-limitations in activities ( $r > 0.6$ ,  $P < 0.01$ ). With intervention for disease, QoL improved significantly in the areas general and mental health and also demonstrated an improving trend in several other psychosocial subscales.

**Conclusion:** Global health and QoL is worse in obese children with OSAHS and improves with intervention for disease.

## MP334

**Preliminary Analysis of a Phase II Study for the Use of Iodine 131 Conjugated Rituximab in Asian Patients with Relapsed or Refractory Low-grade, Transformed Low, Intermediate and High-grade B-cell Non-Hodgkin's Lymphoma****CB GOH<sup>1</sup>, S LOONG<sup>1</sup>, KM LEE<sup>2</sup>, D NG<sup>3</sup>, S YU<sup>3</sup>, SP YAP<sup>1</sup>, F GAO<sup>4</sup>**<sup>1</sup>Clinical Department - Radiation Oncology, National Cancer Centre, Singapore, <sup>2</sup>Radiation Oncology, National University Hospital, Singapore, <sup>3</sup>Nuclear Medicine, Singapore General Hospital, Singapore, <sup>4</sup>Clinical Trials & Epidemiological Sciences, National Cancer Centre, Singapore**Aim:** To study the efficacy and toxicity of an in-house manufactured radioimmunotherapy for heavily pretreated patients with low-grade relapsed and refractory or transformed low-, intermediate- and high-grade non-Hodgkin's lymphoma (NHL).**Methods:** Eleven patients received 450 mg of unlabelled rituximab followed by 80 mCi of tracer I-131 labelled rituximab to determine the total residence time of conjugated rituximab. The therapeutic dose of I-131 was calculated to deliver 65 to 75 cGy whole body radiation absorbed dose, subject to adequate platelet reserves. Patients were reviewed with appropriate tests done to assess response and evaluate toxicity. Follow-up was until disease progression or for 2 years.**Results:** Between April 2002 till March 2005, 11 patients were enrolled. They ranged from 46 to 77 years in age, male to female ratio was 8:3, majority being follicular lymphoma and diffuse large cell type. Nine patients were at advanced stage. Two patients were enrolled after progression with first line chemotherapy, the rest had at least 2 lines of chemotherapy. The median dose of radioiodine used was 79.3 mCi (range, 38.4 mCi to 104 mCi). One patient developed infusion related bradycardia and another had severe neutropenia after the tracer dose of radioiodine. The rest had mainly grade 2/3 haematological toxicities.**Conclusion:** Radioimmunotherapy is a feasible alternative to chemotherapy for heavily pretreated patients with relapsed or refractory NHL. In our study of Asian patients, toxicity remains acceptable in the majority. We will continue to accrue patients to our study.

## MP335

**To Examine the Haplotype Architecture of the Mu Opioid Receptor (MOR) Gene of Chinese Individuals in Singapore****G PANG<sup>1</sup>, C LEE<sup>1</sup>, C GOH<sup>2</sup>**<sup>1</sup>Research Divisions - Medical Sciences, <sup>2</sup>Palliative Medicine, National Cancer Centre, Singapore**Aim:** To examine the haplotype architecture of the mu opioid receptor (MOR) gene of Chinese individuals in Singapore.**Methods:** DNA from 32 Chinese samples in Singapore was sequenced and analysed. Single nucleotide polymorphisms (SNPs) in the 5' and exonic regions of the MOR gene were identified and genotyped. The allele frequencies of these SNPs were calculated and haplotype frequencies derived. Linkage disequilibrium (LD) between SNP pairs was estimated and the statistical significance of the LD assessed.**Results:** Altogether, 3 SNPs were identified. They are the -1748G/A, the -172G/T in the 5' region and the 118A/G SNPs in exon 1 of the MOR gene. Based on the allele frequencies, the A118G SNP was the commonest SNP identified in this study. The A118G SNP is a non-synonymous SNP that causes an amino acid change of asparagine to aspartic acid at position 40 of the amino acid sequence of the MOR.**Conclusion:** The results of this study form a useful platform for future clinically relevant association studies involving SNPs in the MOR gene and the clinical effects of important opioids such as morphine and fentanyl, which are commonly employed to treat symptoms such as pain in cancer patients.

## MP336

**Role of Cardiac Resynchronisation Therapy in Heart Failure****CK CHING<sup>1</sup>, LF HSU<sup>1</sup>, WS TEO<sup>1</sup>**<sup>1</sup>Cardiology, National Heart Centre, Singapore**Aim:** Cardiac resynchronisation therapy (CRT) with or without a defibrillator has been consistently proven to improve symptoms, exercise tolerance and survival. We look at the role of CRT and CRT-D in improving symptoms and survival at the National Heart Centre.**Methods:** Fifty-two patients with NYHA II to IV heart failure on optimal medical therapy with widened QRS complex and impaired LVEF <40% were recruited from the period August 1999 to August 2004.**Results:** 82% were male. The mean age was 62 ± 12 years. Their pre-implantation NYHA classifications were: 10% in class II, 71% in class III, 19% in class IV. The aetiology for heart failure was ischaemic heart disease in 58% (30) with a mean LVEF of 21 ± 8%. Pre-implantation mean PR interval was 208 ± 46 ms with a mean QRS duration of 165 ± 29 ms. 77% had LBBB, 10% had RBBB while 13.5% had IVCD. Additionally, 25% of this cohort received CRT-D (n = 18). The mean procedural time was 161 ± 66 minutes with a mean fluoroscopic time of 42 ± 33 minutes. There were no major procedural complications. All patients felt symptomatically better at 1 month follow-up. 94% and 69% of patients felt a sustained improvement at 6 months and 12 months follow-up respectively. Only 8% felt a deterioration in symptoms at 12 months.**Conclusion:** CRT and CRT-D implantation is a relatively safe procedure for improving symptoms and survival in patients with optimal medical therapy for chronic heart failure.

## MP337

**Sudden Unexpected Cardiac Deaths in Singapore****CK CHING<sup>1</sup>, LF HSU<sup>1</sup>, WS TEO<sup>1</sup>**<sup>1</sup>Cardiology, National Heart Centre, Singapore**Aim:** Sudden unexpected deaths in young people are rare. We conducted a retrospective analysis of all sudden unexpected cardiac deaths (SCD) for the year 2003 in Singapore to identify its causes and demographic characteristics.**Methods:** Consecutive patients, aged 18 to 60 years, seen alive within 24 hours of death, on whom autopsy found a cardiac cause of death were included.**Results:** Out of 229 autopsies performed for sudden death, 56% (n = 129) was classified as SCD. 91% were males. The mean age for males and females was 46 ± 9 years and 49 ± 9 years respectively. The racial distribution was as follows: 53.2% Chinese, 16.4% Malay, 14.3% Indians and 16.4% of other racial group. 81% (n = 178) of these deaths were due to IHD, 14% due to myocardial diseases, 2% due to valvular heart diseases and 3% due to microvascular disease of the heart. The IHD group was predominantly male (92%). The extent of coronary artery disease was triple vessel in 52%, double vessel in 23% and single vessel in 20%. 40% (n = 64) of the IHD group was <45 years old of which triple vessel CAD accounted for 50%. The myocardial disease group (n = 31) comprised hypertensive heart disease (16) (HHD), hypertrophic cardiomyopathy (2) (HCM) and myocarditis (13). The mean left ventricular wall thickness for HHD and HCM were 17 ± 2 mm and 21 ± 3 mm respectively. CAD remains the leading cause of SCD in males.**Conclusion:** CAD remains the leading cause of SCD in male patients between 18 and 60 years old. Irrespective of age (<45 or >45 years), almost half of the patients who died of IHD already had triple vessel disease.

## MP338

**Use of Devices as Bridge to Heart Transplant****KL HO<sup>1</sup>, BWK KWOK<sup>1</sup>, CK CHING<sup>1</sup>, LF HSU<sup>1</sup>, R KAM<sup>1</sup>, WS TEO<sup>1</sup>**<sup>1</sup>Cardiology, National Heart Centre, Singapore**Aim:** Implantable cardioverter defibrillator (ICD) prevents sudden arrhythmic death in heart failure patients. To determine the frequency and efficacy of devices as bridge to transplant in local registry.

**Methods:** Data were gathered retrospectively from 22 consecutive patients (20 males), varying in age from age 20 to 62 years old, who were accepted for heart transplant from January 2001 to December 2004 (mean follow-up was  $443 \pm 394$  days). There were 7 patients with AICD and 15 patients without AICD.

**Results:** There were no difference between the 2 groups in baseline characteristics of proportion of ischaemic cardiomyopathy, left ventricular ejection fraction,  $VO_2$  max and creatinine clearance. Only 31.8% of patients on the transplant list had an ICD inserted. Survival on the waiting list was significantly improved by AICD; only 1 out of the 7 AICD patients (3 transplanted) vs 11 of the 15 non-AICD patients (2 transplanted) died on the waiting list (14% vs 73%,  $P = 0.004$ ). Amongst the group without an ICD implanted 72% died from pump failure.

**Conclusion:** The use of ICD as bridge to heart transplant is under-utilised. Such use may improve the chance to successful transplantation in this group of patients. This needs to be validated in studies with larger population size.

### MP339

#### Complete Atrioventricular Block Complicating Acute Anterior Myocardial Infarction: a Case Series of 11 Patients

**KW HO<sup>1</sup>, LF HSU<sup>1</sup>**

<sup>1</sup>Cardiology, National Heart Centre, Singapore

**Aim:** Anterior acute myocardial infarction (AMI) with complete atrioventricular block (CAVB) has poor prognosis. Outcomes after acute revascularisation have not been evaluated. We reported 11 patients admitted to our centre with CAVB complicating anterior AMI.

**Methods:** Records from Singapore cardiac data bank and our centre of 11 patients admitted from 2000 to 2005 with CAVB complicating anterior AMI were analysed.

**Results:** High admission Killip class (36% class IV), reinfarction (27%) and mortality rates (36%) were found. Interventions included acute percutaneous transluminal coronary angioplasty/stenting 73%, thrombolysis 9% and emergency bypass 9%. Median door-balloon times were delayed ( $140 \pm 220$  minutes). Angiogram showed triple vessel disease (VD) 36%, double VD 28%, single VD 36%; mid left anterior descending artery (LAD) occlusion 9%, proximal LAD occlusion 91%. Mean CAVB onset after chest pain:  $22.5 \pm 28.6$  hours. 46% developed RBBB/LAFB, 36% LBBB and 18% alternating RBBB/LBBB. Mean left ventricular ejection fraction:  $34.0\% \pm 11.4\%$ . 91% had transvenous pacing. CAVB was transient in 86%, resolving with acute revascularisation. One surviving patient required permanent pacemaker and was only 3% pacing-dependent on review. Rhythm on discharge was first-degree AV block (4/7) and normal sinus rhythm (3/7). Mean follow-up was  $20.2 \pm 9.8$  months. There was 1 readmission for congestive heart failure and no readmission for acute coronary syndrome.

**Conclusion:** We found poor acute outcome with anterior AMI complicated by CAVB likely resulting from extensive MI. Most CAVB resolved after acute revascularisation and did not need permanent cardiac pacing after revascularisation.

### MP340

#### Repaired Tetralogy of Fallot: Complications in Adults

**KW HO<sup>1</sup>, RS TAN<sup>1</sup>, JL TAN<sup>1</sup>**

<sup>1</sup>Cardiology, National Heart Centre, Singapore

**Aim:** We report a series of operated tetralogy of Fallot (TOF) focusing on complications and outcomes.

**Methods:** Data from TOF patients seen at our centre's adult congenital heart disease clinic were analysed.

**Results:** There were 15 patients: mean age  $35.0 \pm 11.2$  years; mean age at first operation  $10.6 \pm 8.6$  years; mean postoperative follow-up duration  $22.9 \pm 11.1$  years; current NYHA status: I – 66%, II – 7%, III – 26%. Ten patients had complete operative notes: 8 underwent total TOF correction; 2 had staged aortopulmonary shunt with total correction at mean of 3.2 years later. Operative procedures include ventricular septal defect (VSD) patch repair

(10), infundibulectomy (8), pulmonary artery patch augmentation (7). One patient required pulmonary valve homograft replacement for severe pulmonary regurgitation (PR) 28 years later. Current investigations: RBBB on ECG (87%), mean QRS duration  $139.7 \pm 31.4$  ms ( $>160$  ms in 4). Echocardiography: dilated right ventricular end-diastolic (RVED) diameters, mean  $2.8 \pm 0.9$  cm; severe PR (66%), residual right ventricular outflow tract obstruction (RVOTO) (33%) and VSD patch leakage (13%). Cardiac magnetic resonance (in 7 patients): dilated RVED volumes, mean  $245 \pm 99$  mL; severe PR (6 patients, mean regurgitant fraction  $44.7 \pm 9\%$ ). Treadmill exercise tests (in 7 patients): mean exercise duration  $9.1 \pm 1.8$  min; METS  $10.4 \pm 2.0$ . One patient had atrial tachycardia that required radiofrequency ablation.

**Conclusion:** Challenges in adult post-TOF repair patients remain due to a multitude of complications which includes severe PR (87%), right ventricular dilatation (87%), RVOTO (33%) and VSD leak (13%).

### MP341

#### p53 Immunopositivity and its Prognostic Role amongst Chinese Women with Lung Cancer in Singapore

**YK TAN<sup>1</sup>, TC WEE<sup>2</sup>, M TEH<sup>3</sup>, WT POH<sup>4</sup>, P ENG<sup>5</sup>, A SEOW<sup>6</sup>**

<sup>1</sup>Cardiology, National Heart Centre, Singapore, <sup>2</sup>Singapore Armed Forces, Singapore, <sup>3</sup>Pathology, National University of Singapore – Yong Loo Lin School Of Medicine, Singapore, <sup>4</sup>Laboratory Medicine, Changi General Hospital, Singapore, <sup>5</sup>Respiratory and Critical Care Medicine, Singapore General Hospital, Singapore, <sup>6</sup>COFM, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** There has been recent interest in the prognostic role of p53 mutations in lung cancer. While immunohistochemical methods for detecting these mutations have generally been considered less sensitive and specific than direct gene sequencing, the former are quicker and less costly to perform. We examined the influence of p53 immunopositivity on survival outcome in a defined population of lung cancer patients in Singapore.

**Method:** Ninety-four Chinese women with primary lung cancer, for whom tumour tissue were available to us, were recruited over 2.5 years from 2 hospitals and followed. Data on smoking and diet was collected via in-person standardised questionnaire. Tissue sections were stained immunohistochemically for p53 and classified on a semi-quantitative scale by extent and intensity into negative, weakly (score 1-3) and strongly (4-6) positive. Kaplan-Meier and Cox proportional hazards methods were used for survival analysis.

**Results:** Forty-eight tumours (51.1%) were immunopositive, of which 15 (15.8% of total) were strongly positive. Strong immunopositivity was associated with a significantly poorer survival outcome (age-, smoking- and stage-adjusted hazards ratio 1.8, 95% CI 1.0–3.4) versus weak positivity/negative tumours and its adverse survival impact was greater in smokers (adjusted hazards ratio 3.0, 95% CI 1.1–7.8) than non-smokers.

**Conclusion:** p53 strong immunopositivity is a predictor of poorer survival outcome in this study population. Weak immunopositivity may reflect p53 overexpression during DNA repair processes in tumour tissue, explaining the unpredictable effect on survival outcome in the past. Smoking appears to be an effect modifier for the influence of p53 on survival — the reasons await further evaluation.

### MP342

#### Mortality Trend of Acute Myocardial Infarction in Coronary Care Unit

**P TING<sup>1</sup>, A WONG<sup>2</sup>, LL SIM<sup>2</sup>, T CHUA<sup>2</sup>, TH KOH<sup>2</sup>, ST LIM<sup>2</sup>, P WONG<sup>2</sup>**

<sup>1</sup>Cardiology, <sup>2</sup>Care and Counselling, National Heart Centre, Singapore

**Aim:** The treatment of acute myocardial infarction (AMI) has evolved greatly over the past few decades with the introduction of newer pharmacotherapeutic agents, and recently, primary angioplasty. We aimed to compare the mortality and complication trends of AMI patients admitted to the Coronary Care Unit (CCU) in 2002 with data from previous periods.



**Methods:** All data for patients admitted to the National Heart Centre CCU for AMI in 2002 were collected through Singapore Myocardial Infarction Registry. These were compared to previous data reported in 1967, 1975 and 1988.

**Results:** A total of 516 cases of AMI were admitted to the CCU in this period. The male to female ratio was 2.4:1. 60% of patients were 60 years and above. Common in-hospital complications included heart failure, non-sustained ventricular tachycardia, atrial fibrillation and complete heart block, which occurred in 37.8%, 8.1%, 7.9% and 5.8%, respectively. The following clinical variables were associated with higher mortality; these included age, heart failure, bundle branch block and sustained ventricular tachycardia. The overall in-hospital mortality and the age-standardised mortality was 14.7% and 10% respectively, compared to 20.6% and 17.0% in the year 1988. 278 patients underwent acute percutaneous transluminal angioplasty (PTCA). The overall acute PTCA in-hospital mortality was 5.4%.

**Conclusion:** Our results show a significant drop in the mortality rate in 2002 compared to 1988 despite there being more elderly infarct patients. The understanding of the pathophysiology and introduction of newer therapies such as PTCA may be the reason for this improvement.

### MP343

#### The Predictive Value of Arterial Stiffness in Ethnic Indian and Ethnic Chinese Singaporean Stroke Patients

FP WOON<sup>1</sup>, DA DE SILVA<sup>2</sup>, HY GAN<sup>3</sup>, J CAMERON<sup>4</sup>, TH KOH<sup>5</sup>, B KINGWELL<sup>6</sup>, MC WONG<sup>2</sup>

<sup>1</sup>Research Laboratory, National Heart Centre, Singapore, <sup>2</sup>Neurology, National Neuroscience Institute, Singapore, <sup>3</sup>Neurology, Singapore General Hospital, Singapore, <sup>4</sup>Engineering, Monash University, Australia, <sup>5</sup>National Heart Centre, Singapore, <sup>6</sup>Alfred and Baker Medical Unit, Baker Heart Research Institute, Australia

**Aim:** Arterial stiffness assessed with techniques like pulse wave velocity (PWV) has recently been identified as a cardiovascular risk factor. Aortic PWV >13 m/s is a strong predictor of cardiovascular mortality in hypertension. We previously showed that Singaporean ethnic Indian and Chinese stroke patients have raised PWV comparable to vascular "high-risk groups" (with hypertension, diabetes, coronary artery disease) in the West and that high PWV was significantly associated with age and known vascular risk factors (diabetes, hypertension, hyperlipidaemia). In this study, we examined the predictive value of PWV on prognosis among ethnic Indian and Chinese stroke patients.

**Methods:** One hundred and seventy-six ischaemic stroke patients (median age: 65 years, 111 Chinese) admitted between Nov 2003 and Dec 2004 were examined. Arterial stiffness was measured with carotid-femoral PWV using applanation tonometry. Outcome was assessed at 6 months using the modified Rankin score (MRS) with poor outcome defined as MRS 3-6.

**Results:** The mean PWV (13.4 m/s) of patients with poor outcome was significantly higher than PWV (12.3 m/s) of patients with good outcome (MRS 0-2) ( $P = 0.050$ ). Multivariate analyses including other factors significantly associated with poor MRS [age ( $P = 0.002$ ), ischaemic heart disease (IHD) ( $P = 0.006$ ) and large vessel stroke by TOAST classification ( $P = 0.014$ )] revealed that IHD ( $P = 0.012$ ) was an independent factor for poor outcome and PWV was not.

**Conclusion:** PWV predicted for poor outcome at 6 months in Singaporean ethnic Indian and Chinese stroke patients. However, it is not an independent factor for poor prognosis likely due to its association with age, diabetes, hypertension and hyperlipidaemia.

### MP344

#### Site of Stenosis Poorly Correlates with Oxfordshire Community Stroke Project among Indian Ischaemic Stroke Patients

DA DE SILVA<sup>1</sup>, FP WOON<sup>2</sup>, LL WONG<sup>3</sup>, MP LEE<sup>3</sup>, C CHEN<sup>1</sup>, HM CHANG<sup>1</sup>, MC WONG<sup>1</sup>

<sup>1</sup>Neurology, National Neuroscience Institute, Singapore, <sup>2</sup>Research Lab, National Heart Centre, Singapore, <sup>3</sup>Neurovascular, Singapore General Hospital, Singapore

**Aim:** Among Caucasians, the site of stenosis correlates with the Oxfordshire Community Stroke Project (OCSF) classification, with infrequency of large artery disease among patients with lacunar infarcts (LACI). This correlation is not seen among Chinese, who have a high frequency of large artery disease among patients with LACI. We aimed to study the correlation of stenotic site with OCSF classification among Indians as this has not been studied previously.

**Methods:** We studied 100 consecutive Indian ischaemic stroke patients admitted over a 16-month period. Extracranial large artery disease was defined as stenosis >70% or occlusion of either carotid artery on ultrasonography. Intracranial large artery disease was defined as elevated peak systolic velocity of any large intracranial cerebral artery on transcranial colour-coded doppler.

**Results:** Stroke distribution was 63% LACI, 18% PACI, 12% posterior circulation infarction and 7% TACI. Extracranial disease was present in 8% of patients. Of the 83% with adequate temporal windows, 40% had intracranial disease. Among patients with TACI/PACI, 22%/17% had extracranial large artery disease and 100%/69% had intracranial large artery disease. Among patients with LACI (most common stroke subtype), 5% had extracranial large artery disease and 55% had intracranial large artery disease.

**Conclusion:** Site of stenosis poorly correlates with OCSF classification among Indians, similar to Chinese data and unlike Caucasian data. We postulate this is due to the high frequency of intracranial disease among Indians. In Singapore, where 84% of the population is either Chinese or Indian, clinical axioms on site of stenosis among OCSF stroke subtypes based on Caucasian data may be misleading.

### MP345

#### Immunohistochemical Screening for Paraneoplastic Neurological Syndromes: 5-year Experience of the National Neuroscience Institute

Y CHEN<sup>1</sup>, E PICA<sup>1</sup>, WC YEE<sup>1</sup>

<sup>1</sup>Neuromuscular Laboratory, National Neuroscience Institute, Singapore

**Aim:** We reviewed the findings and experience of the NNI Neuromuscular Laboratory in immunohistochemical (IH) screening for paraneoplastic neurological syndromes (PNS) since its inception.

**Methods:** IH screening of patient sera was initially conducted by an indirect IH technique using human cerebellar frozen sections as substrate. From early 2005, human tissue was replaced by a composite of mouse cerebrum, cerebellum, spinal cord, kidney, and gut tissue as substrate. PNS autoantibodies were identified by their characteristic IH staining patterns.

**Results:** Of the 178 patient serum samples received, 7 (3.9%) showed positive results: anti-Hu antibody (3, lung CA in 2), anti-Yo antibody (2, ovarian and breast CA), antibody(s) with selective hippocampal staining associated with limbic encephalitis and VGKC antibodies (1, malignant thymoma) and antibody with novel punctuate granular cell staining associated with cerebellar degeneration (1, no neoplasm so far). The associated PNS included subacute cerebellar degeneration (4), limbic encephalitis (2) and sensory neuronopathy (1).

**Conclusion:** PNSs are rare disorders associated with specific syndromes and tumours. IH screening is useful and essential for PNS diagnosis. The use of mouse tissue has advantages over human tissue as substrate. Future plans for the lab include western blotting to enhance and confirm antibody diagnosis.

**MP346**

**Review of Hyperbaric Oxygen Recompression Treatment Outcome of Divers with Decompression Sickness**

**BH HO<sup>1</sup>, J WONG<sup>1</sup>, G CHAN<sup>1</sup>**

<sup>1</sup>*Diving Medicine, Singapore Armed Forces, Singapore*

**Aim:** Recompression treatment is a known effective modality of treatment for decompression illness (DCI) as supported by the Undersea Hyperbaric Medical Society (UHMS). This study aimed to review the treatment outcome of divers with DCI who received hyperbaric oxygen recompression treatment in the Naval Hyperbaric Centre (NHC) and to evaluate prognostic factors associated with positive treatment outcome.

**Methods:** Divers who were diagnosed for DCI from the years 1991 to 2004 and underwent hyperbaric treatment for DCI were used for the descriptive study. A total of 317 cases were referred to our centre, but only 216 who fulfilled the selection criteria are included in the final analysis. All the divers were treated using the Australian Book of Records (ABR) modified recompression treatment tables, mainly Tables 61, 62 and 63.

**Results:** The majority of patients who underwent recompression treatment in the NHC had improvement in the symptoms only. Less than 1% of the patients showed no improvement. The provision of onsite surface oxygen therapy and early treatment (less than 24 hours) also significantly improved recompression treatment outcome.

**Conclusion:** Recompression hyperbaric treatment will improve the outcome of divers who suffered from DCI. Early provision of supplementary oxygen and referral to a hyperbaric facility may reduce the severity of symptoms and result in a better treatment outcome.

**MP347**

**Application of Hyperbaric Oxygen Therapy for Poor Healing Wounds in Singapore: the Naval Hyperbaric Centre Experience**

**W CHOW<sup>1</sup>, J WONG<sup>1</sup>, G CHAN<sup>1</sup>**

<sup>1</sup>*Naval Medicine and Hyperbaric Centre, Singapore Armed Forces, Singapore*

**Aim:** Hyperbaric oxygen therapy (HBOT) is indicated in the treatment of specific medical conditions. The aim of this study was to share the Naval Hyperbaric Centre's (NHC) experience in the application of HBOT for poor healing wounds in Singapore. The NHC, Republic of Singapore Navy was established in the 1980s initially to treat military divers who suffered from decompression illness. It was in the 1990s when NHC began to start administering HBOT for certain medical conditions such as poor healing wounds, carbon monoxide poisoning and post-radiation osteonecrosis. Under the recommended Undersea Hyperbaric Medical Society (UHMS) list of approved indications for HBOT, the NHC has had much experience in managing the above medical conditions.

**Methods:** A retrospective study was conducted to look at the patients with poor healing wounds treated at NHC between 1995 and 2003. These patients had diabetic wounds, necrotising fasciitis, neuropathic wounds or ischaemic wounds.

**Results:** A total of 70 patients were treated with a median age of 62.5 years. Patients underwent a median number of 14 oxygen treatment cycles and the median duration of treatment was 2.5 weeks. Treatment outcome was improved in 50% of the patients, whereas 34% of the patients had no improvement. The remaining patients' conditions either worsened or the outcome was not documented.

**Conclusion:** Our experience suggests that HBOT is beneficial as an adjunctive therapy for selected poor healing wounds.

**MP348**

**UCHL1 S18Y Variant and Risk of Parkinson's Disease: Higher Survival in Young Onset Patients**

**KY PUONG<sup>1</sup>**

<sup>1</sup>*Clinical Research, Singapore General Hospital, Singapore*

**Aim:** We performed an independent large case control association study of the variant in subjects of Chinese ethnicity and investigated the age-of-onset effect of the UCHL1 variant utilising a survival analysis methodology.

**Methods:** Allelic discrimination using the 5' nuclease activity assay was adapted to detect the polymorphisms S18Y. Primers and probes were designed using the Primer Express 1.5 software. After PCR, the allelic specific fluorescence was measured on the ABI 7700 (Applied Biosystems) using the Sequence Detection Systems 1.7 software for allelic discrimination. The genotype calls were attributed automatically.

**Results:** Kaplan-Meier analysis carried out separately for the 2 groups with different onset of disease revealed that for the young onset Parkinson's disease group, the Y/Y genotype was associated with a significantly longer survival than Y/S plus S/S ( $P = 0.045$ , median survival rate and its 95% CI for YY vs Y/S/SS: 59 months (95% CI: 57 to 61 months) vs 57 months (95% CI: 56 to 58 months). This inverse relationship for the younger onset patients was also observed in the univariate analysis ( $P = 0.007$ ) and logistic regression analysis ( $P = 0.008$ ).

**Conclusion:** We provided an independent confirmation of the protective effect of the UCHL1 S18Y variant (Y/Y genotype) in young onset Chinese PD. Our findings would further provide impetus for pharmacotherapeutic effort targeting UCH-L1 protein activity.

**MP349**

**A(2A) Adenosine Variability and Coffee and Tea Intake in Parkinson's Disease**

**Y ZHAO<sup>1</sup>, ZY LU<sup>2</sup>, SMC FOOK-CHOONG<sup>1</sup>, H SHEN<sup>2</sup>, E CHUA<sup>2</sup>, Y YIH<sup>3</sup>, EK TAN<sup>4</sup>**

<sup>1</sup>*Clinical Research, Singapore General Hospital, Singapore*, <sup>2</sup>*Research, SingHealth HQ, Singapore*, <sup>3</sup>*Health Screening, Singapore General Hospital, Singapore*, <sup>4</sup>*Neurology, National Neuroscience Institute, Singapore*

**Aim:** Caffeine is an adenosine A(1) and A(2A) receptor antagonist but modulates its wakefulness effect on the A(2A) receptors. Potential functional genetic variants of A(2A) could mediate caffeine-induced anxiety. Caffeine protects against Parkinson's disease (PD). The objective of this study was to investigate the potential interaction of a functional A(2A) genetic variant and coffee and tea intake in modulating the risk of PD.

**Method:** Four hundred subjects, consisting of 200 PD and 200 race-, gender- and age-matched controls, were included. Genotyping of a functional A(2A) genetic variant was carried out under optimised conditions. Information on the quantity and duration of coffee and tea intake was taken from every study subject. A multivariate regression analysis of the various studied variables was carried out. The method of variable selection used was a forward stepwise approach with variable entry and exit criteria of 0.05 and 0.10.

**Results:** A multivariate analysis of the covariates including A(2A) genotypes, age of onset, gender, race and the quantity of tea and coffee interaction of genotype and coffee, interaction of genotype and tea was carried out. Only coffee intake was found significantly associated with PD ( $P < 0.0005$ , OR = 0.922, 95% CI: 0.881, 0.964). However, there was no significant interaction of the A(2A) genotypes with coffee and tea intake with risk of PD.

**Conclusion:** We confirmed a dose-dependent protective effect of coffee intake in PD but this was independent of the A(2A) genotype, suggesting that the protective mechanism of caffeine in PD may be different from other caffeine-induced neurologic syndromes.

**MP350**

**Vertebrae Adjacent to Spinal Bone Lesion are Inconsistent Reference Markers: a Magnetic Resonance Spectroscopic Viewpoint**

**H RUMPEL<sup>1</sup>, LL CHAN<sup>1</sup>, LP CHAN<sup>1</sup>**

<sup>1</sup>*Diagnostic Radiology, Singapore General Hospital, Singapore*

**Aim:** Distinguishing vertebral body compression fractures due to underlying tumour infiltration (malignant) from underlying bone weakening (e.g., osteoporosis) and/or minor trauma (benign) depends on the magnetic resonance

(MR) image contrast. This involves comparison of the MR appearances of the affected vertebra to the adjacent (reference) vertebrae. This may sometimes be difficult as the MR characteristics of the reference vertebrae are a priori unknown.

**Methods:** We present a study of vertebral body fractures examined by MR spectroscopy. There were 25 patients (10 male, 15 female; aged 19 to 81 years) examined.

**Results:** There were consistent water-only patterns in the fractured vertebra suggesting either near complete marrow replacement by malignant tissue or local oedematous fluid/haemorrhage within the marrow spaces in benign fractures. However, the adjacent vertebrae showed a wide range of patterns: from a dominant lipid signal to the inverse of a pronounced water level. Specifically, the analysis of the MR data yielded lipid fractions [lipid/(lipid + water)] in a tight range of 0 to 0.12 in cases of fractured vertebrae, whilst a range as widespread as 0.30 to 0.82 was found in the reference vertebrae.

**Conclusion:** These results far exceed the normal variation expected based on age and sex, and suggest that using the adjacent vertebrae as a reference may not be accurate, especially for diffusion-weighted imaging. MR spectroscopy provides useful adjunctive information of not only the compressed vertebra, but also the adjacent bony environment.

### MP351

#### Demographics of Adverse Drug Reactions in Singapore

##### R PONAMPALAM<sup>1</sup>

<sup>1</sup>Emergency Medicine, Singapore General Hospital, Singapore

**Aim:** Adverse drug reactions (ADRs) are common clinical problems. This study aims to explore the demographics of ADRs in Singapore.

**Methods:** A prospective observational study over 2 years (2001 and 2002) collating data on ADRs in patients presenting to the Emergency Departments of 2 public hospitals. Patients with ADRs were identified on presentation to the Emergency Department and prescribed survey forms filled by their attending physicians.

**Results:** There were 1353 ADRs reported over the 2-year study period. Of these, 294 (21.7%) cases involved type A ADRs (side effects of medications) and the rest, type B ADRs (allergic type reactions). Most affected were females (52.8%) and the mean age was 38.58 (SD ± 18.18). Medications involved included analgesics (33.9%), antibiotics (20%), cough and cold preparations (4.2%), gastrointestinal medications (6.1%), traditional medicines (5.7%) and others. Most patients were treated as outpatients (74.6%). Of the remaining, 23.9% were admitted and 1.5% discharged against doctors' advice. Of those who were admitted, 12 required intensive care (3.7%) and 4 high-dependency care (1.2%).

**Conclusion:** ADRs are significant problems affecting the younger, economically active population. The proportion of type A reactions in our study appear to be lesser compared to published reports.

### MP352

#### Adverse Drug Reactions to Intravenous N-acetylcystein (NAC)

##### R PONAMPALAM<sup>1</sup>

<sup>1</sup>Emergency Medicine, Singapore General Hospital, Singapore

**Aim:** N-acetylcystein (NAC) is beneficial in the therapy of paracetamol poisoning. This study examines the risk factors for development of adverse drug reactions (ADR) to NAC.

**Methods:** A retrospective review of patients admitted with paracetamol poisoning over a 4-year period was conducted. Demographic data of patients who were treated with NAC were recorded and hospital records reviewed.

**Results:** There were 609 cases of paracetamol poisonings. Of these patients, 412 (67.6%) received NAC and 71 patients (17.2%) developed ADR. The ADR occurred at a mean delay of 88.6 minutes from start of NAC infusion. Common reactions included nausea (2.8%), vomiting (5.6%), rash (78.9%), flushing (14.1%), pruritis (36.6%), breathlessness (7%), bronchospasm (4.2%) and angioedema (5.6%). The main determinant for developing ADR was a history of asthma or a positive history of drug allergies (21.2%

compared to 16.9%). Contrary to published reports, it was found that patients receiving the initial bolus of NAC over 15 minutes as per guidelines were less affected by ADR compared to the slower infusions (16.3% compared to 18%).

**Conclusion:** ADRs to NAC are quite common but fortunately, potentially life-threatening reactions are uncommon. It is now possible to predict some risk factors for development of ADR.

### MP353

#### Epidemiology of Paracetamol Poisonings Presenting to a Tertiary Care Hospital in Singapore

##### R PONAMPALAM<sup>1</sup>

<sup>1</sup>Emergency Medicine, Singapore General Hospital, Singapore

**Aim:** This study looks at the epidemiology of paracetamol poisoning and its toxicity through a review of cases presenting at Singapore General Hospital.

**Methods:** A retrospective review of patients with paracetamol poisoning was conducted for a 3-year period. Patients were identified from hospital computer databases using the ICD diagnosis code for poisoning with antipyretics and analgesics and their records reviewed.

**Results:** There were 490 cases of paracetamol overdose identified. Most patients were females (75.8%), with mean age of 28.1 years. The commonest cause for overdose was intentional (68.3%). The time delay in seeking treatment at the Emergency Department (ED) averaged 7.25 hrs, with 9.9% presenting within 60 min and 95.9% presenting within 24 hours. The mean dose of ingestion was 202 mg/kg/body weight. The proportion of patients developing liver dysfunction was 2.9% while those with renal dysfunction was 9.2%.

**Conclusion:** Of the 56% of patients who took a hepatotoxic dose, only a small minority developed hepatic dysfunction. A larger proportion of these individuals develop renal dysfunction compared to liver dysfunction. Further studies need to be done locally to look into the differences in renal and liver toxicity in Asian communities.

### MP354

#### Implementation of a Simple Insulin Infusion Protocol in a Surgical Intensive Care Unit

##### YM BEE<sup>1</sup>, JYY NGEOW<sup>1</sup>, SY GOH<sup>1</sup>, J TRAN<sup>1</sup>, HL CHEE<sup>2</sup>, PHK ENG<sup>1</sup>

<sup>1</sup>Endocrinology, <sup>2</sup>Anaesthesia and Surgical Intensive Care, Singapore General Hospital, Singapore

**Aim:** Hyperglycaemia and insulin resistance are common in critically ill patients, even if they have not previously had diabetes. Randomised controlled trials have shown that tight glycaemic control in critically ill patients resulted in improved clinical outcome. These protocols unfortunately tend to be difficult to follow and involved complicated calculations. A pilot study was carried out in our surgical intensive care unit (SICU) to implement a relatively simple nurse-implemented insulin infusion protocol (IIP). We report on the effectiveness and safety of the IIP.

**Methods:** In this prospective study, patients admitted to the SICU and found to have capillary blood glucose levels of >9.0 mmol/L were put on a nurse-implemented IIP. Detailed insulin dosing instructions were provided in the protocol and minimal physician input was required. Blood glucose levels were the primary outcome measurement.

**Results:** Our IIP was employed 20 times in 18 patients. Five patients had known diabetes. The median time to reach target blood glucose level (6.0-9.0 mmol/L) was 4.5 hours. Once blood glucose fell below 9.0 mmol/L, 56.6% of all blood glucose measurements fell within our target range; and 85.3% were within a "clinically acceptable" range of 4.4 to 11.1 mmol/L. The median duration of insulin infusion was 50 hours. Only 4 (0.7%) blood glucose values were <4.0 mmol/L.

**Conclusion:** This pilot study showed that our IIP is effective and safe in improving glycaemic control in critically ill patients with a very low incidence of hypoglycaemia and with a vast majority of glucose measurements within the clinically acceptable range.

**MP355**

**Clinical Course of Hepatocellular Carcinoma in Patients after Seroclearance of HBsAg – A Cause for Concern**

**J CHANG<sup>1</sup>, WC ONG<sup>1</sup>, CK TAN<sup>1</sup>**

<sup>1</sup>Gastroenterology, Singapore General Hospital, Singapore

**Aim:** To examine differences in clinical characteristics between hepatocellular carcinoma (HCC) in post-HBsAg seroclearance and in HBsAg-positive patients.

**Methods:** The study population comprised 638 HCC patients seen in our department from 1988 to 1997. Of these, there were 97 patients negative for HBsAg but with serological evidence of prior hepatitis B infection i.e., post-HBsAg seroclearance (group A) and 344 HBsAg-positive patients (group B). Clinical and tumour characteristics at presentation and survival were compared between the 2 groups.

**Results:** In group A, 93.8% of patients was  $\leq 45$  years old compared to 82.0% in group B ( $P = 0.004$ ). In both groups, the majority were male. There was no significant difference in ethnicity. Child-Pugh score at diagnosis was comparable in both groups. In group A, 14.6% had normal AFP levels (10  $\mu\text{g/L}$ ) compared to 9.9% in group B ( $P = 0.198$ ) and median serum AFP was similar. There were no significant differences in TNM stage, portal vein invasion and presence of extrahepatic spread. Kaplan-Meier survival analysis showed no significant difference in survival ( $P = 0.75$ ).

**Conclusion:** Patients who develop HCC after HBsAg seroconversion present at a later age compared to HBsAg-positive carriers. However, the severity of underlying liver disease, extent of HCC and survival do not differ significantly from HBsAg-positive patients. Hence, patients with chronic hepatitis B infection who achieved seroclearance with loss of HBsAg should remain in a surveillance programme for HCC, just like their HBsAg-positive counterparts.

**MP356**

**Clinical Characteristics of Patients with Fatty Liver in a Tertiary Gastroenterology Unit in Singapore**

**R CHOWDHARY<sup>1</sup>, G KUMAR<sup>1</sup>, SM YUEN<sup>1</sup>, LF LING<sup>1</sup>, WC CHOW<sup>1</sup>**

<sup>1</sup>Gastroenterology, Singapore General Hospital, Singapore

**Aim:** The aim of the study was to define the epidemiologic profile, anthropometric features, and other clinical characteristics in patients with fatty liver.

**Methods:** Cross-sectional study over 1 month in September 2003. Patients attending the Gastroenterology Outpatient Clinic, Singapore General Hospital, were reviewed by medical officers. Diagnoses of fatty liver were based on imaging findings  $\pm$  liver biopsy. Patients identified were clinically examined. Body mass index (BMI) and waist-hip ratio (WHR) of each patient were derived from anthropometric measurements.

**Results:** One hundred and thirty-one patients – 94 males and 37 females. The age (mean) of males and females were 48 (S.D. 12.3) and 51 (S.D. 9.5) years. Mean BMI of the males and females were 26.6 and 26.2, their corresponding WHR 0.90 and 0.83. 20 patients had diabetes, 67 had chronic hepatitis B and 3 had chronic hepatitis C infection.

**Conclusion:** Fatty liver is not a female-predominant disease. The females had higher WHR relative to the recommended upper limit, there was no difference in BMI between the males and females and both exceeded BMI of 25 by a small margin.

**MP357**

**Natural History of Chronic Hepatitis B Virus Infection (CHBVI) in Pregnant Females**

**HH TAN<sup>1</sup>, WC CHOW<sup>1</sup>**

<sup>1</sup>Gastroenterology, Singapore General Hospital, Singapore

**Aim:** To study the natural history of CHBVI in pregnant and peripartum females who were followed up at the department in the past 5 years.

**Methods:** Clinical and laboratory data of pregnant females with CHBVI who

were seen in the department between 2000 and 2004 were studied retrospectively. Their clinical progress was documented up to 6 months postpartum. Clinical progress were observed in age-, and HBe status-matched, non-pregnant, female patients with CHBVI, who were randomly selected from the department's CHBVI registry as controls (ratio 1:4), over a 1-year period.

**Results:** A total of 19 pregnant patients and 76 controls were studied. Mean age of patients  $31.1 \pm 4.3$  years. Majority (68%) presented during pregnancy itself, mostly in the second trimester. Most patients came for review either on advice by their primary physicians or as part of their regular follow-up. Majority (63%) were positive for HBe antigen (HBeAg) at time of presentation. 13/19 (68%) patients had a clinical event (i.e., alanine transferase [ALT] elevation, loss of HBeAg or decompensation) vs 28% among controls ( $P = 0.001$ ). Among HBeAg-positive subjects, more patients (27%) than controls (2%) had resultant HBeAg loss ( $P = 0.003$ ). Among HBeAg-negative subjects, more patients (5/7; 71%) than controls (2/28; 7%) had s.ALT elevation ( $P = 0.001$ ). Overall, more patients had elevated ALT levels than controls, regardless of their HBeAg status. Neither patients nor control subjects decompensated clinically, required liver transplantation or died during the study period.

**Conclusion:** Pregnancy is associated with s.ALT elevation and/or HBeAg loss in mothers with CHBVI in the peripartum period.

**MP358**

**Acute Exacerbation of Chronic Hepatitis B (AECHB) Post-hepatic Resection for Hepatocellular Carcinoma (HCC)**

**K THIA<sup>1</sup>, HF LUI<sup>1</sup>, A CHUNG<sup>2</sup>, P CHOW<sup>2</sup>, L OOF<sup>2</sup>, WC CHOW<sup>1</sup>**

<sup>1</sup>Gastroenterology, <sup>2</sup>General Surgery, Singapore General Hospital, Singapore

**Aim:** To better understand the incidence, outcomes and risk factors of AECHB post-hepatic resection, a retrospective review of consecutive HBsAg-positive patients who underwent liver resection for hepatocellular carcinoma was conducted in our centre between January 2002 and December 2004

**Methods:** The following data were systematically collected and analysed: (i) baseline demographic, biochemical, virological and surgical characteristics, (ii) incidence of postoperative hepatitis (i.e., ALT  $> 2x$  baseline or ALT  $> 200$  IU/L between 2 and 24 weeks post-resection) and HBV flares (i.e. postoperative hepatitis associated with detectable HBV DNA), (iii) survival post-surgery and tumour recurrence rate. All results are expressed as median unless otherwise stated.

**Results:** Seventy-seven patients (87% male), aged (mean)  $58.0 \pm 12.1$  years, underwent 82 liver resections (70% segmentectomy, 30% hemi-hepatectomy). Twenty-one (26%) and 7 (9%) had postoperative hepatitis and HBV flares, with peak ALTs of 231.0 and 312 IU/l observed at days 85 and 84 post-resection, respectively. Hepatic decompensation was more frequent and more severe in postoperative hepatitis arising from HBV flare than non-HBV flare related postoperative hepatitis (incidence 86% vs 43%,  $P = 0.16$ ; peak bilirubin 322.0 vs 42.5  $\mu\text{mol/L}$ ,  $P = 0.046$ ; peak PT 19.5 vs 14.2 seconds,  $P = 0.38$ ). One- and 2-year survival rates for non-postoperative hepatitis group were 80.6% and 66.2%; vs postoperative hepatitis group 54.3% and 45.2% ( $P < 0.005$ ) vs HBV flare group 42.9% and 21.4% ( $P < 0.001$ ) respectively. Neither postoperative hepatitis nor HBV flare resulted in higher HCC recurrence. Preoperative ALT  $> 100$  IU/L was the only risk factor for postoperative hepatitis but not for HBV flare.

**Conclusion:** HBV flare, or AECHB, occurred in 9% of HBsAg-positive patients who underwent liver resection and was associated with poorer outcome.

**MP359**

**Fatal Acute Hepatic Failure Occurring in a Hepatitis B Carrier with Chronic Myeloid Leukaemia Treated with Imatinib Mesylate**

**K THIA<sup>1</sup>, HH TAN<sup>1</sup>, CTH CHUAH<sup>2</sup>, WM YAP<sup>3</sup>, WC CHOW<sup>1</sup>, HF LUI<sup>1</sup>**

<sup>1</sup>Gastroenterology, <sup>2</sup>Haematology, <sup>3</sup>Pathology, Singapore General Hospital, Singapore

**Aim:** Imatinib mesylate is widely used for the treatment of gastrointestinal stromal tumours and chronic myeloid leukaemia (CML).

**Methods:** We report a case of imatinib-induced acute liver failure.

**Results:** Mr CHH, 45-year-old Chinese with CML, chronic phase, and chronic hepatitis B virus (HBV) infection, was commenced on imatinib 400 mg om from December 2004. He was HBeAg negative, Anti-HBe antibody positive, HBV DNA 309,692 cop/mL (5.49 log) and Anti-HCV IgG non-reactive. Baseline and recent liver function test were normal. He presented with lethargy, jaundice and fever for 4 days in May 2005. Significant clinical findings were jaundice and herpes simplex labialis. D1 admission labs: ALT 4193U/L, AST 4264U/L, Bil 181umol/L, ALP 151U/L, PT 25.9s, PTT 45.6s. Ultrasound was unremarkable. Hepatic anti-liver failure therapy together with lamivudine and acyclovir were started for possible hepatitis B flare and herpes simplex hepatitis. D3 admission: Patient developed grade II encephalopathy with worsened coagulopathy and liver function. Investigations were negative for HepBcIgM, HAV IgM, HDV antibody, HEV antibody, CMV IgM, EBV IgM, HSV IgM and Leptospira IgM but HBV DNA had increased to >100,000,000 cop/mL (>8 log). Urgent transjugular liver biopsy performed revealed chronic hepatitis with confluent necrosis; immunostaining for HepBsAg, HepBcAg and later for HSV-1 and HSV-2 were negative. MARS therapy was instituted on D4 admission for 2 cycles without improvement and patient demised D8 admission.

**Conclusion:** The pattern of a rapidly deteriorating acute hepatitis together with negative HBV antigen and HSV antigen immunostains on liver biopsy support the diagnosis of imatinib-induced acute liver failure. It highlights the importance of regular monitoring of liver function test in patients on imatinib treatment.

### MP360

#### B-cell Non-Hodgkin's Lymphoma Presenting as Recurrent Cellulitis and Myositis of the Lower Limb: a Case Report

**T AHMAD<sup>1</sup>, YLS MING<sup>1</sup>, SK SURRUN<sup>2</sup>**

<sup>1</sup>Haematology, <sup>2</sup>Internal Medicine, Singapore General Hospital, Singapore

**Introduction:** The majority of cases of cellulitis usually run a benign course with the appropriate antibiotics. However, occasionally a sinister underlying condition may masquerade as cellulitis.

**Case History:** A 47-year-old Chinese woman was admitted for an initial episode of cellulitis of the left leg where she previously operated for varicose veins. The condition initially improved with antibiotics, but residual swelling persisted. After discharge, she sought traditional Chinese medication and therapy during which nicks were made in the skin and blood vessels of the affected limb. As the condition deteriorated, she was re-admitted for a second episode of cellulitis 3 weeks later. The X-rays showed erosion of the lower end of the tibia that was diagnosed as osteomyelitis. She then had severe myositis needing debridement and eventual above-knee amputation due to uncontrolled pseudomonas sepsis. The final histopathology report revealed a diffuse large B-cell non-Hodgkin's lymphoma (NHL) involving the bone and adjacent tissues. CAT scan of the thorax and abdomen revealed lymphadenopathy involving the left retrocrural region and pelvic region. The bone marrow examination was normal. She was finally diagnosed to have stage IV NHL and commenced on chemotherapy comprising of 6 cycles of cyclophosphamide, adriamycin, vincristine, prednisolone and rituximab (R-CHOP).

**Progress:** She is presently completing her final cycles of R-CHOP.

**Conclusion:** To prevent diagnostic pitfalls, detailed investigations are indicated in cases where cellulitis does not improve significantly with initial antibiotics, in cases of abnormal presentations of cellulitis, and for recurrent cellulitis.

### MP361

#### Successful Autologous Haematopoietic Stem Cell Transplants for Severe Multiple Sclerosis with Fludarabine and Cyclophosphamide Conditioning

**Y LOH<sup>1</sup>, R PAVANNI<sup>2</sup>, W HWANG<sup>1</sup>**

<sup>1</sup>Haematology, Singapore General Hospital, Singapore, <sup>2</sup>Neurology, National Neuroscience Institute, Singapore

**Aim:** The pathogenesis of multiple sclerosis (MS) is generally accepted to have an autoimmune basis and thus high-dose immunosuppressive therapy and autologous haematopoietic stem cell transplant (AHSCT) has been employed in severe cases. We aimed to study the feasibility and tolerability AHSCT in the treatment of severe MS in a Singapore centre.

**Methods:** Three patients with secondary progressive MS underwent AHSCT between 2002 and 2003. They were mobilised with cyclophosphamide and subcutaneous G-CSF and peripheral blood stem cells harvested via apheresis to obtain a yield of 12 to 18 x 10<sup>6</sup>/kg CD34. They were conditioned with a unique regimen of fludarabine and cyclophosphamide and CD34-selected or enriched PBSC was re-infused on day 0. The expanded disability status scale (EDSS) were monitored prior to and serially after AHSCT.

**Results:** Neutrophil engraftment occurred in all 3 patients by day +9 and platelet engraftment by day +13 (range d+10 to d+13). Mobilisation or conditioning chemotherapy was complicated by sepsis in all 3 patients, which responded to antibiotics. All 3 patients were surviving at median follow-up of 19.34 months (17.06 to 30.18 months). The patients had EDSS ranging from 3.5 to 9.5 at baseline. There was definite improvement in power of some limbs and the EDSS improved by between 1.0 and 2.5 in the 3 patients from baseline to 18 months post transplant.

**Conclusion:** AHSCT with the FC conditioning regimen was tolerated in these 3 patients and is a feasible modality of treatment of severe MS in Asian patients. It warrants further study in a larger group of patients.

### MP362

#### Incidence and Presentation of Sarcoidosis in Singapore

**SJ ONG<sup>1</sup>, D ANANTHAM<sup>2</sup>, KL CHUAH<sup>3</sup>, A HSU<sup>2</sup>, P ENG<sup>2</sup>**

<sup>1</sup>Haematology, <sup>2</sup>Respiratory and Critical Care Medicine, <sup>3</sup>Pathology, Singapore General Hospital, Singapore

**Aim:** Information about sarcoidosis in Singapore is limited. To report our experience with sarcoidosis in Singapore General Hospital.

**Methods:** Retrospective review of 60 cases of sarcoidosis from 1998 to 2003.

**Results:** The extrapolated national incidence of sarcoidosis is 1.6 per 100,000. Male to female ratio was similar but the former tended to present younger. Overall age of diagnosis had a bimodal distribution with peaks in the 30 to 39 y and the 50 to 59 y groups. The majority were symptomatic, with cough being the commonest presentation. Extra-thoracic manifestations were present in 28.3% including peripheral lymphadenopathy (11.6%), uveitis (10%), erythema nodosum (1.6%) and hepatosplenomegaly (6.7%). 23.3% of patients presented with stage 0 disease; 40% with stage 1, 15% stage 2, 16.7% stage 3 and 15% stage 4. Mean spirometry was normal with FEV1 85.1% and FVC 80.6% of predicted. There were differences between expected and observed frequency of disease among ethnic groups, with 45% Indians and 31.7% Chinese. Latter tended to be asymptomatic but no significant racial differences, however, were noted in extra-thoracic manifestations, radiology or spirometry. In all, 38.3% received systemic steroids while 6.7% were given inhaled steroids. The remainder were managed by observation.

**Conclusion:** This study provides insight on sarcoidosis in Singapore. It shows that the incidence of sarcoidosis is lower in Singapore and fewer patients present with extra-thoracic manifestations. The disproportionately large number of Indian patients suggests a racial predisposition.



**MP363**

**Fulminant EBV-associated NK/T Cell Lymphoproliferative Disorder — The Experience of a Single Institution**

**D TAN<sup>1</sup>, LP KOH<sup>1</sup>, Y LOH<sup>1</sup>, C CHUAH<sup>1</sup>, W HWANG<sup>1</sup>, YT GOH<sup>1</sup>, M KOH<sup>1</sup>**

<sup>1</sup>*Haematology, Singapore General Hospital, Singapore*

**Aim:** We report the clinicopathologic features of 6 patients with fulminant EBV-associated NK/T-cell lymphoproliferative disorder treated between 2002 and 2005 in a single institution, and compare their presenting features, treatment approaches and survival.

**Methods:** This is a retrospective study. Patients were identified from our lymphoma registry and data obtained from pathological reports and attending clinicians.

**Results:** Patients were all Asians with a median age of 38 years. Five had preceding acute URTI and all presented with haemophagocytic syndrome characterised by fever, pancytopenia, liver dysfunction and coagulopathy. No bulky disease or significant lymphadenopathy were found in all patients. In-situ hybridisation for EBV-encoded-early-small-RNA was positive on the neoplastic tissues in all. Five patients demonstrated the NK/T-cell lymphoma, nasal-type phenotype while 1 had peripheral T-cell lymphoma phenotype. EBV anti-VCA IgM was not demonstrated in all patients, implying a lack of humoral response to acute EBV infection. Median survival was 33 days. Two had up-front CHOP chemotherapy regime and 2 had immunosuppression with etoposide, prednisolone and cyclosporin prior to full dose chemotherapy. Although mortality was uniform, those who received immunosuppression first had longer survival.

**Conclusion:** This disorder should be suspected whenever a patient presents with haemophagocytic syndrome. Bone marrow, skin or liver biopsies are vital for its diagnosis as tumour masses are not striking. Important pitfall in diagnosis is the lack of serological evidence. The NK cell phenotype seems to be more common. Immunosuppression may have a role in controlling the cytokine release, which may have a more detrimental effect than the lymphoma initially.

**MP364**

**Amifostine Cytoprotection in Patients with Haematologic Malignancies Receiving High-dose Chemotherapy**

**GC WONG<sup>1</sup>, C WONG<sup>1</sup>, LH LEE<sup>1</sup>**

<sup>1</sup>*Haematology, Singapore General Hospital, Singapore*

**Aim:** High-dose chemotherapy for haematologic malignancies is associated with significant haematologic and non-haematologic toxicities. Amifostine may selectively protect normal tissues. This study aims to evaluate if amifostine can reduce such toxicities associated with high-dose cytarabine (HiDAC) for relapsed acute myeloid leukaemia (AML) patients and DHAP chemotherapy for relapsed non-Hodgkin's lymphoma (NHL) patients.

**Methods:** Relapsed AML patients received HiDAC 2 g/m<sup>2</sup> iv 12 hourly X 5 days. Amifostine 500 mg iv over 15 mins was given 30 mins before each Ara-C dose. Relapsed NHL patients received DHAP (dexamethasone 40 mg iv days 1-4, Ara-C 2 g/m<sup>2</sup> iv 12 hourly day 2, cisplatin 100 mg/m<sup>2</sup> iv CI day 1). Amifostine 500 mg iv over 15 mins was given 30 mins before first dose of Ara-C and cisplatin. Neutropenic duration, days of GCSF required, episodes of fever, infection, bleeding, mucositis, packed cell and platelet transfusions, renal and liver function were documented. These were compared to historical controls to determine if amifostine decreased toxicities.

**Results:** Relapsed NHL patients: 42 patients/episodes of DHAP/amifostine were compared to controls with DHAP only. DHAP/amifostine patients had significantly less platelet transfusions compared to DHAP only patients (35.7% vs 81.3%,  $P = 0.002$ ). Mucositis incidence was significantly less in the amifostine group (0% vs 12.5%,  $P = 0.020$ ). Relapsed AML patients: In 23 patient/episodes with HiDAC/amifostine, bleeding incidence was significantly lower compared to controls (17.4% vs 56.5%,  $P = 0.006$ ). All other parameters evaluated were not different between the amifostine groups and controls.

**Conclusion:** Amifostine significantly reduced mucositis incidence and platelet transfusions in relapsed NHL patients receiving DHAP chemotherapy. Amifostine also significantly reduced bleeding incidence in relapsed AML patients receiving HiDAC.

**MP365**

**Multilocus Variable-number Tandem-repeat Analysis (MLVA) for Typing of Methicillin-resistant *Staphylococcus Aureus* in Singapore**

**LY HSU<sup>1</sup>, N LOOMBA CHLEBICKA<sup>2</sup>, YL KOH<sup>1</sup>, TY TAN<sup>3</sup>, RTP LIN<sup>4</sup>, P KRISHNAN<sup>5</sup>, T BARKHAM<sup>5</sup>**

<sup>1</sup>*Internal Medicine, Singapore General Hospital, Singapore*, <sup>2</sup>*Institution Review Board, NHG College, India*, <sup>3</sup>*Microbiology, Changi General Hospital, Singapore*, <sup>4</sup>*Laboratory Medicine, National University Hospital, Singapore*, <sup>5</sup>*Laboratory Medicine, Tan Tock Seng Hospital, Singapore*

**Aim:** Molecular typing of bacteria is an integral component of outbreak and routine epidemiological surveillance. The gold standard for typing of methicillin-resistant *Staphylococcus aureus* (MRSA) is pulsed-field gel electrophoresis (PFGE). Recently, a PCR-based method of typing *Staphylococcus aureus* was described – multilocus variable-number tandem-repeat analysis (MLVA). We aimed to determine the feasibility of using MLVA as an alternative method for typing MRSA locally.

**Methods:** Clinical MRSA strains isolated in SGH, CGH, TTSH and NUH in May 2005 were collected. PFGE was performed according to a standardised protocol. Gel patterns were normalised and analysed using the Molecular Analyst v6.0 program. Bacterial DNA was extracted and MLVA was performed using published primers and Qiagen Multiplex PCR kits. PCR products were run on 1.5% LE agarose gel. Gel patterns were normalised and analysed using the Molecular Analyst v6.0 program. Comparison of the results of both approaches was done.

**Results:** One hundred and eighty-two MRSA strains were typed. MLVA clusters matched those obtained by PFGE, and each PFGE gel pattern had a corresponding MLVA pattern. Certain isolates with identical PFGE patterns (clonal) had different but related MLVA patterns. This was most apparent in strains from different hospitals.

**Conclusion:** Our results suggested that MLVA had a discriminatory power which was similar if not greater than PFGE. Coupled with advantages over PFGE such as a shorter and less complicated protocol, ease of comparison of results between institutions, and relative availability of PCR thermocyclers in local hospitals, MLVA could be used for molecular typing of MRSA locally.

**MP366**

**Trends in Community-associated MRSA In Singapore: Increasing Numbers and Predominance of ST30 Strains**

**LY HSU<sup>1</sup>, L WJAYA<sup>1</sup>, YL KOH<sup>1</sup>, TY TAN<sup>2</sup>, TH KOH<sup>3</sup>**

<sup>1</sup>*Internal Medicine, Singapore General Hospital, Singapore*, <sup>2</sup>*Microbiology, Changi General Hospital, Singapore*, <sup>3</sup>*Pathology, Singapore General Hospital, Singapore*

**Aim:** We describe the evolutionary trend of community-associated methicillin-resistant *Staphylococcus aureus* (CA-MRSA) in Singapore based on strains isolated in local microbiology laboratories.

**Methods:** We had previously established the profiles of local CA- and healthcare-associated MRSA (HA-MRSA), and determined that susceptibility to ciprofloxacin was the most specific basic criterion for distinguishing between CA-MRSA and HA-MRSA locally. MRSA strains susceptible to ciprofloxacin which had been isolated at local microbiology laboratories were analysed. All strains were typed via pulsed-field gel electrophoresis (PFGE), multilocus sequence typing (MLST), multilocus variable-number tandem-repeat analysis (MLVA) and toxin-profiling according to published methods. Clinical and epidemiological data of patients who had harbored these strains were obtained via chart review.

**Results:** A total of 34 ciprofloxacin-susceptible MRSA strains were isolated

between January 2001 and June 2005, of which 25 were isolated in the period 2004 to 2005. All strains had molecular profiles which differed from known HA-MRSA strains. The majority of strains isolated in the latter period belonged to ST30, which had been infrequently represented from 2001 to 2003. The majority of strains had the Panton-Valentine leukocidin gene, and 85.3% (29 of 34) of cases presented with cutaneous abscesses. In contrast to the earliest cases, no significant travel history was apparent for the majority of patients with CA-MRSA who presented in the past year.

**Conclusion:** CA-MRSA has become established in Singapore, with an increasing number of cases presenting each year. The current predominant strain belongs to ST30, a well known pandemic clonal type. Community-level studies are required to delineate the true extent of the problem.

### MP367

#### A Case of Japanese Encephalitis Acquired in Singapore

**YL KOH<sup>1</sup>, EE OOF, SY SU<sup>3</sup>, LY HSU<sup>1</sup>, A KURUP<sup>1</sup>**

<sup>1</sup>Internal Medicine, Singapore General Hospital, Singapore, <sup>2</sup>Defence Medical & Environmental Research, Singapore, <sup>3</sup>Medicine, NUS – Yong Loo Lin School of Medicine, Singapore

**Aim:** Japanese encephalitis (JE) virus is one of the leading causes of viral encephalitis. Its transmission is linked to irrigated rice production and pig rearing. We describe a case of meningoencephalitis due to JE virus in Singapore to alert clinicians to the possibility of continuing transmission of this virus in this country despite the abolishment of pig farming.

**Methods:** PCR (polymerase chain reaction) carried out on the patient's blood and cerebrospinal fluid (CSF) detected the presence of JE virus. JE-neutralising antibodies were found in the patient's serum.

**Results:** A 53-year-old previously healthy Singaporean Chinese man presented to Singapore General Hospital with a 1-week history of fever and altered mental status. He worked as a lifeguard in a community swimming pool and had not recently travelled out of Singapore. His clinical presentation was consistent with meningoencephalitis. He was febrile and disoriented with a stiff neck. He became progressively more drowsy and developed pinpoint pupils, bradycardia and hypothermia, suggesting brainstem involvement. He eventually required mechanical ventilation in the medical intensive care unit (ICU) for type 2 respiratory failure. Lumbar puncture revealed a CSF white cell count of 192/mm<sup>3</sup>, consisting mostly of lymphocytes. CSF glucose was 2.4 mmol/L, and total protein was 1.5 g/L. CSF investigations were negative for bacteria, fungi, tuberculosis and enterovirus. The patient improved with supportive care and was successfully extubated after 6 days in the ICU.

**Conclusion:** Clinicians should be aware of the possibility of JE virus infection in Singaporean patients presenting with encephalitis even in the absence of travel to areas of high transmission.

### MP368

#### Fulminant Clostridial Necrotising Enterocolitis — A Case Report

**M IBRAHIM<sup>1</sup>, WB LIAN<sup>1</sup>**

<sup>1</sup>Neonatal and Developmental Medicine, Singapore General Hospital, Singapore

**Introduction:** Necrotising enterocolitis (NEC) continues to be among the most severe life-threatening gastrointestinal disease that predominantly affects preterm neonates. A major cause of morbidity and mortality, the manifestation may be insidious, with subtle clinical signs, and the course catastrophic.

**Case Discussion:** We report a rare, fatal case of NEC in a 44-day-old very-low-birthweight infant who presented with a short period of feed intolerance, followed by acute, rapidly progressive abdominal distension. Emergency laparotomy revealed inoperable, irreversible and extensive bowel ischaemia with multiple perforations. Anaerobic blood culture grew *Clostridium perfringens*. Despite maximal supportive care and aggressive treatment with antibiotics, the baby succumbed, as the first, most fulminant case of Clostridial NEC the department has encountered.

**Conclusion:** The presence of *C. perfringens* in blood and peritoneal fluid is

associated with an especially intractable form of NEC with mortality rates reported as high as 78%. Mortality is often inevitable despite consistent monitoring, anticipatory evaluation and rapid therapeutic intervention.

### MP369

#### The Impact of Diagnostic Cerebrospinal Fluid Enterovirus RT-PCR Assay on Clinical Management of Uncomplicated Aseptic Meningitis — A Pilot Study in KK Hospital

**SY LEE<sup>1</sup>, N TEE<sup>2</sup>**

<sup>1</sup>Neonatology and Developmental Medicine, Singapore General Hospital, Singapore, <sup>2</sup>Laboratory, KK Women's & Children's Hospital, Singapore

**Aim:** CSF enterovirus reverse transcriptase polymerase chain reaction (EV RT-PCR) assay may help streamline diagnosis and treatment of viral meningitis, thus saving costs. The impact of this assay on the management of aseptic meningitis in our local paediatric patients was studied.

**Method:** Retrospective review of records of uncomplicated (i.e., no neurological deficits) aseptic meningitis cases admitted to KKWCH paediatric unit, in the year 2004. Cases were extracted from laboratory records of patients with CSF pleocytosis and negative CSF cultures. A total of 35 cases identified, divided into 3 groups: PCR+ve, PCR-ve and no-PCR, and compared for outcome measures as shown in the table.

**Results:** Results for no-PCR, PCR+ve and PCR-ve: LOS (days) – 4.4 (SD 1.3), 4.8 (SD 1.2), 4.3 (SD 1.2); antibiotic duration (days) – 3.9 (SD 1.1), 4.2 (SD 0.8), 4.2 (SD 0.8); hospital costs (\$) – 2052 (SD 463), 2427 (SD 740), 2176 (SD 590). Not all PCR+ve patients had antibiotics discontinued. However, the likelihood of stopping antibiotics despite fever, was higher in the PCR+ve group (29%) vs PCR-ve group (5%).

**Conclusion:** Duration of antibiotic use is shorter in the PCR+ve group, but we cannot exclude chance causing the difference, due to a small sample size. LOS was comparable among the 3 groups, possibly due to the current practice of discharging patients only when they deferverse. LOS usually determines the eventual hospitalisation service costs. Hence, minimal costs savings was demonstrated in the PCR+ve group. An evidence-based review to consider early discharge of EV PCR+ve uncomplicated meningitis should be considered.

### MP370

#### The Role of IGFBP7 in TNF-alpha-induced Inflammation in Human Microvascular Endothelial Cells

**Y SHEN<sup>1</sup>, LL TAN<sup>2</sup>, SK TAY<sup>1</sup>, R SU<sup>1</sup>, MC WONG<sup>2</sup>**

<sup>1</sup>Obstetrics and Gynaecology, Singapore General Hospital, Singapore, <sup>2</sup>Neurology, National Neuroscience Institute, Singapore

**Aim:** Endothelial dysfunction is a major feature of cerebrovascular and cardiovascular diseases with inflammation playing a central role. Pro-inflammatory cytokine TNF-alpha increases expression of endothelial cell adhesion molecules (ECAMs). IGFBP7, 1 of the ECAMs, is readily up-regulated in inflamed vessels in vivo, and also in vitro in response to TNF-alpha, indicating that IGFBP7 plays an important roles in endothelial cell inflammatory response. However, the role and mechanism of IGFBP7 in TNF-alpha induced inflammation is unclear. Our aim is to explore the function of IGFBP7 in inflamed human microvascular endothelial cells (HMVEC).

**Methods:** The objectives have been accomplished by combined approaches of RNA interference (siRNA), Western blot, GeneChip microarray and real-time RT-PCR.

**Results:** IGFBP7 was successfully knocked down in human microvascular endothelial cell by siRNA technique. We confirmed the knockdown effect by real-time PCR at mRNA level and Western blot at protein level. The signal transduction pathways of IGFBP7 in TNF-alpha treated and non-treated endothelial cells were further studied by microarray and the results were confirmed by real-time PCR.

**Conclusion:** The networks of molecular pathways modulated by IGFBP7 in TNF-alpha treated and non-treated endothelial cells have been determined in vitro. This may potentially provide new diagnostic and therapeutic insights.

MP371

**The Utility of Liver Function Tests in Dengue**

**MZ WONG<sup>1</sup>, E SHEN<sup>2</sup>**

<sup>1</sup>Orthopaedic Surgery, Singapore General Hospital, Singapore, <sup>2</sup>Medicine, Alexandra Hospital, Singapore

**Aim:** Dengue infection is endemic in Singapore and causes significant morbidity in adults. It may result in hepatic injury and rarely presents as acute hepatitis. This study aims to assess the derangement of liver function tests in dengue and its utility in diagnosis and prediction of disease severity.

**Method:** Biochemical results of 137 serologically confirmed dengue cases diagnosed at Alexandra Hospital between November 2003 and November 2004 were retrospectively analysed.

**Results:** One hundred and six patients had dengue fever, with an additional 31 patients classified as having dengue haemorrhagic fever. An average of 1.7 liver function tests were performed for each patient. Abnormal levels of aspartate aminotransferase (AST), alanine aminotransferase (ALT), bilirubin, alkaline phosphatase, and gamma-glutamyl transpeptidase (G-GT) were observed in 89.8%, 71.9%, 7.0%, 5.5% and 32.8% of the patients, respectively. The elevation of transaminases was 10-fold greater than the normal upper limit for AST and ALT in 10.2% and 9.4% of the patients, respectively. These patients were more likely to have secondary dengue or associated episodes of bleeding. Liver function tests returned to normal within 3 weeks of illness. Hepatomegaly was present in 17 patients (12.4%). None of the patients in this series had clinical jaundice or liver failure. Hepatitis serology testing was negative in 15 patients who were tested.

**Conclusion:** Liver function tests are frequently performed in patients with suspected dengue fever. Transient transaminase elevation is common and may help in diagnosis. Further investigations such as hepatitis serology should be performed only if clinically indicated.

MP372

**Antibiotic Susceptibility Pattern of *Neisseria meningitidis* Strains Isolated from Patients Attending a Clinic for Sexually Transmitted Infections**

**C NGAN<sup>1</sup>, SW HUANG<sup>1</sup>, R CHAN<sup>2</sup>**

<sup>1</sup>Pathology, Singapore General Hospital, Singapore, <sup>2</sup>Dermatology, National Skin Centre, Singapore

**Aim:** To study the susceptibility pattern of *N. meningitidis* isolates to penicillin, ceftriaxone, rifampicin, trimethoprim/sulfamethoxazole (TMP/SMX) and ciprofloxacin.

**Methods:** Forty-six strains of *N. meningitidis* were analysed. These have been incidentally isolated from throat swab samples submitted for the isolation of *Neisseria gonorrhoeae*. The strains were confirmed to be *N. meningitidis* using the apiNH (bioMérieux) bacteria identification system. Antibiotic susceptibility testing was performed using the Etest method for minimum inhibitory concentration (MIC) determination.

**Results:** All the strains were susceptible at very low MICs to ciprofloxacin (MIC<sub>90</sub> ≤ 0.006 µg/mL) and ceftriaxone (MIC<sub>90</sub> ≤ 0.003 µg/mL). These were also susceptible to rifampicin (MIC<sub>90</sub> ≤ 0.094 µg/mL). Thirty-six per cent (n = 17) of the isolates were relatively resistant to penicillin (MIC ≥ 0.125 µg/mL). There were no β-lactamase-producing strains. Seventy-six per cent (n = 35) of the isolates were susceptible to TMP/SMX.

**Conclusion:** Strains of *N. meningitidis* with decreased susceptibility to penicillin (MIC > 0.16-1.28 mg/mL) have been described worldwide, but frequency varies widely. In Spain, the incidence was 67% in 1996 whilst in the Netherlands, it is still 2%. The reduced susceptibility rate for penicillin (36%) in Singapore is moderately high. The clinical importance of infection with strains that have a reduced susceptibility to penicillin is unclear because treatment with high doses has been reported to be successful. Ceftriaxone, used in the treatment of acute bacterial meningitis, remains highly effective. There is also uniform susceptibility to ciprofloxacin and rifampicin, used in the prophylactic treatment of close contacts of index cases. The susceptibility results for TMP/SMX precludes its use.

MP373

**Survey of Hantavirus Infection in Occupational Risk Groups in Singapore**

**LLE OON<sup>1</sup>, PW KWEK<sup>1</sup>, JA COMER<sup>2</sup>, PE ROLLIN<sup>2</sup>, TG KSIAZEK<sup>2</sup>**

<sup>1</sup>Pathology, Singapore General Hospital, Singapore, <sup>2</sup>National Center of Infectious Diseases/Viral and Rickettsial Diseases/Special Pathogens Branch, Centers for Disease Control and Prevention, Atlanta, USA

**Aim:** Reports of hantavirus infection are rare in Singapore despite the presence of domestic rats that carry the Seoul virus. A serological survey for the prevalence of Seoul virus infection in Singapore was therefore conducted on selected occupational groups whose jobs place them at risk of contracting the virus from rodents.

**Methods:** A total of 1792 serum samples from 1112 individuals were included in this study. The individuals included 42.7% turf club workers, 37.2% abattoir workers, 9.4% pig and meat inspectors, 5.6% zoo-workers, and the rest worked in animal-related occupations or in the laboratory. Seoul virus IgG was measured using an in-house enzyme immunoassay (EIA), and positive results were confirmed by the plaque reduction neutralisation test (PRNT) conducted in biosafety level-3 laboratory conditions. In addition, samples that were positive for Seoul virus IgG were also tested for the presence IgG antibodies of 3 other hantaviruses, as well as for Seoul virus IgM by EIA.

**Results:** The study found 6 workers (0.54%) with IgG antibodies to Seoul virus, as confirmed by PRNT. These 6 workers were negative for Seoul virus IgM, and paired sera for 4 out of the 6 persons showed standing titres for both EIA and PRNT, indicating past infection. Of these 6 positive workers, 3 were abattoir workers and 2 were turf club workers.

**Conclusion:** The study suggests that workers in Singapore whose occupations bring them into contact with rodents are at risk of hantavirus infection. Precautions are therefore necessary to avoid contact with rodents and their excreta.

MP374

**Outcomes of Critically Ill Patients (CIP) with Gram-negative Respiratory Tract Infections (GNRTI)**

**A KWA<sup>1</sup>, J LOW<sup>2</sup>, A KURUP<sup>2</sup>**

<sup>1</sup>Pharmacy, <sup>2</sup>Internal Medicine, Singapore General Hospital, Singapore

**Aim:** To assess the outcomes and prognostic indicators in CIP with documented GNRTI.

**Methods:** Seventy-three CIP treated for GNRTI were evaluated retrospectively. Demographics, baseline APACHE 2 scores (A2S), infections due to multidrug-resistant (MDR) pathogens (defined as resistance to all agents tested except for aminoglycosides and polymyxins), adequate empiric (first 24 h) therapy were examined in relation to infectious disease-related mortality (IDRM), clinical/microbiological cure, and duration of positive culture. Breakpoint was determined by classification and regression tree analysis; logistic regression and Kaplan-Meier survival analysis were used for statistical analysis.

**Results:** Forty-eight males and 25 females were studied. The mean age and A2S were 63.2 ± 14.5 years and 20.8 ± 7.6, respectively. Twenty-nine were infected with MDR pathogens. IDRM was associated with A2S [odds ratio (OR) 1.12; 95% confidence interval (CI) 1.02-1.23, P = 0.02]; CIP with A2S ≥ 26 (the most significant breakpoint) were 4.9 times more likely to result in IDRM (95% CI 1.15-20.88, P = 0.03). Infections caused by MDR pathogens were associated with a lower likelihood of adequate empiric therapy (OR 0.05; 95% CI 0.01-0.24, P < 0.001), clinical cure (OR 0.36; 95% CI 0.13-1.00, P = 0.05) and microbiological cure (OR 0.36; 95% CI 0.12-1.09, P = 0.07). Inadequate empiric therapy was associated with a longer duration of positive culture (median duration: 12 vs 7 days, P = 0.03). GNRTI due to *Acinetobacter baumannii* was associated with a lower likelihood of microbiological cure (OR 0.26; 95% CI 0.08-0.81, P < 0.02).

**Conclusion:** A2S ≥ 26 was associated with a higher rate of IDRM. Inadequate empiric therapy was often seen with MDR pathogens. There were statistical trends suggesting that various outcomes might be less favourable with MDR GNRTI. Further studies are needed.

## MP375

**Independent Predictors for Active *Stenotrophomonas maltophilia* Infections**A KWA<sup>1</sup>, TP LIM<sup>1</sup>, SK TAN<sup>1</sup>, J LOW<sup>2</sup>, A KURUP<sup>2</sup><sup>1</sup>Pharmacy, <sup>2</sup>Internal Medicine, Singapore General Hospital, Singapore**Aim:** Independent predictors (IP) for active *Stenotrophomonas maltophilia* (SM) infections.**Methods:** SM is emerging as an important source of nosocomial infections. SM, often being part of a polymicrobial culture, results in a dilemma if treatment is needed. We study the risk factors for SM infections, and hence, identify the IP for active SM infections (ASMI).**Results:** A retrospective review of 110 patients with cultures of SM in a 1-year period between 1 January and 31 December 2003 was performed. Potential risk factors were identified by univariate analysis via Pearson chi-square and analysed by multivariate analysis via logistic regression to determine IP for ASMI. ASMI was diagnosed after clinical assessment by an infectious diseases physician.**Conclusion:** Admission to intensive care units, presence of haematological malignancies, presence of indwelling catheters (central venous lines, arterial lines, urinary catheters), duration of antibiotics use prior to positive SM culture >14 days, use of broad spectrum antibiotics prior to positive SM culture, use of carbapenem prior to positive SM culture are identified as significant RF [p7 days odds ratio (OR) 15.8; 95% confidence interval (CI) 3.2-76.9,  $P = 0.001$ ], use of carbapenems prior to positive SM culture (OR 26.9; 95% CI 5.3-136.3,  $P < 0.0001$ ) and presence of renal diseases (OR 0.2; 95% CI 0.42-0.941,  $P = 0.042$ ) were identified as the IP for SM infections.

## MP376

**Outpatient Antibiotic Therapy (OPAT)—Our Singapore General Hospital Experience**W LEE<sup>1</sup>, J LIM<sup>2</sup>, BH TAN<sup>3</sup><sup>1</sup>Pharmacy, <sup>2</sup>Nursing, <sup>3</sup>Internal Medicine, Singapore General Hospital, Singapore**Aim:** To report the efficacy and safety outcomes of the OPAT service in the SGH since June 2003.**Methods:** Medical records of all patients on OPAT between June 2003 and March 2005 were reviewed. Patients' general demographics, types of infections, laboratory markers and antibiotic therapy were collected. Outcome measures were microbiological eradication (ME), clinical signs of improvement, number of adverse events (AE) and patients' daily cost savings.**Results:** Eighty patients (90 OPAT courses) were reviewed. Mean and median age were  $49.3 \pm 16.6$  years and 51 years respectively. Bone/joints was the most common site of infection (32.2%). The most frequent type of infection was abscesses (16.7%), followed by osteomyelitis (15.6%) and melioidosis (8.9%). Gram-positive bacteria were more common (54.0%) than gram-negative bacteria (29.9%). The more common antibiotics were vancomycin (25.6%) and cephalosporins (45.6%). The mean total length of antibiotic therapy was  $31.2 \pm 18.5$  days, of which, approximately 64.1% were completed on OPAT ( $20.0 \pm 15.0$  days). 91.1% of 82 evaluable OPAT cases achieved ME presumably while clinical improvement was documented in 83 (92.2%) cases. Eleven (12.2%) cases developed AE, with leukopenia (54.5%) being the most common complication. Rehospitalisation was required for 18 (20%) cases due infection relapse (38.9%), complication relating to therapy (33.3%) and others (27.8%) such as falls. Cost savings of up to S\$227.00/day were attained.**Conclusion:** OPAT provides an alternative to hospitalisation for stable patients who require prolonged antibiotic treatment. All criteria should be met before patients enter OPAT. Regular monitoring of patients' outcomes and satisfaction level is needed to improve OPAT.

## MP377

**Identifying Patient-related Risk Factors (PRRF) Catheter-related Bacteraemia (CRB)**W LEE<sup>1</sup>, JA WONG<sup>1</sup>, D TAN<sup>1</sup>, A KWA<sup>1</sup><sup>1</sup>Pharmacy, Singapore General Hospital, Singapore**Aim:** To identify patients at risk for CRB will enable clinicians to better decide on which patients should be treated before cultures results are obtained.**Methods:** A retrospective review of 150 catheterised patients with positive blood cultures between January 2000 to March 2005 was done. Univariate (UA) and multivariate analyses (MA) via logistic regression were performed to identify PRRF and independent predictors (IP) for CRB.**Results:** Via UA, significant ( $P < 0.05$ ) PRRF identified were: age, length of hospitalisation prior to CRB, length of prior antibiotic therapy, use of dialysis, presence of haematological disease, respiratory disease, clinical symptoms and anaemia. IP for CRB determined via MA were: presence of clinical symptoms [odds ratio (OR): 13.809, 95% confidence interval (CI): 2.481 - 76.858,  $P = 0.003$ ], presence of neutropenia (OR: 3.811, 95% CI: 1.201 - 12.095,  $P = 0.023$ ), presence of anaemia (OR: 3.561, 95% CI: 1.217 - 10.422,  $P = 0.02$ ), underlying respiratory disease (OR: 6.356, 95% CI: 1.157 - 34.9,  $P = 0.033$ ) and length of prior antibiotic therapy (OR 12.464, 95% CI: 2.329 - 66.701,  $P = 0.003$ ).**Conclusion:** Patients presenting with clinical symptoms of CRB, i.e., fever or hypothermia, erythema and/or tenderness at catheter insertion site as well as leukocytosis were 14 times more likely to be having CRB. Neutropenic and anaemic patients are approximately 3.5 times more likely to develop CRB. Patients not on any empiric antibiotic therapy had an increased likelihood (12.5 times) of getting CRB. Patients with underlying respiratory disease were 6 times more likely to have CRB.

## MP378

**Rehabilitation of Patients with Physical Deconditioning — A Look at Laboratory Markers, Functional Outcomes and Lengths of Stay**CW BOK<sup>1</sup>, YS NG<sup>1</sup>, PAC LIM<sup>1</sup><sup>1</sup>Rehabilitation Medicine, Singapore General Hospital, Singapore**Aim:** Physical deconditioning is a common referral and rehabilitation diagnosis. There is no consensus with regards to diagnosis currently. We aim to define common clinical characteristics and evaluate the impact of deconditioning on functional outcomes.**Methods:** Data was obtained from patients discharged over a 7-month period from January to July 2005. Twenty-seven patients with deconditioning were identified. Consensus regarding the diagnosis of deconditioning was obtained from 3 independent physicians. Patients with specific rehabilitation diagnoses such as stroke, spinal cord injury, multiple trauma and limb amputations were excluded. The motor component of functional independence measure (FIM) scores on admission and discharge were calculated. Lengths of stay in both the acute (LOSA) and rehabilitation (LOSR) units were recorded. Blood haemoglobin, serum albumin, sodium and calcium values on admission were obtained.**Results:** The mean age of patients was 67.5 years. Ten patients (37% of total) were functionally dependent prior to admission. There was improvement in the mean motor FIM scores (admission = 46, discharge = 56). Average change in motor FIM scores was 10.8. Mean levels of haemoglobin ( $12.3 \pm 1.9$  g/dL), serum sodium ( $132.9 \pm 9.5$  mmol/L) and albumin ( $30.1 \pm 7.2$  g/L) were low on admission. Mean serum calcium was normal ( $2.3 \pm 0.2$  mmol/L). Average LOSA was 13.5 days while average LOSR was 15.3 days.**Conclusion:** Patients with deconditioning tend to be elderly and are associated with abnormal haemoglobin, sodium and albumin levels on admission. They show improvement in function after rehabilitation and have short average LOSR. A standardised criteria set is needed to help identify patients with deconditioning. Further studies are needed to investigate the prognostic significance of laboratory markers in these patients.

**MP379**

**Factors affecting Length of Stay in Acute Rehabilitation and Consequent Implications on the National Rehabilitation Health Care Systems**

**YS NG<sup>1</sup>, MTT DELA CRUZ<sup>1</sup>, Y CHIONG<sup>1</sup>, A TJANDRA<sup>1</sup>, PAC LIM<sup>1</sup>**  
<sup>1</sup>Rehabilitation Medicine, Singapore General Hospital, Singapore

**Aim:** Critical analysis of the determinants of acute rehabilitation length of stay (RLOS) is important to facilitate better stratification and allocation of limited rehabilitation resources and distribution of health care funding. More efficient discharge planning and rehabilitation goal setting can also be achieved. We aimed to identify social, demographic, medical and functional factors associated with the rehabilitation length of stay (RLOS) in an acute medical rehabilitation facility.

**Methods:** Prospective database review of 1022 consecutive patients admitted over a 4-year period to the rehabilitation unit of a tertiary teaching hospital. Multiple linear regression analysis with RLOS as the dependent variable was performed.

**Results:** There were 577 (56.5%) males with a mean age of 60.3 ± 14.9 y. Stroke (604 patients, 59.1%) was the most common diagnosis, followed by spinal cord injury (88 patients, 8.6%). The mean total admission Functional Independence Measure (FIM) score was 70.1 ± 23.9 and mean total discharge FIM score was 89.5 ± 23.3, reflecting highly significant functional gains ( $P < .001$ ). The FIM efficiency was 1.02 points/day. A longer RLOS was associated with younger patients, an indwelling catheter on admission, spinal cord injury, a non-lift landing residence, absence of a caregiver, depression in rehabilitation and a lower admission FIM score. The acute LOS, marital status, employment status, number of vascular risk factors and infective complications were not associated with the RLOS.

**Conclusion:** Multiple socio-demographic, medical and functional variables contribute to the RLOS. Stratification and allocation of rehabilitation resources and funding distribution should incorporate these factors, particularly the initial functional status, rather than be simply based on disease diagnosis alone.

**MP380**

**Application of Pharmacokinetic Drug Interaction between Diltiazem and Tacrolimus in Clinical Renal Transplantation**

**CTS LIM<sup>1</sup>, A VATHSALA<sup>1</sup>, HX LOU<sup>2</sup>**  
<sup>1</sup>Renal Medicine, <sup>2</sup>Pharmacy, Singapore General Hospital, Singapore

**Aim:** To study the effects of addition of diltiazem (DTZ) on tacrolimus (FK)-dosage requirements for renal transplant recipient (RTX) receiving FK-based immunosuppression.

**Methods:** Thirteen stable FK-treated RTX, without liver dysfunction, constituted the study population. After being maintained on a stable FK dose, DTZ was initiated at 90 mg daily and FK trough levels were measured before and after initiation of DTZ. Subsequently, FK dose was adjusted to achieve the same target FK trough level. FK doses required to achieve similar troughs before and after DTZ were compared.

**Results:** Mean and SD are reported. Following initiation of DTZ 90 mg daily, FK dose requirement was significantly reduced (0.18 + 0.06 vs. 0.10 + 0.05 mg/kg/day, pre- vs post-DTZ 90 mg,  $P = 0.00005$ ). Despite a large inter-patient FK-sparing effect (range, 8.3% to 75%) a reduction of 42.5% + 20.4% in FK dose was achieved. Trough FK levels were unchanged before and after addition of DTZ (9.7 + 2.0 vs 10.1 + 3.0 ng/mL, pre vs post,  $P = NS$ ). The interaction translated into a reduction in total FK daily dose of 4.5 + 2.4 mg. Eight RTX had a further increase in DTZ dose to 90 mg twice daily; this resulted in further reduction in their FK dose from 0.12 + 0.06 to 0.10 + 0.04 mg/kg/day (DTZ 90 mg vs DTZ 180 mg,  $P = NS$ ), while maintaining the same target trough.

**Conclusion:** The addition of DTZ 90 mg daily resulted in significant reduction in FK dose requirement, while maintaining target trough FK levels. However, there is considerable inter-patient variation in reduction in FK dose and dosing needs individualisation. This pharmacokinetic interaction is FK-sparing and allows cost savings in clinical RTX.

**MP381**

**Mycophenolate Mofetil in the Treatment of Refractory Lupus Nephritis**

**RCH TAN<sup>1</sup>, GSC CHIANG<sup>2</sup>, HS HOWE<sup>3</sup>, A VATHSALA<sup>1</sup>**  
<sup>1</sup>Renal Medicine, <sup>2</sup>Pathology, Singapore General Hospital, Singapore, <sup>3</sup>Rheumatology, Allergy & Immunology, Tan Tock Seng Hospital, Singapore

**Aim:** The use of cyclophosphamide (CYC) in combination with prednisolone is effective in the treatment of lupus nephritis (LN) but is associated with adverse events. Though mycophenolate mofetil (MMF) is as effective as CYC-based regimens in treatment of LN, its efficacy in refractory LN is unknown.

**Methods:** Thirty-one patients with biopsy-proven LN (class III-V) were treated with MMF for a mean duration of 13 months. 35% had refractory LN (REF\_LN), 45% refused CYC, while 20% had side effects from CYC.

**Results:** Overall, following MMF, 24-hour urine protein decreased (TUP, 3.25 g/d pre vs 1.7 g/d post,  $P < 0.0005$ ); however, serum creatinine (Scr, 108 vs 117 umol/L), creatinine clearance (CCT, 76 vs 82 mL/min) and anti-dsDNA titres (289 vs 123) were not significantly changed (pre vs post respectively). 32% had complete remission (TUP <0.5 g/d) at 10 + 10.3 months; 58% achieved partial remission (TUP 0.5-2.5 g/d) at 6.5 + 2.8 months. Complications with MMF included gastrointestinal complaints, leukopenia, herpes zoster, transaminitis and pulmonary tuberculosis. Class IV LN had significant reduction in anti-dsDNA titres (213 vs 61, pre vs post,  $P = 0.036$ ), and TUP (4.0 vs 1.9 g/d,  $P < 0.0005$ ). Upon stratification, REF\_LN (n = 10) had decrease in TUP (3.2 vs 1.3 g/d,  $P = 0.02$ ) and anti-dsDNA titres (418 vs 203,  $P = 0.008$ ) following MMF. However, class IV REF\_LN (n = 6), demonstrated no improvements in Scr, CCT, TUP or anti-dsDNA titres following MMF.

**Conclusion:** MMF is well tolerated and is an effective treatment in LN in general and class IV LN in particular; therapy results in decrease in TUP and anti-dsDNA titres. However, MMF may be less effective for those with class IV REF\_LN, suggesting the need for alternative treatment strategies.

**MP382**

**The Effect of Combined Angiotensin Converting Enzyme Inhibitor (ACE-I) and Angiotensin II Receptor Blocker (ARB) on Anaemia in Patients with Chronic Kidney Disease**

**WS YANG<sup>1</sup>, SMC FOOK-CHONG<sup>2</sup>, KS WONG<sup>1</sup>, CM CHAN<sup>1</sup>**  
<sup>1</sup>Renal Medicine, <sup>2</sup>Clinical Research, Singapore General Hospital, Singapore

**Aim:** Dual blockade of the renin-angiotensin system has been shown to be more effective in renoprotection compared to monotherapy. Both ACE-I and ARB can cause or aggravate anaemia in patients with chronic kidney disease. We evaluated the reduction in haemoglobin (Hb) in patients on combined ACE-I and ARB.

**Methods:** We performed a retrospective analysis of 146 patients (97 type 2 diabetics and 49 non-diabetics) followed up from our Renal Retardation Programme over a period of 6 months. All patients with renal impairment and proteinuria of >1 g per day were on combined ACE-I and ARB. The level of Hb and correlating GFR were measured at the start of combination phase and repeated between 3 and 6 months. Patients who had haemoglobinopathies, blood transfusion due to blood loss or on prior erythropoietin treatment were excluded from the data analysis

**Results:** Baseline Hb [mean (95% CI)] 12.4 (12.1 to 12.7) g/dL and Hb at 3/6-month interval was 12.0 (11.7 to 12.3) g/dL ( $P < 0.005$ ). The mean reduction in Hb from baseline was 0.4 (0.3 to 0.6) g/dL. There was no correlation between the changes in GFR and Hb.

**Conclusion:** The use of ACE-I and ARB combination resulted in a significant reduction in haemoglobin in our population. Even though the decrease in haemoglobin was statistically significant, the change in haemoglobin 3 to 6 months after the initiation of ACE-I and ARB did not appear clinically important. The renoprotective effect of combined ACE-I and ARB may be more favourable than reduction in Hb.



## MP383

**A Clinical Evaluation of Hyperkalaemia in Patients with Renal Impairment on Combination Therapy of Angiotensin-converting Enzyme Inhibitor (ACEI) and Angiotensin-receptor Blocker (ARB)**WS YANG<sup>1</sup>, TH GOH<sup>1</sup>, SC TAN<sup>2</sup>, SMC FOOK-CHONG<sup>2</sup>, KS WONG<sup>1</sup>, CM CHAN<sup>1</sup><sup>1</sup>Renal Medicine, <sup>2</sup>Clinical Research, Singapore General Hospital, Singapore

**Aim:** Proteinuria is an independent predictor of progressive kidney disease. The anti-proteinuric effects of combination therapy using ACEI and ARB confers long-term renoprotection. Hyperkalaemia is a well known side effect using either agent. We evaluated the risks of such combination in our patient population.

**Methods:** Retrospective data on 205 patients (140 diabetics, 65 non-diabetics) with proteinuria >1 g/day on combination therapy in our programme were analysed. Target blood pressure of <130/80 mm Hg were achieved using additional antihypertensive agents. Changes in serum potassium at 3 month and at month 6 were evaluated.

**Results:** The mean serum potassium (95% CI) mmol/L at baseline, 3 and 6 months were 4.4 (4.4 to 4.5), 4.5 (4.4 to 4.6) and 4.5 (4.5 to 4.6), respectively. There was a significant change in serum potassium between period 1 and period 2 ( $P = 0.006$  and  $0.016$ ) only. At 3 and 6 months, the incidence of patients with serum potassium >5.5 mmol/L was 2.0% and 3.1%, respectively. The mean serum creatinine (Cr) (95% CI) umol/L at baseline, 3 months and 6 months were 179 (167 to 191), 190 (177 to 202) and 203 (188 to 217). Significant changes occurred in serum Cr in all periods ( $P = 0.005$ ). No correlation was found between the increase in serum Cr and the rise in serum potassium at 6 months. Changes in serum potassium were not significantly different between diabetics and non-diabetics.

**Conclusion:** Combination therapy with ACEI and ARB caused significant increase in serum potassium in the first 3 months of therapy.

## MP384

**Severe Heat-related Illness Requiring Intensive Care**GC PHUA<sup>1</sup>, J KWEK<sup>2</sup>, YM TAN<sup>2</sup>, KL TAN<sup>1</sup>, P ENG<sup>1</sup><sup>1</sup>Respiratory and Critical Care Medicine, Singapore General Hospital, Singapore, <sup>2</sup>Medicine, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** Heat stroke is a medical emergency that is associated with high morbidity and mortality. With global warming and worldwide increase in heat waves, the threat of heat-related illness is escalating. We describe our experience in the management of critically ill patients with heat-related illness over the past 7 years.

**Methods:** Retrospective review of all patients with heat stroke or heat exhaustion who required MICU admission between 1999 and 2005.

**Results:** Twenty-four patients (20 males) were identified. Twenty (83%) had heat stroke and 4 had heat exhaustion. The median age was 20 years (range, 16 to 45). All had been involved in physically strenuous activities. Mean body temperature was 40.2°C. Seventeen (71%) underwent cooling in the body cooling unit (BCU) for a median duration of 60 minutes. Common findings included neurological impairment (83%), elevated creatine kinase (83%), leukocytosis (79%), elevated aspartate transaminase (75%), elevated creatinine (54%), prolonged prothrombin time (50%), hypophosphatemia (46%), metabolic acidosis (46%) and hypotension (25%). Three patients required mechanical ventilation and 1 required inotropic support. Median length of ICU stay was 2 days (range, 1 to 5). All patients were alive on discharge.

**Conclusion:** We found that despite the high incidence of multi-organ dysfunction at presentation, these abnormalities were rapidly reversible. Our findings differ from previous studies describing high mortality rates from heat stroke during heatwaves. Effective treatment of heat-related illness requires aggressive lowering of body temperature. We found the BCU effective in rapidly cooling our patients.

## MP385

**The Value of Joint Aspirations in the Diagnosis of Patients in a Hospital-based Rheumatology Service**YY CHONG<sup>1</sup>, KY FONG<sup>1</sup>, J THUMBOO<sup>1</sup><sup>1</sup>Rheumatology and Immunology, Singapore General Hospital, Singapore

**Aim:** Joints aspiration for diagnostic or therapeutic purposes is an essential part of rheumatological practice. The aim of this study was to quantify the value of joint aspiration in the diagnosis of patients with arthritis.

**Methods:** We performed a retrospective review of all joint aspirations in our department over 13 months (November 2003 to December 2004) to determine the proportion of patients where joint aspiration provided (a) a definitive diagnosis or (b) information which aided diagnosis.

**Results:** Of 76 patients, mean (SD) age 60.9 (15.9), male:female = 41:35, Chinese:Malay:Indian:Others, (50:20:4:20), 7 had 2 aspirations and 1 had 4 aspirations. Joint/s aspirated were knees (72%), ankles (14%), elbows (8%), wrists, shoulders, metacarpo-phalangeal and/or metatarso-phalangeal (1% each). Joint aspiration provided a definitive diagnosis in 47.5% of patients, who had gout (n = 28), septic arthritis (n = 8) or pseudogout (n = 2). In the remaining patients, joint aspiration provided useful information which aided diagnosis, with synovial fluid which was inflammatory (n = 25), non-inflammatory (n = 16) or blood stained (n = 2; 1 patient was subsequently diagnosed with a chronic anterior cruciate ligament tear).

**Conclusion:** Joints aspiration provides a definitive diagnosis or information that aids diagnosis in most patients

## MP386

**Tropical Rheumatology: Infection or Inflammation?**DA KANDIAH<sup>1</sup><sup>1</sup>Rheumatology and Immunology, Singapore General Hospital, Singapore

**Aim:** Clinical features of inflammation and infection are often difficult to differentiate. This presentation describes 2 patients who had clinical features that were initially thought to represent the other entity but were with subsequent clinical developments and investigations shown to have the opposite problem.

**Methods:** **Patient A:** A 34-year-old Indian male, who worked as a manual labourer, presented with chest pain over his manubrium sternum and right shoulder. The pain had started 3 years before. He had had treatment for osteomyelitis in India for 6 months. **Patient B:** A 59-year-old Malaysian durian farmer with long-standing diabetes mellitus, presented with severe right rib cage pain and mild swelling over the tenth rib. He had no systemic symptoms, particularly fever or rigors. He had elevated inflammatory markers.

**Results:** **Patient A:** Investigations revealed a destructive lesion at the manubrio-sternal junction and right second costal cartilage with surrounding hyperostosis. The patient had partial sternal resection. The histology showed fibrosis and spindle cell proliferation. Culture for acid-fast bacilli was negative at 6 weeks as were laryngeal swabs. The pain partially responded to diclofenac and settled well with prednisolone. **Patient B:** Blood cultures on this occasion revealed *Burkholderia pseudomallei*, which also grew from aspirate of the soft tissue mass that showed up on the subsequent CT scan of chest. The patient did well with a 6-week course of intravenous ceftazidime, followed by oral ciprofloxacin.

**Conclusion:** In tropical climates, relevant infectious diseases must be considered in a patient who does not respond to other treatments.

## MP387

**Applied Clinical Learning in Undergraduate and Postgraduate Medical Education**DA KANDIAH<sup>1</sup><sup>1</sup>Rheumatology and Immunology, Singapore General Hospital, Singapore

**Aim:** A number of medical initiatives have been incorporated to make medical education more stimulating for students. One of the elements of medical practice is clinical decision-making based on the information

obtained and knowledge acquired. An innovative method of medical teaching specifically for final-year medical students was devised.

**Methods:** The OSCAR method of clinical teaching for larger groups was devised in 1989 and fine-tuned over the next 10 years with students from 2 Australian universities. In 1998, this became part of the final teaching programme for the graduating students at the University of Sydney at both the Royal Prince Alfred and Concord Repatriation Hospitals, Sydney.

**Results:** The feedback from these sessions was positive. The students who came from diverse cultural and national backgrounds all found the sessions helpful as they prepared for their final examinations. The main benefit of this process, as reported by the students, was that it gave them clinical perspectives that were lacking throughout their medical course where they accumulated a vast amount of knowledge but could not appreciate the relative importance of each volume of information acquired.

**Conclusion:** This method of clinical teaching is a potential programme for all final-year medical students as it helps to incorporate and consolidate clinical understanding, rationalisation, knowledge and perspective. Coles found that when students were assessed on their revision methods and examination grades, there was a statistically significant improved performance in students who were able to link all knowledge acquired into some form of unifying method (Medical Education 1990;24:14-22).

### MP388

#### Comparison of Medico-Legal Issues in Health Care Delivery between Australia and Singapore

**DA KANDIAH<sup>1</sup>**

<sup>1</sup>Rheumatology and Immunology, Singapore General Hospital, Singapore

**Aim:** Australia and Singapore have similar standards of health care delivery, average life expectancy from birth and infant mortality rates. Medical practitioners in both countries are highly regulated by their respective medical boards with requirements for continual professional development. The one major difference is the cost to the patient at the point of care.

**Methods:** Statistical comparisons are made on the methods of delivery of health care with average bed days, use of ambulatory surgery and average length of stay from data available from the websites of the Ministry of Health, Singapore and Health Regulation Authorities in Australia, as well as from the World Health Organisation website.

**Results:** While the use of ambulatory surgery is similar in the 2 countries, Singaporeans have less days in hospital. However, out-of-pocket expenses are significantly more at the point of delivery of health care. This appears to have a bearing on the rate of complaints at the point of delivery of health care.

**Conclusion:** In Australia, litigation is often a carefully thought-out process that predominantly involves the legal fraternity and medical defence organisations. In Singapore, the complaints are often made at the time of the event and related to a large part to the cost and sequelae of treatment. As both countries originated from the same adversarial legal system, the mode of delivery of health care and the subsequent legal issues that arise make an important study for both countries to rationalise their systems for the benefit of both their patients and health care professionals.

### MP389

#### Neuro-Immunology: Correlation of Neurological Events with Serological Results

**DA KANDIAH<sup>1</sup>**

<sup>1</sup>Rheumatology and Immunology, Singapore General Hospital, Singapore

**Aim:** Patients with connective tissue diseases (CTDs) need to be identified when they present with neurological manifestations so that treatment can be tailored to the underlying conditions as well.

**Methods:** In this study, patients were assessed for their clinical manifestations and serological blood tests. Clinical events were confirmed by physical assessment and investigations.

**Results:** Eighty-nine autoimmune patients were followed from October 2003 to the end of August 2004. All patients had an anti-nuclear antibody (ANA)

titre greater than 1:400 dilution. Seventy-seven of these patients had SLE, and the other 12 had other CTDs. Twenty-one patients had neurological events. The 15 SLE patients had seizures (5), vascular events (4), personality changes, anxiety and confusion (4), migraine (1) and myasthenia gravis (1). The 3 primary Sjogren's syndrome patients had associated myasthenia gravis, paraesthesiae and definite optic neuritis and transverse myelitis. The other 3 patients had benign intracranial hypertension (undifferentiated CTD), personality disorder (mixed CTD) and vascular events (scleroderma). There was no difference in the age of the total population versus the patients with CNS disease (mean 44 vs 40 years). There was no difference as well in the gender (79.5% vs 76.2% females) and race. In the assessment of the serological features, only 1 test stood out – 54.8% of all patients had anti-cardiolipin antibodies by ELISA testing. Of the 21 patients with CNS manifestations, 86.7% had aCL antibodies (odds ratio 3.52; 95% CI, 1.15-10.8).

**Conclusion:** Patients presenting with neurological events need to be assessed for autoimmune diseases, especially if they are less than 50 years and female.

### MP390

#### Recurrent Carotid and Aortic Aneurysms in a Young Man with Hearing Loss and Inflammatory Eye Disease

**AHL LOW<sup>1</sup>, KY FONG<sup>1</sup>, J THUMBOO<sup>1</sup>**

<sup>1</sup>Rheumatology and Immunology, Singapore General Hospital, Singapore

**Introduction:** Cogan's syndrome (CS) is a rare multi-systemic disease characterised by vestibuloauditory dysfunction, inflammatory eye disease (typically non-syphilitic interstitial keratitis) and vasculitis, with less than 250 cases in the literature. Serious clinical outcomes of CS include deafness, blindness, systemic vasculitis, cardiovascular complications and death. Aortitis with aortic insufficiency, stenotic lesions of vessels and coronary artery involvement are well-recognised cardiovascular manifestations. Aortic aneurysms however are very rare, with (to our knowledge) only 5 cases reported in the English literature.

**Case Report:** We describe a 19-year-old Chinese male with bilateral sensorineural hearing loss, bilateral recurrent scleritis, recurrent carotid and aortic aneurysms and left facial nerve palsy. The patient presented initially with recurrent scleritis and later developed progressive bilateral sensorineural hearing loss. He subsequently developed a left common carotid artery aneurysm and mid-descending thoracic aortic aneurysm which required surgical correction. He had 2 further operations to repair perigraft leaks from pseudoaneurysm formation at the graft anastomosis. Aortitis was confirmed on review of histological specimens, the diagnosis being made 4 years after his initial presentation. His disease remains stable after 1 year of treatment with methotrexate and prednisolone, with no recurrence of aneurysms.

**Conclusion:** This case illustrates (1) the challenges in diagnosing CS when various manifestations occur separately over a relatively long period of time and (2) that methotrexate and high-dose steroids may be effective in preventing further aneurysms in CS patients. Early recognition of this syndrome may prevent deafness, blindness and life threatening events such as aortic aneurysmal rupture.

### MP391

#### Genetic Polymorphism of Mannose Binding Lectin Gene and Correlation with Infections in Systemic Lupus Erythematosus (SLE) Patients

**SK TIN<sup>1</sup>, LY LEE<sup>2</sup>, J THUMBOO<sup>1</sup>, KY FONG<sup>1</sup>**

<sup>1</sup>Rheumatology and Immunology, <sup>2</sup>Clinical Research, Singapore General Hospital, Singapore

**Aim:** Mannose binding lectin (MBL), the protein in the third complement pathway, plays an important role in both innate immunity and removal of immune complexes. Its genetic variants are associated with low serum MBL and frequent infections. We investigated the genetic polymorphism of MBL-low-producing variants and correlated with infections in lupus patients.

**Method:** Unselected lupus patients (n = 100) and healthy controls (n = 102) were recruited. Both infection and treatment data were collected by chart

review. The genetic variants of exon 1 (codons 52, 54 and 57) and promoter region (H/L and X/Y polymorphic sites) were analysed using PCR-RFLP method. Those variants were correlated with infections in lupus patients. Chi-square test was used to determine the statistical significance.

**Results:** The MBL-low-producing variants have a higher prevalence in lupus patients (controls vs patients: 0% vs 26% at codon 52 variants:  $P < 0.0001$ ; 8% vs 14% at LX/LX haplotypes:  $P = ns$ ). Lupus patient with MBL-low-producing variants had higher infections rate (variant vs normal: 30% vs 18% at codon 52:  $P = ns$ ; 15% vs 12% at LX/LX haplotypes:  $P = ns$ ). Two-thirds of lupus patients had corticosteroids and cytotoxic drugs and infection presentations were not influenced by MBL gene polymorphisms. However, in corticosteroid group, lupus patients with codon 52 variants presented with more infections compared to those without such variants (83% vs 56%,  $P = ns$ ). The number of LX/LX haplotypes was small for analysis.

**Conclusion:** In conclusion, MBL-low-producing genetic variants were associated with SLE and codon 52 variants were associated with infections in those ingesting corticosteroids.

### MP392

#### Rheumatoid Atlantoaxial Disease Associated with Syringomyelia: A Causal Link?

**JKC YOONG<sup>1</sup>, KY FONG<sup>1</sup>, RKL TAN<sup>2</sup>, KK TANG<sup>3</sup>, J THUMBOO<sup>1</sup>**

<sup>1</sup>Rheumatology and Immunology, <sup>2</sup>Diagnostic Radiology, Singapore General Hospital, Singapore, <sup>3</sup>Neurosurgery, National Neuroscience Institute, Singapore

**Case Study:** Rheumatoid arthritis-atlantoaxial subluxation and associated syringomyelia is rare, with only 2 cases reported in the literature. We describe a third such patient with seropositive rheumatoid arthritis who presented with an 18-month history of mild peripheral joint disease affecting the hands, wrists, elbows and shoulders with global reduction of neck movement. He had taken complementary medication with some improvement in his joint symptoms. Plain radiographs showed subtle joint erosions in 2 metacarpophalangeal joints. However, there was profound cervical spine involvement with vertical atlantoaxial subluxation, pannus eroding the odontoid peg and a syrinx cavity which extended from C2-T6 level of the spinal cord on magnetic resonance imaging. Clinical examination suggested and nerve conduction studies confirmed widespread neuropathic changes affecting the right upper limb with C8-T1 being most severely affected. Transcranial magnetic stimulation testing revealed findings compatible with extensive cervical myelopathic process. The possible mechanisms by which rheumatoid cervical disease culminates in a syrinx cavity are: 1) raised intraspinal pressure from structural crowding caused by AA disease forcing the cerebrospinal fluid in the spinal subarachnoid space down the central canal producing a syrinx; 2) compression due to the cervical spine disease interferes with blood supply to the cord and subsequent ischaemia, necrosis and cavity formation. The patient's disease activity improved with combination DMARD (methotrexate/hydroxychloroquine) and low-dose corticosteroid therapy; occipitocervical fusion and posterior fossa decompression are planned.

**Conclusion:** Improvement or resolution of the syrinx after surgery would provide further evidence for a causal link between rheumatoid-atlantoaxial disease and syringomyelia.

### NUR393

#### Has Care Management in National Healthcare Group (NHG) Polyclinics Made a Difference to the Quality of Care for Patients with Chronic Diseases?

**R HENG<sup>1</sup>**

<sup>1</sup>Administration, National Healthcare Group Polyclinics, Singapore

**Aim:** Care management of patients with chronic illnesses was introduced in the National Healthcare Group Polyclinics in 2001. It is a system of care delivery for patients that spans the continuum, from primary prevention of complications to ongoing long-term maintenance for individuals with chronic health conditions or diagnoses.

**Methods:** This presentation gives a 4-year history of care management's structure, process and outcomes. Effective chronic illness interventions generally rely on a multidisciplinary care team, which includes doctors, nurses, pharmacists, dieticians and podiatrists. Registered nurses are specially trained to be care managers and they promote collaboration with this multidisciplinary team and the patients by assessing, planning, facilitating and advocating to ensure that quality patient care is delivered in the primary care setting.

**Result:** In care management, patients diagnosed with diabetes mellitus, hypertension or hyperlipidaemia are recruited and offered a structured intervention programme, which includes a close monitoring and tracking system.

**Conclusion:** Care management has contributed to positive outcomes as evidenced by improvement in blood pressure and glycaemic control. It has been proven to reduce morbidity and mortality in patients inflicted with chronic conditions.

### NUR394

#### Nurses' Perception and Beliefs in Initiating Pain Relief at Triage

**AC PANG<sup>1</sup>, VYK ONG<sup>1</sup>, FLK ONG<sup>1</sup>, CK TAN<sup>1</sup>, R MOHAMED ISA<sup>1</sup>, J KOSHY<sup>1</sup>**

<sup>1</sup>Emergency Medicine, Alexandra Hospital, Singapore

**Aim:** The study aims to examine whether the nurses in the Department of Emergency Medicine (DEM) would be comfortable initiating and prescribing analgesia for patients with both upper and lower limb injuries presenting with pain at the triage area after initial assessments.

**Methods:** A prospective, descriptive study, using convenience sampling of the nurses in DEM, was carried out. A semi-structured questionnaire were given to all the nurses working in DEM and returned completed forms signified consent.

**Results:** The results of the study revealed that the DEM nurses surveyed were willing to participate in prescribing analgesia for patients in pain after initial assessment at triage. They believed that they could contribute to patients' well-being by initiating pain relief early. The study also revealed that the nurses felt that it could upgrade and improve their professionalism.

**Conclusion:** The results of the research will help create awareness amongst nurses to manage patients presenting with upper and lower limb injury and pain in the DEM. Early pain management can be initiated and its effectiveness reviewed with the pain scoring at the end of the visit. This will allow researchers to review if the analgesia initiated was sufficient or if it managed to relieve pain.

### NUR395

#### Patient Satisfaction in Emergency Department: The Current Predictors in Recent Literature (2000 to 2005)

**S SASTRO<sup>1</sup>**

<sup>1</sup>Emergency Medicine, Alexandra Hospital, Singapore

**Aim:** The aims of the study were to provide an insight on recent research on predictors of patient satisfaction in the emergency department and to identify the measures to be taken for improving patient satisfaction in Singapore hospitals' emergency departments. Evaluating patient satisfaction in the emergency department is of utmost importance; much research literature reported patient satisfaction as a quality indicator. Thus, the "reflection" level on standard of customer service care given in a department determines the outcome of patients' satisfaction and eventually a hospital's reputation.

**Methods:** Literature search of CINAHL and MEDLINE was performed, using with the key words "patient satisfaction" and "emergency department" from 2000 till May 2005.

**Results:** From the search, various indicators emerged as predictors of patient satisfaction. Most patients perceived waiting time and interaction with medical staff as key factors to patient satisfaction.

**Conclusion:** More studies need to be done to identify the actual predictors of patient satisfaction in the emergency department.

**NUR396**

**Nurses Perception on Benefits of Patient Education**

**SC WONG<sup>1</sup>, P CHAN<sup>1</sup>, NL LEE<sup>1</sup>, HY CHAN<sup>1</sup>, SP CUI<sup>1</sup>**

<sup>1</sup>Nursing, Alexandra Hospital, Singapore

**Aim:** To determine the perception of nurses on the benefits of patient education in Alexandra Hospital (AH), and hindrances in providing patient education whilst identifying tools to equip nurses in providing effective health teaching to patients.

**Methods:** Data were collected from convenience sample of 329 nurses working in various departments in AH from December 2004 to May 2005. The study identified the perception, training, teaching tools and hindrances to patient education.

**Result:** Two categories of hindrances were identified. The main concerns were the lack of time (29.3%), communication skills (23%), teaching skills (14.8%) and knowledge deficit (11.4%). Factors that hindered effective patient education were patient denial (17.2%), patient with low education level (15%) and language barrier (13.4%). Findings on perception showed that patient education was important (93.6%), it was part of the nursing role (97.1%), nurses were willing to participate in patient education (69%), patients recognised nurses as resource persons (79%), education increased awareness and participation (79%) and helped patients make better decisions (80.5%).

**Conclusion:** The study showed that to motivate nurses to actively participate in patient education, organisational support is important in providing continuous training/education. Effective teaching methods and materials should be developed and made available to nurses conducting teaching.

**NUR397**

**Home Carers' Needs, Concerns and Coping Strategies in Caring for the Elderly with Dementia**

**N SAILANI<sup>1</sup>, CM GAN<sup>2</sup>, YT LAU<sup>2</sup>, YL LOO<sup>2</sup>, S ISHAK<sup>2</sup>**

<sup>1</sup>Nursing, National University Hospital, Singapore, <sup>2</sup>Nursing, Tan Tock Seng Hospital, Singapore

**Aim:** The aim of this study was to identify the needs, concerns and coping strategies of home carers looking after the elderly with dementia.

**Methods:** This triangulation study design utilises an explorative and descriptive case study. A 10-item Perceived Stress Scale (PSS) was distributed to 15 carers (71.4%) to measure the stress experienced whose care-recipients attended 1 dementia day care centre. A non-structured interview was conducted with 5 carers who scored a PSS of 16 to 40 indicating moderate to high level of stress. Data were analysed using Colaizzi's framework.

**Results:** Carers viewed the caregiving experience as physically, emotionally and financially draining. Despite constraints faced, caregivers continued with the demands of caregiving because of filial piety. Caregivers were concerned with their loss of freedom and saw the need to get out from the caregiver's role to pursue their own interests. It resulted in a myriad of emotions such as resentment, helplessness and guilt. Strong family and social support, religious faith and adequate information were some of the coping strategies used. Institutional care or employment of maid was an option when the caregivers found the burden too heavy.

**Conclusion:** Carers who were highly stressed view the caregiving experience as physically, emotionally and financially draining. The coping strategies used may not be effective. External support may need to be considered.

**NUR398**

**A Retrospective Cross-sectional Study on the Effectiveness of Nurse-led Asthma Counselling in the Primary Health**

**MS CHIOH<sup>1</sup>, CL LEE<sup>1</sup>, ST TAN<sup>1</sup>, ML HO<sup>1</sup>, HL TEO<sup>1</sup>, X LIN<sup>2</sup>**

<sup>1</sup>Nursing/Paramedical, National Healthcare Group Polyclinics, Singapore, <sup>2</sup>Biostatistician, CTERU, Singapore

**Aim:** To evaluate the effectiveness of nurse-led counselling for asthma in the

primary healthcare setting using the reduction for nebulisation visits post counselling as the outcome indicator.

**Methods:** A total of 246 patients were identified from the Toa Payoh Nebulisation Registry within the period May 2003 and January 2004. Of these, 68 patients met the inclusion criteria for established asthma. Cases excluded from the study were patients with COPD and hospital follow-up. The data extracted were nebuliser frequency, demographics and preventor medication at the counselling. Response to asthma counselling was determined by the frequency of post-counselling nebulisation. A decrease or increase of 1 nebulisation visits post-counselling compared to the frequency pre-counselling was taken as good and bad responses respectively.

**Results:** Seventy-five per cent of the patients had a good response to counselling (CI, 0.636-0.838). The mean number of nebulisation visits post-counselling was reduced from 1.10 to 0.44 ( $P < 0.001$ ). The mean time interval between nebulisation visits also lengthened after counselling, from 7.13 days to 17.82 days ( $P = 0.026$ ). However, there was no significant difference between the different response to counselling to the use of preventers and demographic characteristics, e.g., age, gender and ethnic groups.

**Conclusion:** Nurse-led asthma counselling appears to be effective in reducing asthma visits and increase mean time interval in between visits. A prospective study, using a control group with no counselling, should be done to confirm these findings.

**NUR399**

**Strategies to Improve Patients' Compliance to Self-monitoring Blood Glucose for Patients with Type 2 Diabetes Mellitus not Receiving Insulin**

**KL LEOW<sup>1</sup>**

<sup>1</sup>Nursing/Paramedical, National Healthcare Group Polyclinics, Singapore

**Aim:** This paper aims to discuss the various strategies in improving or achieving compliance to self-monitoring of blood glucose in type 2 diabetic patients not receiving insulin. In achieving near normal glycaemic levels, patients can cut down the number of visits to the polyclinics.

**Methods:** Meta-analysis/systemic reviews.

**Results:** Studies have shown that self-monitoring of blood glucose helps to improve glycaemic control to near normal levels.

**Conclusion:** Primary healthcare nurses play a crucial role in providing patient education particularly in achieving compliance on treatment plans and preventing complications.

**NUR400**

**Effectiveness of a Weight Management Programme for Nurses**

**J MATHEWS<sup>1</sup>, MY CHAN<sup>1</sup>, D LIEW<sup>1</sup>**

<sup>1</sup>Nursing/Paramedical, National Healthcare Group Polyclinics, Singapore

**Aim:** In a health assessment of 228 NHGP nurses in 2004, 25% were found to have body mass index (BMI)  $>25 \text{ kg/m}^2$  ( $n = 57$ ). A weight management programme was then designed to assist and motivate overweight nurses to adopt lifestyle changes and become good testimonies to their patients. The objective was to impart strategies on the adoption of healthy lifestyles; mainly that of reasonable approaches towards balancing caloric consumption and expenditure, to achieve and maintain healthy weight.

**Methods:** A total of 90 overweight nurses from all the 9 NHG polyclinics were invited to join this programme. The response rate was 43.3% ( $n = 39$ ). The programme comprised 12 weekly exercise sessions with a fitness trainer and 2 group sessions with a dietitian. Participants were guided on theoretical aspects of exercise, interactive exercise techniques and dietary techniques and concerns.

**Results:** At baseline, the mean BMI was  $30.2 \text{ kg/m}^2 \pm 5.2$  and mean body fat percentage was  $39.7\% \pm 3.5$ . At the end of the 12-week programme, BMI was 1% significantly lower ( $P < 0.01$ ) and mean body fat percentage was 3% lower ( $P < 0.01$ ). Nurses increased their push-up scores by 16% ( $P < 0.01$ ) and their flexibility scores by 3.5%.

**Conclusion:** The main effects were to promote adopting healthy lifestyles and to achieve and maintain healthy weight. Although the amount of weight loss was not large, the benefits of a systematic and structured weight programme are real. This programme was subsequently rolled out to the other healthcare workers in NHG polyclinics, as one of the workplace health promotion initiatives.

#### NUR401

##### Prevention and Management Strategies of Chronic Health Diseases — Singapore's National Healthcare Group Polyclinics' Nursing Perspective

**E NAH<sup>1</sup>, KPS GOH<sup>1</sup>, LH ER<sup>1</sup>**

<sup>1</sup>Nursing/Paramedical, National Healthcare Group Polyclinics, Singapore

**Aim:** The purpose of this paper was to share primary health nursing strategies used to successfully manage and prevent chronic diseases as used at the National Healthcare Group Polyclinics (NHGPs).

**Methods:** Through a thorough process of detection, prevention and comprehensive management of patients with risk factors, patients were screened and referred to chronic care services to ensure coverage and follow-up. Opportunistic screening (detects abnormal blood pressure/blood glucose/lipid count/BMI), collaborative care management (1-to-1 counselling and support groups), follow-up recalls on detected abnormal laboratory results and aggressive health education campaigns to reach attending patients and visitors were employed.

**Results:** Monitoring in progress to capture data for a preliminary outcome by October 2006. Results have shown an improvement in chronic disease outcomes for "care-managed" patients at the 9 NHGPs in Singapore.

**Conclusion:** Currently, chronic diseases are major causes of death and disability worldwide. It is imperative that these diseases are managed to prevent uncontrollable rising healthcare costs and to reduce the burden on the healthcare system. The management of chronic diseases is a daunting task, as risk factors are patient-managed. This paper hopes to share nursing "Care Management" strategies employed by the National Healthcare Group Polyclinics, leading to successful collaborative management of 3 chronic ailments (diabetes mellitus, hypertension and coronary heart disease), which are listed in the top 10 principal causes of death in Singapore. NHGP's strategies may provide a model for consideration in the implementation of primary healthcare practice targeted towards the management and prevention of chronic ailments.

#### NUR402

##### To Evaluate Interventions at the Primary Care Level to Improve the Efficiency of Health Education, Reduce Barriers and Increase Patient Participation

**CC YAN<sup>1</sup>, SM NG<sup>1</sup>, SH NG<sup>1</sup>, R FOO<sup>1</sup>, KL LEOW<sup>1</sup>**

<sup>1</sup>Nursing/Paramedical, National Healthcare Group Polyclinics, Singapore

**Aim:** To identify interventions at the primary care level to improve the efficiency of health education, reduce barriers and increase patient participation.

**Methods:** Systematic reviews, randomised controlled trials, non-randomised trials with concurrent control group and before and after studies were included to identify current approaches in promoting effective health education. Primary outcomes were focused on identifying changes in the population's cognitive, affective, behavioural and health status. Databases searched included CINAHL, MEDLINE, EMBASE, Cochrane Library, DARE, Expanded Academic Index and Electronic Collections Online.

**Results:** Five studies and 3 reviews were included. Effective interventions identified were structured interactive health education with pamphlets designed culturally and linguistically to meet clients needs. Others identified were videotape shows in the waiting area with instructional handouts, a discussion and Q&A coupled with a brief behavioural counselling based on clients' stage of change.

**Conclusion:** Approaches in health education can influence an outcome

towards more positive health practices in the population. However, interventions combining different strategies and approaches were found to be more effective than a single-method approach. Following this review, a pilot programme aimed at utilising the interventions to improve health education participation and the development of healthy lifestyle behaviours for our clients in the polyclinic was conducted. The evaluation designed in the form of a simple descriptive study showed positive data in the process, impact and outcome report. The design of the interventions using evidence-based health education strategies proved an effective way to achieve improvements in the efficiency of health education for the community in the polyclinic.

#### NUR403

##### Beside Insertion of Nasojejunal Feeding Tube in Children — The Children's Medical Institute Experience

**LP TAN<sup>1</sup>, LY LIM<sup>1</sup>, A LIM<sup>1</sup>**

<sup>1</sup>Paediatrics, National University Hospital, Singapore

**Aim:** The benefits of early enteral feeding are well established in both adults and children. This is not always possible when there is delayed gastric emptying and standard nasogastric tube feeding fails therefore the timely and accurate placement of a nasojejunal (NJ) tube is important. However, bedside placement of the NJ-tube is technically challenging and occasionally endoscopic placement is required.

**Methods:** Results of bedside transpyloric NJ-tube placement using air insufflation method in consecutive children in the paediatric intensive care unit and general wards were recorded. The NJ tube was considered to be in the small bowel when less than 2 mL of insufflated air could be aspirated from the tube. The initial insertion was confirmed with abdominal radiograph.

**Results:** From September 2004 to June 2005, a total of 64 bedside placements of NJ-tubes in 13 patients were performed with a success rate of 79% by radiograph confirmation. Five patients required a repeat reinsertion due to failure of initial placement. The mean age of the children was 5.9 years. Eight of 13 patients (61.5%) required long-term NJ feeding for severe gastroesophageal reflux. The most common indication for NJ-tube reinsertion was accidental removal by the patients. No complications were noted. The cost saved from bedside insertion versus endoscopic placement of NJ-tube was estimated to be 60%.

**Conclusion:** Bedside transpyloric NJ-tube insertion is accurate and feasible without needing specialised equipment. It is both cost-saving and has the potential long-term benefits of improving early enteral nutrition and outcome in ill children.

#### NUR404

##### Clinical Profile of Diabetes Mellitus in Our Young Diabetes Patients in Changi General Hospital

**SR MASJUM<sup>1</sup>, G CHANG<sup>1</sup>, PL LEE<sup>1</sup>, AN MANIKAM<sup>1</sup>, YY KWOK<sup>1</sup>, J CHIA<sup>1</sup>, MY KAE<sup>1</sup>**

<sup>1</sup>Diabetes Centre, Changi General Hospital, Singapore

**Aim:** This study aimed to investigate the immunological and clinical features of our young diabetic patients.

**Methods:** A retrospective study was conducted for 15 months from November 2001 to February 2003. All patients with diabetes <10 years and under the age of 30 were recruited for the study.

**Results:** There were a total of 63 subjects. Seventeen per cent of them were diagnosed with type 1 and 83% with type 2 diabetes. Half of the subjects reported to have familial history of diabetes. Type 1 subjects were significantly younger at diagnosis, with a mean age of 18.8 years as compared to type 2 subjects, with a mean age of 22.2 years at diagnosis. The average body mass index (BMI) for subjects with type 1 was 24.88 compared to 29.52 in the type 2 group. Type 1 subjects were significantly leaner than type 2 in this study. GAD antibodies were done for 16 subjects and only 1 was reported to be GAD antibody positive. One subject was diagnosed as type 1 despite a negative GAD antibodies. Twenty-seven per cent defaulted after 8 months of follow-up and all were on lifestyle modification or OHGA. This is higher than our average percentage of defaulters.



**Conclusion:** The incidence of type 1 in our young adults is very low; however, the emerging trend of obesity leading to type 2 diabetes is a concern and prevention of overweight and obesity should be a therapeutic goal. Researchers found that the presence of autoantibodies alone is not enough to make a diagnosis in our population and clinicians must rely on the subjects' clinical presentation.

#### NUR405

##### Comparison of Two Sedation Regimes for Diagnostic Oesophago-Gastro-Duodenoscopy (OGD): A Prospective Qualitative Survey

LL SEE<sup>1</sup>, GD YAK<sup>1</sup>, LE CHUA<sup>1</sup>, R ZHANG<sup>1</sup>, SB PANG<sup>1</sup>, YM SUNE<sup>1</sup>, SC WEE<sup>1</sup>

<sup>1</sup>Endoscopy Unit, Changi General Hospital, Singapore

**Aim:** The objective of this study was to compare the acceptability and comfort experienced by patients undergoing diagnostic OGD using 2 different regimes: (1) I/V midazolam and (2) I/V midazolam combined with I/V fentanyl.

**Methods:** This was a prospective qualitative study, comprising the administration of a questionnaire to 100 consecutive patients who underwent diagnostic OGD at Changi General Hospital. Fifty patients were sedated with intravenous midazolam alone while 50 patients were sedated with a combination of intravenous midazolam and fentanyl. All patients gave informed consent for the study. The questionnaire was administered 120 minutes after completion of the endoscopic procedure. The questionnaire consisted of questions pertaining to the patient's memory of events, comfort during the procedure and overall satisfaction with the procedure.

**Result:** Ninety-two per cent (46/50) of patients who were sedated with midazolam alone reported an overall satisfaction of having had an excellent or good experience compared to 74% (37/50) of patients who were sedated with a combination of midazolam and fentanyl. The remaining patients in both groups reported an overall satisfaction of having had an acceptable experience. No patients reported having had a poor or terrible experience.

**Conclusion:** The use of intravenous midazolam as sedation for diagnostic OGD is sufficient to achieve a good to excellent level of satisfaction among patients. The addition of intravenous fentanyl did not increase the level of satisfaction. Instead, the side effects of fentanyl resulted in a decrease in the level of patient comfort and satisfaction. The routine use of intravenous midazolam in combination with intravenous fentanyl is not recommended.

#### NUR406

##### Study to Identify the Level of Knowledge on Body Mechanics among Nurses and its Co-relationship with Work-related Backache

SH CHENG<sup>1</sup>, Y FENG<sup>1</sup>, EYT TEOH<sup>1</sup>

<sup>1</sup>Nursing, Changi General Hospital, Singapore

**Aim:** To study the level of knowledge on body mechanics among nurses and its co-relationship with work-related backache in a restructured hospital in Singapore.

**Methods:** This is a typical descriptive, non-experimental and quantitative study using convenience sampling. A structured questionnaire was developed based on information from relevant literature. A total of 300 copies were distributed to all departments within the hospital. Two hundred and seventy-six (92%) nurses responded and provided essential demographic data, history of training in lifting techniques and completed test on body mechanics.

**Results:** Descriptive statistics and cross tabulation were used for analysis. 68.1% (n = 188) of participants got full marks on the knowledge of body mechanics. 67.6% of nurses who complained of work-related backache scored full marks on the knowledge questions. A total of 67.9% who had no complaint of work-related back pain scored full marks on the knowledge questions (r = 0.655, P <0.05). Work-related backache was prevalence among those between the age group of 21 and 35 years and among those with body weight ranging from 46 kg to 60 kg.

**Conclusion:** There is no significant difference in the level of knowledge on body mechanics among nurses who suffer from work-related backache and

those who are free from symptoms. Furthermore, there were no significant relationships compared to the level of knowledge, number of training received with regular physical exercise and job absenteeism. These confirm that symptoms of lower back pain are multifactorial and complex.

#### NUR407

##### Voiding Behaviour in Females With Type II Diabetes: A Comparative Study

CT GOH<sup>1</sup>, G CHANG<sup>1</sup>, LH TAY<sup>1</sup>, TB ANG<sup>1</sup>, PLC QUEK<sup>2</sup>

<sup>1</sup>Nursing, <sup>2</sup>Urology, Changi General Hospital, Singapore

**Aim:** This study aimed to examine voiding behaviour in women with type 2 diabetes versus a control group of non-diabetic women.

**Methods:** This is a prospective study. The recruitment of participants started in March 2005. Voiding function between 28 females with type 2 diabetes and 20 age-matched non-diabetic females was compared. Subjects with co-existing medical factors that would affect voiding function were excluded using the Bristol Female Lower Urinary Tract Symptom Score. Each participant drank 500 mL of water and at normal desire to void, uroflow analyses was done with post void bladder scan for residual urine estimates. The emptying efficiency was defined as 100% x volume voided/(volume voided + post void residual urine).

**Results:** The mean age was 52.5 years. The average body mass index (BMI) for the diabetic group was 29.21, which is higher than the normal group of 19.38. The minimum urinary flow rate for the normal group was 14.1 mL/s and maximum was 78.3 mL/s with a mean of 30.66 mL/s; whereas the diabetic group had a minimum flow rate of 10.60 mL/s and a maximum of 53 mL/s with a mean of 23.64 mL/s. However, the mean voided volume in the diabetic group to the control group was 344.47 mL and 308.95 mL, respectively. The measurement of mean residual urine in the diabetic was 17.643 mL as compared to the control, 13.90 mL.

**Conclusion:** The sample size is small, hence the results are not very significant. However, this has enlightened us to re-examine the age group that we are recruiting as well as the other compounding factors from the effects of diabetes that would affect the voiding behavior. The researchers would continue to expand this study to include more patients.

#### NUR408

##### Hip Fracture: An Outcome Study of Patients from Nursing Homes

HMM RAUDHAH<sup>1</sup>, JKL CHOO<sup>1</sup>, MMK TAN<sup>1</sup>, WYL SOO<sup>1</sup>, HM THOMAS<sup>2</sup>, D YONG<sup>2</sup>

<sup>1</sup>Nursing, <sup>2</sup>Geriatric Medicine, Changi General Hospital, Singapore

**Aim:** The objective of the study was to assess mortality and ambulatory ability of patients from nursing homes who were admitted for hip fracture.

**Methods:** The study population comprised 41 patients, aged 60 years and above, from various nursing homes, admitted for hip fracture from January 2004 to December 2004. Three patients were excluded as they died during hospitalisation. Out of 38 patients, 79% (n = 30) went for surgery while 21% (n = 8) were managed conservatively. The outcomes of this group of patients were analysed.

**Results:** The mean age was 82.8 years. Sixty-six per cent were female and 34% were male. Out of the 30 patients (79%) who had surgery done, 33% showed an improvement in their ambulatory status, 50% remained status quo while 7% was not able to sustain their current ambulatory status. Ten per cent of the patients died within 1 year of discharge. Out of the 8 patients (21%) who were conservatively managed, 50% remained status quo in their ambulatory status while 12.5% were not able to sustain their pre-morbid status. The mean total hospitalisation period was 14.7 days for patients who went for surgery and 18.3 days for patients who were managed conservatively.

**Conclusion:** Studies have shown that 10% to 20% of elderly hip fracture patients will die within 12 months of injury after surgery. The findings of our study are consistent with the studies conducted by other researchers. Half

came from 3 facilities, giving opportunities for targeting fall and injury prevention.

#### NUR409

##### A Study in Perception of Registered Nurses on Continuing Nursing Education (CNE) in Changi General Hospital

**SS HIEW<sup>1</sup>, CP CHAI<sup>1</sup>, WC CHIU<sup>1</sup>**

<sup>1</sup>Nursing, Changi General Hospital, Singapore

**Aim:** To explore registered nurses' perception of continuing nursing education (CNE) and identify factors that motivate or hinder registered nurses in CNE participation at Changi General Hospital (CGH).

**Methods:** This is a quantitative descriptive study with self-developed and structured questionnaires involving a non-probability convenience sample of 200 registered nurses in 20 wards from 16 to 28 August 2004 in Changi General Hospital. Questionnaires were collected and analysed by using Statistical Package for Social Sciences (SPSS).

**Results:** One hundred and forty-four of 155 respondents agreed that CNE was important to the professional development of nursing practice. We identified 7 motivators and 4 hindrances in this study. However, 6 out of 7 identified motivators were extrinsic. Sixty per cent of less than 20 hours spent on CNE category fell in the category of those who agreed strongly that CNE could upgrade professional nursing status. Sixty per cent of nurses agreed that low ward staffing deterred nurses in pursuing CNE.

**Conclusion:** Future CNE should be driven by learners' needs and cater for respective specialty. Positive peer and superior support were important factors for nurses in pursuing CNE. Nurses will not able to maintain commitment to CNE without strong and continuing support from their employer. Singapore Nursing Board may consider mandating continuing education as a requirement for nurses' relicensure. Low ward staffing and heavy domestic commitment were main barriers deterring nurses in attending CNE. Majority of respondents reported that the main barrier to CNE was heavy domestic or family responsibilities.

#### NUR410

##### A Descriptive Study of Registered Nurses' Knowledge on Deep Vein Thrombosis

**LL OW<sup>1</sup>, PS LEE<sup>1</sup>, AE CHEW<sup>1</sup>, HY TAN<sup>1</sup>**

<sup>1</sup>Nursing, Changi General Hospital, Singapore

**Aim:** To determine registered nurses' knowledge on deep vein thrombosis (DVT) in Singapore in an acute care hospital.

**Methods:** This is a descriptive study involving registered nurses from various disciplines. The instrument used for this study was a self-designed questionnaire. The questionnaire comprised 6 demographic data questions and 25 multiple choice questions. The 25 multiple choice questions were divided into 3 sections: 1) knowledge of DVT, 2) clinical signs and symptoms of DVT, and 3) knowledge of treatment and prevention modalities of DVT. The survey was conducted over a period of 1 week from 17 June 2005 to 24 June 2005.

**Results:** Of the 300 questionnaires, 250 responded, achieving a response rate of 83%. The mean total score was 17.88. 74% of the nurses scored below 20. The section best answered on treatment and prevention modalities was 70.4%, while the weakness section answered was on clinical signs and symptoms (68.7%). The results indicated that nurses require more training and education on DVT so that they can recognise the signs and symptoms of DVT and render appropriate care to patients.

**Conclusion:** This study revealed a knowledge deficit among nurses in particularly with the identification of clinical signs and symptoms of DVT. There is a need for further in-service and training in this aspect.

#### NUR411

##### Impact of an Acute Stroke Unit Care — A Controlled Study

**GH CHUA<sup>1</sup>, JKL CHOO<sup>1</sup>**

<sup>1</sup>Nursing – Case Management, Changi General Hospital, Singapore

**Aim:** This study aimed to evaluate the clinical outcomes of stroke patients put on a clinical pathway and managed in a designated acute stroke unit.

**Methods:** A prospective analysis of 115 patients, aged 79 years and below, put on a clinical pathway and admitted to an Acute Stroke Unit from 1 September 2004 to 31 December 2004. Clinical outcomes of the prospective group were compared to a historical cohort of 98 patients admitted with stroke from 1 April 2004 to 31 May 2004. The main outcome measures including rates of pneumonia, urinary tract infection, pressure sores, mortality and functional disability were analysed using SPSS 12.0.1.

**Results:** There were no significant differences in gender ( $P = 0.721$ ), age ( $P = 0.054$ ) and ethnic group ( $P = 0.833$ ) for both pre- and post-study groups. The study showed a reduction in the number of patients acquiring: 1) pneumonia by 1.4% ( $P = 0.525$ ), 2) urinary tract infection by 2.5% ( $P = 0.537$ ) and 3) pressure sores by 1.1% ( $P = 0.470$ ). The mortality rate was reduced by 9% ( $P = 0.020$ ). In the post-study group, the Barthel Index score was used to measure the severity of functional disability. The mean score on admission was 13/20 and the 30-day post-stroke score was 16/20. There was a significant improvement on functional ability post-stroke ( $P = 0.000$ ).

**Conclusion:** The use of a clinical pathway for patients admitted with stroke and managed in an acute stroke unit provides a systematic management plan was shown to reduce complications and mortality with improved functional ability.

#### NUR412

##### Community Health — The Emerging Roles of Resource Nurses in KK Women's and Children's Hospital

**Z MOHD YATIM<sup>1</sup>**

<sup>1</sup>Nursing, KK Women's and Children's Hospital, Singapore

**Introduction:** Innovative methods for incorporating new knowledge into nursing practice are necessary to bring meaning and substance to patient education and advocacy. For any nursing role to be successful, it needs to fit into the healthcare system and fulfill the unmet needs for society.

**Methods:** Responding to these needs, KKH provides resource nurses with the expertise, knowledge and skills to deliver education and support services. Their goals are to reduce stress and anxiety, as well as to enhance coping skills among patients/caregivers by providing them with emotional support. These resource nurses understand not only the unique characteristic of the healthcare system, but also the cultural and ethnic background of the patients whom he/she serves. They are the important link in the continuum of healthcare.

**Results:** These nurses conduct teaching programmes to the communities, work together with the staff to promote family-centred care, offer input in planning programmes and policies, identify family concerns and priorities, create educational and support resources for families and contribute to the education of healthcare providers. They thereby promote preventive healthcare through a comprehensive and multi-faceted approach.

**Conclusion:** Patient education is a continual process. It provides clients and family with accurate information. Training in home care management helps prevent re-admission, decrease overall economic cost and gives a better quality of life for the clients. Hence, it promotes the smooth transition back into the community and improves their quality of life. Furthermore, these resource nurses bridge the gap among the doctors, patients and their family, hence promoting collaboration, co-ordination and cost-effectiveness of healthcare services.

**NUR413**

**An Action Research Project for the Development, Implementation and Evaluation of Focus Charting as a New Nursing Documentation System in a Children's Hospital**

**YY CHIA<sup>1</sup>, GM LAU<sup>1</sup>, V NADESAN<sup>1</sup>, LL ONG<sup>1</sup>, ST WONG<sup>1</sup>, BE SIM<sup>1</sup>**  
<sup>1</sup>Nursing, KK Women's & Children's Hospital, Singapore

**Aim:** To develop, implement and evaluate focus charting (FC) as a new nursing documentation system in a children's hospital. To identify the strengths and weaknesses of narrative charting (NC); develop the focus charts and the nursing documentation audit tool; equip the nurses with the knowledge and skills in using focus charts; pilot Focus Charting; conduct the nursing documentation audit during the pilot phase; improve and revise the focus charts; monitor and report the progress of change.

**Methods:** Action research (AR) was the primary research methodology, supplemented by the pre-course survey, "Your Opinion Counts" (YOC) survey, audit feedback survey and the audits. The questionnaires comprised closed and open-ended questions or statements rated on a 5-point Likert Scale. A wide variety of other data collection methods were used e.g. field notes, observations and meetings. Descriptive analysis and content analysis were used for closed and open-ended responses respectively.

**Results:** The cyclic process, participation, collaboration and innovation, promoted by AR generated creative ideas and practical knowledge on the design and use of the focus charts. The pre-course and the YOC surveys revealed that FC was favoured. The audit feedback survey showed less time and effort was needed for FC assessment and handover but more time to complete, as compared to NC. The audits revealed standards and criteria that achieved high or low compliance.

**Conclusion:** For any documentation system to work successfully requires individual and team effort, effective teaching and learning, communication and continuous monitoring through regular audits. A variety of data collection methods provided useful information for further action and began another round of AR cycle where refinements are made.

**NUR414**

**Lower Abdominal Surgery — To Shave or Not to Shave: A Systematic Review**

**CP GOH<sup>1</sup>, PE GIAM<sup>1</sup>, SP CATHERINE<sup>1</sup>, LL CHEE<sup>1</sup>, MZ HAN<sup>1</sup>, HL SEAH<sup>1</sup>, EP SEBHA<sup>1</sup>**  
<sup>1</sup>Nursing, KK Women's and Children's Hospital, Singapore

**Aim:** To study the need for preoperative shaving on patients undergoing lower abdominal surgery in relation to surgical wound site infection.

**Methods:** This systematic review reviewed articles on preoperative hair removal for patients undergoing surgery. Key words used for the literature search were "lower abdominal surgery, shaving, hair removal, skin preparation, infection rate, wound breakdown, patient's comfort and preoperative care". Electronic searches on Ovid, Pubmed, Cochrane, CINAHL and CDC Guidelines yielded a total of 642 articles. Five of these articles were identified for this systematic review. The inclusion criteria were systematic review or quasi-randomised controlled trials, various methods of hair removal, time of shaving and surgical site infection rate. Cases requiring oral, rectal, oncology and plastic surgeries were excluded from the review.

**Results:** A systematic review that reviewed 22 studies recommended no hair removal prior to surgery. Other studies had supported that razor shaving decreased skin integrity, resulting in nicks and cuts on the skin surface. The Center for Disease Control and Prevention (CDC) recommends that hair should not be removed preoperatively unless the hair at or around the incision site will interfere with the surgical procedure. If hair is to be removed, removal should be done immediately before the procedure, preferably with electric clippers.

**Conclusion:** This systematic review supported that surgical site hair need not be removed in order to reduce the risk of infection. Therefore, a cohort study will be conducted to determine if there is any statistical significance in surgical wound site infection in patients without preoperative shaving.

**NUR415**

**To Sponge or Not to Sponge**

**GMLAU<sup>1</sup>, SL LIM<sup>1</sup>, PK LIM<sup>1</sup>, RYF LEE<sup>1</sup>, BE SIM<sup>1</sup>, V NADESAN<sup>1</sup>, SK TOR<sup>1</sup>**

<sup>1</sup>Nursing, KK Women's and Children's Hospital

**Aim:** To review the effectiveness of tepid sponging in reducing body temperature of paediatric patients in the hospital.

**Methods:** A systematic review was used where a wide variety of sources were searched, relevant papers critically appraised and ranked for quality, reliability, generalisability and applicability.

**Results:** Insufficient evidence was found to demonstrate or refute tepid sponging alone is effective in normalising temperature. There was limited evidence from the review that tepid sponging has an antipyretic effect. The effectiveness of tepid sponging as a treatment alongside paracetamol varied between studies, with some finding that it was of no benefit, whereas others suggest that it was helpful. However, opinions varied among experts about the actual benefits and adverse effects of tepid sponging. The common adverse effects of tepid sponging included shivering, crying, and discomfort which warranted a review of practice. In fact, this adverse effect caused rebound rising of body temperature. Also, tepid sponging did not sustain temperature reduction.

**Conclusion:** Empirical evidence showed that febrile children were frequently upset and crying inconsolably during tepid sponging. This is congruent with our findings and we do not advocate tepid sponging as a mode of temperature reduction in febrile children. Moreover, tepid sponging could be a waste of valuable nursing time.

**NUR416**

**Breast Self-Examination Behaviours among Female Relatives of Cancer Patients**

**GY LEE<sup>1</sup>, C TAN<sup>2</sup>**

<sup>1</sup>Nursing, National Cancer Centre, Singapore, <sup>2</sup>Quality Management, SingHealth HQ, Singapore

**Aim:** To identify factors associated with the use of breast self-examination (BSE) among female relatives of cancer patients who were being followed at the National Cancer Centre Specialist Outpatient Clinics.

**Methods:** A survey was conducted using the instrument adapted and modified from the Health Belief Model Questionnaire developed by Champion (1984, 1995).

**Results:** Twenty-eight per cent of the respondents mentioned it was the first time they have heard of BSE, of whom only 17% of them expressed confidence they could perform BSE correctly to detect problems. Those above 40 years old seemed more confident in BSE than those below 40 years of age. The respondents who perceived a higher confidence in BSE were more likely to perform BSE. For the respondents (56.7%) who practised BSE, 41.8% of them did it monthly and 17.7% did it 4 to 10 times a year. Only 39.4% of the respondents indicated that they performed BSE after their menstrual period. The BSE practisers were significantly more confident in performing BSE to detect for breast lumps compared to the non-BSE practisers. More BSE practisers received health education compared to the non-BSE practisers ( $P < 0.001$ ). The respondents of relatives with breast cancer viewed themselves as more susceptible to breast cancer and more of them practised BSE compared to those with relatives of other cancers.

**Conclusion:** The study results revealed the uptake of BSE was unsatisfactory and required active promotion, especially for women younger than 40 years old as mammography is recommended for those 40 years and above.

## NUR417

**Improving the Work Process for the Handling of Histology Charges at the National Cancer Centre's Operating Theatre****GJT LIM<sup>1</sup>**<sup>1</sup>Nursing - Operating Theatre/Endoscopy Suite, National Cancer Centre, Singapore**Aim:** To improve the work process for the handling of histology charges at the operating theatre.**Methods:** Historically, charges for patients' histology specimens were based on the quantity and estimated size of the specimens. Patients who had undergone day surgery/procedure in the National Cancer Centre's Operating Theatre (NCC OT) would receive their finalised bills before leaving the institution. Although this process of same-day bill finalisation had eased the billing process, there was the tendency to undercharge patients for histology specimens as interpretation of specimens may be different from the histology department and additional tests may be done. Eventually, this led to revenue loss and complaint from a patient because he was charged more than what he was told by the listing nurse. Recognising the potential source of revenue leakage as well as addressing the source of customers' dissatisfaction, the NCC's OT decided to review the work process for the handling of histology charges. With the modified process, patients would not be receiving their finalised bills on the day of their surgery. They would only received their bills after the histology department had confirmed the charges for the investigation of the specimens.**Results and Conclusion:** Through the improved work process, NCC OT was able to make a significant reduction in revenue loss for the institution and address the potential source of customer dissatisfaction. An overview of the process modifications, issues and problems encountered, and advantages will be discussed.

## NUR418

**Quality of Life in Patients with Parkinson's Disease****PN LAU<sup>1</sup>, RD JAMORA<sup>2</sup>, LCS TAN<sup>2</sup>**<sup>1</sup>Nursing, <sup>2</sup>Neurology, National Neuroscience Institute, Singapore**Aim:** To identify the demographic and disease-specific data related to quality of life in patients with Parkinson's disease (PD) using the Parkinson's Disease Quality of Life 8 (PDQ8) questionnaire.**Methods:** All consecutive PD patients, who could read English or Chinese seen at the Movement Disorders clinic of NNI were asked to self-administer the PDQ8 questionnaire without relatives' assistance. Patients with concurrent dementia (Chinese mini-mental state examination score equal or less than 20) were excluded.**Results:** A total of 170 PD patients completed the self-administered PDQ8 questionnaire. There were 119 males. The patients' mean age was 61.33 ± 9.89 years, mean age at diagnosis was 57.39 ± 10.58 years, and mean duration of disease was 4.61 ± 3.81 years. The mean PDQ8 summary index (PDQ8SCI) was 27.70% ± 19.87%. There was no inter-racial difference in their mean PDQ8SCI: Chinese (27.57% ± 20.00%), Indians (26.20% ± 19.96%), and Malays (31.60% ± 19.36%) ( $P = 0.962$ ). The factors associated with a poorer quality of life in PD patients were: duration of disease ( $P < 0.001$ ; 95% CI, 0.61-2.14), Hoehn and Yahr stage ( $P < 0.001$ ; 95% CI, 5.47-13.65), and motor score ( $P < 0.001$ ; 95% CI, 0.36-0.88). Patients' age at diagnosis was inversely related to a poorer quality of life [ $P = 0.022$ ; 95% CI, -(0.61-0.05)].**Conclusion:** The quality of life of patients with PD was similar across the races. The factors associated with a poorer quality of life were: longer duration of disease, higher Hoehn and Yahr stage, higher motor score and younger age at diagnosis.

## NUR419

**Complementary Therapies in Patients With Parkinson's Disease****PN LAU<sup>1</sup>, DRG JAMORA<sup>2</sup>, LCS TAN<sup>2</sup>, ESY CHAN<sup>3</sup>**<sup>1</sup>Nursing, National Neuroscience Institute, Singapore, <sup>2</sup>Neurology, National Neuroscience Institute, Singapore, <sup>3</sup>Clinical Trials and Epidemiology Research Unit, Singapore**Aim:** To determine the frequency and spectrum of the use of complementary therapies (CTs) and its association with socio-demographic or disease-specific characteristics amongst patients with Parkinson's disease (PD).**Methods:** A standardised structured questionnaire exploring the usage of CTs was administered to 159 patients via a face-to-face or telephone interview. Consecutive patients with a diagnosis of PD who were seen at the Movement Disorders clinic of NNI from 23 March to 25 May 2004 were recruited. Patients with concurrent dementia with CMMSE score of <20 or residents of nursing homes were excluded.**Result:** Sixty-one per cent (95% CI, 55-67) of participants used at least 1 type of CT for PD. The most common CTs used were traditional medicine, acupuncture and vitamins/health supplements. Amongst CT users, 40% (95% CI, 32-48) subjectively reported some improvement of their symptoms. However, only 16% (95% CI, 11-24) informed their physicians of their use of CTs. Due to unequal follow-up times, a survival analysis approach was adopted for statistical analysis. The rate of starting CT use was 1.2/100 person months. At 3 years after PD diagnosis, 48% had started using CTs. Amongst a subgroup, participants with a baseline UPDRS motor score of >16 had a 2.5 times significantly greater risk for starting CTs compared to those with a baseline score of <16 ( $P = 0.031$ ; 95% CI, 1.1-5.8).**Conclusion:** The use of CTs is high amongst PD patients. Patients with more severe motor dysfunction at onset are more likely to use CTs.

## NUR420

**Association of Restless Legs Syndrome among Parkinson's Disease Patients****J LEE<sup>1</sup>, EK TAN<sup>2</sup>**<sup>1</sup>Nursing, <sup>2</sup>Neurology, National Neuroscience Institute, Singapore**Aim:** The association between restless legs syndrome (RLS) and Parkinson's disease (PD) has been debated. The presence of an impaired central dopaminergic transmission and response to dopaminergic medications in restless legs syndrome (RLS) suggest an aetiologic link between RLS and PD. Our preliminary observation reported a low prevalence of RLS in PD.**Methods:** Consecutive PD patients ( $n = 200$ ) were prospectively evaluated in our movement disorders clinic. The prevalence of RLS was determined by the diagnostic criteria of the International Restless Legs Syndrome Study Group (IRLSSG). In addition, the Epworth Sleepiness Scale (ESS) was also administered.**Results:** There were 65% men and 35% women in this study, with a mean age of 63.0 ± 8.1 years and a mean age of disease onset of 57.5 ± 9.0 (SD) years. Twenty-three patients (11.5%) had motor restlessness. One patient (0.05%) satisfied the IRLSSG diagnostic criteria of RLS. The mean ESS score in those with motor restlessness was higher than those without (5.1 vs 2.4) ( $P < 0.05$ ).**Conclusion:** Our study demonstrates that motor restlessness was present in 11.5% of our PD patients. Those with motor restlessness tend to have a greater tendency for hypersomnolence. However, the prevalence of RLS in our PD patients was very low.

## NUR421

**Perception of Stress in an Intensive Care Unit Setting among Nurses Working in an Intensive Care Unit and General Ward****HL LIM<sup>1</sup>, CP LEE<sup>1</sup>, SL WONG<sup>1</sup>**<sup>1</sup>Anaesthesia and Surgical Intensive Care, Singapore General Hospital, Singapore**Aim:** To compare the perception of stress level in an intensive care unit

(ICU) setting between nurses working in the ICU and the general ward in a hospital.

**Methods:** The study was conducted in an ICU and selected general wards of a local restructured hospital to compare the perception of stress in ICU setting between critical care and general ward nurses. Registered nurses (n = 166) participated in this study on an anonymous and voluntary basis. Sixteen critical care and 150 general ward nurses completed the questionnaire. A survey research method was adopted in which a questionnaire was designed for data collection. Four clusters of stress variables: (a) nature of direct patient care, (b) inadequate knowledge and skills, (c) interpersonal conflict and (d) management of the unit were incorporated into the questionnaire, which also contained data on participants' background information.

**Results:** There was a significant difference between actual stress experienced by intensive care unit nurses and stress level perceived by general ward nurses. The result also indicated that general ward nurses had misconceptions on the stressors in the intensive care setting.

**Conclusion:** From the results of this study, the major stressors experienced by ICU nurses and the main misconceptions from the general ward nurses on ICU setting had been identified. Correction of any misconception could thus help in the recruitment of general ward nurses to ICU and relevant coping strategies could be engaged by ICU nurses so as to manage stress more effectively.

#### NUR422

##### To Ensure Patients Get Medication on Time

**PYL YONG<sup>1</sup>, GE LEE<sup>1</sup>, SCH LEE<sup>1</sup>, CT KHAW<sup>1</sup>, SB ARSAD<sup>1</sup>, M MASUDI<sup>1</sup>, SJ SAKIBIN<sup>1</sup>**

<sup>1</sup>Anaesthesia and Surgical Intensive Care, Singapore General Hospital, Singapore

**Aim:** To reduce the time taken to serve medication by 60 minutes.

**Methods:** A simplified relations diagram was used to analyse the causes for the delay in obtaining medications for the patients. The causes identified were manpower shortages, lack of co-ordination and storage space constraints. The team brainstormed for ideas that would ensure seamless service and a cost-effective way of dispensing medications. The ideas generated were the use of telelift system, a vending machine or a central console system. The team used the tree diagram matrix approach to grade various ideas based on the criteria such as cost-effectiveness, security, time savings and easy maintenance. The team collaborated with the Pharmacy Department to source a suitable design for dispensing medication.

**Results:** The team decided to use the Pyxis Medstation for dispensing medication. The Pyxis Medstation is an advanced, point-of use system that automates the distribution, management and control of medications. Each transaction conducted at the Medstation is electronically accessed using an individually assigned identity and password, which is stored at the central computer in the Pharmacy. The time taken to serve medication was reduced by 88 minutes and substantial cost savings per year was achieved.

**Conclusion:** The nurse is able to deliver quality and seamless service and the patient gets medication on time. There is an assurance of accountability and patient safety as all medications retrieved from the Medstation are recorded. It is also cost-effective as the work process is reduced, maximising human resource.

#### NUR423

##### To Improve Delivery of Patient-related Information Upon Discharge

**LL CHONG<sup>1</sup>, HL LEE<sup>2</sup>, YM KOH<sup>2</sup>, L NASRON<sup>3</sup>, D TAN<sup>4</sup>, CG TAN<sup>5</sup>, P TAN<sup>6</sup>**

<sup>1</sup>Haematology, <sup>2</sup>Nursing, <sup>3</sup>Occupational Therapy, <sup>4</sup>Physiotherapy, <sup>5</sup>Rehabilitation Medicine, <sup>6</sup>Renal Medicine, Singapore General Hospital, Singapore

**Aim:** The project aimed to reduce the time taken for the delivery of patient-related information upon discharge by 70%.

**Methods:** A survey on discharge process was conducted on nurses (n = 18) and patients (n = 42). Nurses reported that with multiple discharge documents, the discharge process became complicated. Two patients felt stressed upon receiving discharge information delivered in a disorganised manner. A motion study on discharge workflow process showed that the process took 83 minutes per patient. The following were identified as root causes: too many steps in the discharge process, too much information to be delivered, too many loose documents and late discharge decision. With a tree matrix diagram, creative solutions were selected for implementation. Firstly, give advance notice on discharge plan. Secondly, the discharge documents and caregivers' teaching must be carried out 1 day in advance. Finally, a computer-generated Appointment Summary Sheet for easy tracking of appointments and a plastic holder to file all loose discharge documents were given to patients.

**Results:** There was a time saving of 52% (43 minutes/patient or 2093 hours per year) and better spending on nursing manpower cost of \$29,302 per year for the newly admitted patients. Post-implementation feedback had showed an increase in work satisfaction from nurses and patients' satisfaction during the discharge process.

**Conclusion:** The new workflow was able to facilitate early discharge for patients with multiple discharge documents. With shorter waiting time for beds, prompt treatment can be rendered to the acute cases.

#### NUR424

##### Examining the Efficacy of Programmed Breathing Technique (PBT) as a Pain Relief Measure for Patient Who is Receiving Subcutaneous Neupogen (Filgrastim)

**EBE LIM<sup>1</sup>, H ABDUL RAHIM<sup>1</sup>, LP NGO<sup>1</sup>, CSC TAN<sup>2</sup>, X YAN<sup>3</sup>**

<sup>1</sup>Haematology, <sup>2</sup>Clinical Trials and Epidemiology Research Unit, Singapore General Hospital, Singapore, <sup>3</sup>Research, Ministry of Health, Singapore

**Aim:** To determine the efficacy of programmed breathing technique (PBT) in managing pain during the subcutaneous administration of Neupogen (filgrastim) for haematology patients.

**Methods:** The study involved 100 patients who were receiving subcutaneous Neupogen for haematological indications. They were assigned to either the experimental group or control group according to randomisation list prepared by the statistician. Subjects in the experimental group received instructions in breathing exercises. After needle entry, medication was pushed during deep inspiration and withheld on expiration. This continued till all medication in the syringe was administered. Subjects in both groups marked their pain score on any point of the 10 cm VAS line that best described his/her pain level after the injection. This marking was measured against the ruler in millimetre and indicated the pain score.

**Results:** Using Levene's test, the *P* value (0.008) was less than 0.05. A 2-tailed *P* value (0.002) showed there was a significant difference between the 2 groups. The 95% confidence interval (0.32290, 1.45532) positively implies that deep breathing actually reduce pain score. The mean pain score in the experimental group (1.2780) was 41.6% less than that of the control group (2.1889).

**Conclusion:** Our study showed that patients who performed PBT during the administration of subcutaneous Neupogen injection experienced less pain than those who did not. This simple measure was able to make a significant difference to help make the pain experience, if not pleasant, at least more tolerable for our patients.

#### NUR425

##### 100% Compliance to Hand Hygiene – Are We There Yet?

**KY TAN<sup>1</sup>, KS NG<sup>2</sup>, ML LING<sup>2</sup>, LC LEE<sup>1</sup>, PC LOW<sup>2</sup>**

<sup>1</sup>Infection Control Unit, <sup>2</sup>Quality Management, Singapore General Hospital, Singapore

**Aim:** Healthcare-associated infections have been frequently associated with high morbidity and mortality rates among hospitalised patients, increased healthcare cost and occasionally with legal implications. Although hand



hygiene has been proven to effectively reduce the spread of microorganisms at healthcare facilities, healthcare workers often do not wash their hands when recommended. The objective of the project was to improve hand hygiene compliance in healthcare workers using a multi-pronged approach.

**Methods:** The project was carried out from March 2004 to May 2005. A multi-disciplinary team was formed and brainstormed the contributing factors of non-compliance. The effectiveness of the interventions was evaluated using an on-going hand hygiene audit tool. Several root causes for non-compliance were the lack of role models, lack of training, healthcare workers' forgetfulness and the poor quality of the hand rub products.

**Results:** Several interventions were implemented. These included the appointment of role models to exert peer pressure in improving hand hygiene; display of educational posters at all patient care areas, organising a poster competition; producing patient educational pamphlets; and evaluation of new hand rub products. The effectiveness of the project was evaluated by monitoring ongoing hand hygiene compliance. We noted an improvement from a median hand hygiene compliance rate of 93% to 100% following the interventions.

**Conclusion:** We have demonstrated the effectiveness of a multi-pronged approach programme in improving hand hygiene compliance. This is further enhanced by the strong support demonstrated by the hospital leadership.

#### NUR426

##### The Study of the Relationship Between the Demographics of Caregiver and the Level of Participation in Diabetes-related Foot Outcomes

**CJ SIAH<sup>1</sup>, R KWAN<sup>1</sup>**

<sup>1</sup>Internal Medicine, Singapore General Hospital, Singapore

**Aim:** This study aimed to explore how the demographics of the caregivers would affect the diabetic elderly's level of participation in diabetic-related foot outcomes. We could then identify the possible resources to meet the caregiver's needs in taking care of the diabetic elderly, thereby decreasing the risk of amputations that lead to lower quality of care.

**Methods:** The study was conducted in SGH Ward 46 (Endocrine), Ward 73 (Medical) and Ward 76 (Orthopaedic) and targeted 30 elderly diabetic patients over 60 years of age with diabetic-related foot complications. Upon admission, the researcher assessed the subject's medical history to ascertain his/her suitability for the study by reviewing their foot condition and their age. Upon meeting the inclusion criteria, the researcher identified the patient's main caregiver and sought his/her participation in completing the questions. Data on the caregiver's demographics and the patient's foot condition were recorded.

**Results:** Descriptive statistics were used to describe the data. Spearman's order correlation was used to analyse the relationship between the demographics of caregiver and the level of caregiver support of the diabetic elderly. The level of significance was taken as  $P = 0.05$ .

**Conclusion:** From the survey we conducted on 30 participants, it was shown that the level of family involvement played a significant part in motivating the diabetic patient towards better disease management. The majority of the patients interviewed had low family involvement. The main reasons for low family involvement by the caregiver were lower education level and lower financial income.

#### NUR427

##### To Reduce Time Taken in Handing Over Patient's Report by Nurses

**T SINNAPPAN<sup>1</sup>, R KWAN<sup>2</sup>, T VELLASAMY<sup>2</sup>, MK PHOON<sup>2</sup>**

<sup>1</sup>Internal Medicine, <sup>2</sup>Nursing, Singapore General Hospital, Singapore

**Aim:** 1) To improve clinical quality management for patient care. 2) To improve work process in terms of cost, labour, materials and time saving. 3) To improve work environment. 4) For comprehensive integrated clinical practice.

**Methods:** The Gantt chart was used for the actual progress of our project and a flow chart was used to identify the sequence of actions. A relation diagram was used to analyse the process to help identify and eliminate unproductive steps. Solutions that met the organisation's goals and objectives were used. Members used ideas and creative-thinking techniques such as Serendipity, Random Word and Delphi. Facilities and plant engineering staff were consulted to modify a trolley with a "door and lock" to ensure patients' records were kept safe and confidential.

**Results:** Post-implementation results showed that 1 minute was spent compared to 3.6 minutes before implementation. Therefore, there was a reduction of 2.6 minutes. Annually, the time savings amounted to 4380 hours; material savings, \$3,074.20; manpower savings, \$45,721. A 12-compartment box was built and placed on the second shelf of the existing stainless steel procedure trolley. The in-patient medical record, nursing care record and progress notes were placed into 1 file instead of 2 different files. A designated room was introduced for the handing-over of patients' reports to ensure privacy and confidentiality.

**Conclusion:** We met our organisation's objectives through improved clinical quality management for patient care and improved work process.

#### NUR428

##### A Descriptive Studies on the Extent of Knowledge that Epileptic Patient have on their Neurological Disorder — Epilepsy

**K HUSSEIN<sup>1</sup>, J LIU<sup>1</sup>**

<sup>1</sup>Nursing Administration, Singapore General Hospital, Singapore

**Aim:** To assess the extent of knowledge of patients who have epilepsy so that nurses can design educational packages to cater to the special needs of these patients.

**Methods:** One hundred and two epilepsy patients were recruited either during their consultation at specialist outpatient clinic or during admission to the wards in the Singapore General Hospital. Face-to-face interviews were conducted using structured closed-ended questionnaires which included topics related to safety, compliance, driving and employment.

**Results:** Out of 102 epilepsy patients, 55 (53.9%) were male and 47 (46.1%) were female. Their age ranged from 20 to 50 years. The highest education level obtained ranged from primary level to university. Forty-two (41.2%) patients were unemployed and 60 (58.8%) were employed. The duration of epilepsy ranged from 1 to 50 years. 69.6% of patients believed that inadequate sleep and 79.4% believed that stress could trigger a seizure attack. However, only 27.5% of patients who did not drink agreed that alcohol could trigger seizure attacks. Most of the patients showed positive attitude on medication compliance and regular follow-up with their doctors, with 90 (88.2%) patients agreeing to go for follow-up visit even though they have been seizure-free for 6 months. Patients were more aware that epilepsy is not infectious or contagious. There is still uncertainty when answering question on whether epilepsy patients can have children: 81 (79.4%) agreed, 14 (13.7%) disagreed and 7 (6.9%) were not sure whether epilepsy patients can have children. Many patients were not aware that they were not allowed to drive in Singapore; 68 (66.7%) patients thought they could drive and 32 (31.4%) knew they were not allowed to drive. Fifty-six (54.9%) patients agreed that an object should be placed in the mouth during seizure attack while 44 (43.1%) disagreed.

**Conclusion:** Patients with epilepsy are still lacking in knowledge about their disorder, regardless of their age, educational level, or number of years with epilepsy. There is a need for educational intervention, particularly related to safety precaution and prevention, social aspect such as driving or employment and the disease itself.

#### NUR429

### Nurses' Understanding on the Process of Case Management and Their Satisfaction with the Services Provided by Case Managers/ Nurse Case Co-ordinators

**R ANANG<sup>1</sup>**

<sup>1</sup>Nursing, Singapore General Hospital, Singapore

**Aim:** This study aimed to assess and better understand the relationship between nurses' understanding of case management processes and their satisfaction level with services provided by case managers.

**Methods:** A questionnaire designed to allow respondents to rate their own knowledge of and satisfaction with aspects of case management were distributed to nurses working where case management is practised. Fifty-one Singapore General Hospital and 49 Institute of Mental Health nurses responded to the survey. Approval from the ethics committee of both institutions were obtained.

**Results:** Fifty-nine per cent of respondents perceived their case management knowledge to be fair. With more years of service, more respondents perceived their knowledge to be fair to excellent. Those with "excellent" self-rating of understanding belonged only to the 16 to 20 years of service group. A large proportion of those surveyed were either slightly (50%) or fairly (39%) satisfied with case management. Analysis showed significant correlation between understanding and satisfaction.

**Conclusion:** The majority of nurses believe they have some level of understanding of case management and are satisfied with it and the services provided by case managers. The longer the years of service, the higher the level of understanding and the greater the level of satisfaction.

#### NUR430

### Creating Job and Building Knowledge Workforce through Work Redesign

**AL HO<sup>1</sup>, SH LIM<sup>1</sup>, AP TAN<sup>1</sup>, MK FONG<sup>2</sup>**

<sup>1</sup>Nursing, Singapore General Hospital, Singapore, <sup>2</sup>Nursing, National Heart Centre, Singapore

**Aim:** This paper illustrates the work redesign project initiated in Singapore General Hospital with the aim of increasing the value of the work performed and professionalism of the patient support and nursing jobs.

**Methods:** This project is done through a systematic process of reviewing the job contents and re-training of nursing and nursing support roles in the patient care chain. Feedback and suggestions were gathered from the staff. Training needs of the targeted nursing support staff and nursing staff were identified. Structured training courses including post-training competency assessment were designed for the targeted groups of nursing and patient support staff.

**Results:** Since the programme started, we have trained a significant number of staff. Feedback from the staff has been positive. The pilot group of patient care assistants, who completed the training of performing 12-lead electrocardiogram and have taken over the job formerly performed by an ECG nurse (enrolled nurse grade) or house officer, felt that their jobs were more enriching and satisfying. Healthcare attendants are now able to assist the nurses in basic nursing care and respond to the enquiries of the patient more confidently. We are seeing more unemployed locals coming forward to be trained to work in the healthcare setting. Since June 2004, we have recruited 20 local patient care assistants, 4 patient service clerks and 11 healthcare attendants.

**Conclusion:** The results reflect the positive progress made by the work redesign project. Staff are equipped with additional knowledge and skills to do their jobs, work productivity is increased and value added to nursing and nursing-support jobs. Non-nursing roles are taken over by support staff and redistributed to nursing-support staff, enabling senior enrolled nurses and staff nurses to make better use of their professional skills and abilities and devote more time to patients. This project has increased job satisfaction, improved work productivity and enhanced the career prospects of nurses and nursing-support staff.

#### NUR431

### To Improve Method in Priming Intracranial Pressure Line

**J KAMSIAH<sup>1</sup>, HK HO<sup>1</sup>, SH CHUA<sup>1</sup>, SH CHUA<sup>1</sup>, S A/P MUNUSAMY<sup>1</sup>**

<sup>1</sup>Nursing, Singapore General Hospital, Singapore

**Aim:** To reduce the process of priming intracranial pressure (ICP) line and to improve the quality of patient care.

**Methods:** A simplified relation diagram was used to identify the root causes for priming the line. The causes identified were manpower, time wastage, and dislodge of the drip chamber and regulator. The team brainstormed for ideas that were cost-effective, time-saving and increased efficiency. We used the tree diagram matrix to approach and work flow chart to identify the time spent priming the ICP line. Data were collected in the Neurology ICU.

**Results:** The team decided to improve the process by introducing a new method which is safe and less time-consuming. We used 20 mL of normal saline attached to a disposable transducer and lightly syringed normal saline into the line in order to prevent air from entering. We avoided using a drip chamber and regulator; instead, we used disposable 5 mL syringes to flush the ICP line, so that we would not be required to use the drip set. Our original target was 46% but we managed to achieve 53%. We exceeded our target by 7% through reductions in processes with our new method. The savings on manpower was \$2737.50 and the savings on normal saline was \$2701; the total cost saving was \$5438.50.

**Conclusion:** With good teamwork, ideas can be generated. This project that improved the work process for the department was well accepted by the staff. The ideas and thoughts generated during brainstorming sessions were stimulating and added pleasure to our daily work.

#### NUR432

### Improve Patient Family Education and Enhance Compliance in the Tertiary Care Hospital

**K KAUR<sup>1</sup>, SL ONG<sup>1</sup>, AM TAN<sup>1</sup>, DO SUSANTI<sup>1</sup>, SH LIM<sup>1</sup>, ML LING<sup>2</sup>, A GOH<sup>3</sup>**

<sup>1</sup>Nursing, <sup>2</sup>Quality Management, <sup>3</sup>Health Information Management, Singapore General Hospital, Singapore

**Aim:** To improve compliance to provision of patient family education at the multidisciplinary tertiary care hospital by health care professionals.

**Methods:** Gaps identified were the abundant educational resources that were not readily available to the health care professionals who provide patient family education. There was no policy on patient family education and no way of tracking whether education had been provided. The education resources were reviewed, approved by clinical heads, reorganised and computerised for easy access and availability to teach online if necessary. The draft of the patient family education policy was approved by the management. A patient family education record (PFER) was developed and implemented for use by all nurses, doctors and allied health staff who had contact with patients/family. Health Information Management Service and the Quality Management team provided the support to audit and analyse the results. There are ongoing audits to improve compliance and to monitor patient feedback on being informed.

**Results:** Post-implementation results have been promising with a steady increase in compliance ranging from 50% to 85% for each group of health care professionals over a period of 8 months. A marked improvement was noted for compliance to provide patients with key information on their disease conditions, procedures, cost implications to allow patients/family to make informed choices regarding their care delivery.

**Conclusion:** Patient family education is now consistently provided with ease, documented in a standard form filed in the patient's medical record and used by all healthcare professionals wherever and whenever education takes place.

## NUR433

**A Study on Registered Nurses' (RN) Knowledge in Palliative Care in a Hospital Setting****N KAUR<sup>1</sup>, Z OSMAN<sup>1</sup>, SB ANG<sup>1</sup>, LK SIM<sup>2</sup>, KL ONG<sup>3</sup>, S BEDAH<sup>4</sup>**<sup>1</sup>Nursing, Singapore General Hospital, <sup>2</sup>Nursing, Alexandra Hospital, <sup>3</sup>Nursing, Bright Vision Hospital, <sup>4</sup>Nursing, Dover Park Hospice, Singapore**Aim:** The aim of this study was to measure the knowledge level of registered nurses (RNs) on palliative care, to identify misconceptions and to stimulate discussion about palliative care.**Methods:** A descriptive study was used to explore RNs' knowledge of palliative care. A convenience sample of 150 RNs across 4 wards was done. A questionnaire adapted from the palliative care quiz for nursing (PCQN), developed by Ross et al (1996) was used in the study. Out of the 150 questionnaires distributed, 133 (88.7%) responded. The questions for discussion were basically divided into 3 main categories. They were knowledge of palliative care, questions on pain and symptom management, and psychosocial and spiritual aspect. Data were analysed using SPSS 11.5.**Results:** Findings revealed that 35% of nurses had the misconception that palliative care is appropriate only when there is evidence that there is deterioration of patient's condition. The study also showed that 43% of RNs had knowledge deficits in the area of pain control and complex symptoms management in relation to the use of morphine. Fifty-seven per cent attributed the high number of deaths in the palliative care settings to burnout in healthcare providers. The findings from this study showed that many felt unable to give their best in the hospital environment as they felt that they lacked training and education.**Conclusion:** Incorporating some content on death and dying issues into structured programmes will help increase RNs' confidence in handling the dying patients and their families. Providing some basic knowledge of palliative care and symptom management to all nurses would ensure better quality of care for terminally ill patients in the hospital.

## NUR434

**A Quantitative Descriptive Study of Patients' Satisfaction with Urodynamics Studies****SK KOAY<sup>1</sup>, A MOHD BASIR<sup>2</sup>, P CHONG<sup>3</sup>, KE KOH<sup>4</sup>**<sup>1</sup>Nursing, <sup>2</sup>Renal Medicine, Singapore General Hospital, Singapore, <sup>3</sup>Private Dialysis Centre, Renal Dialysis Centre, Singapore, <sup>4</sup>Nursing, National University Hospital, Singapore**Aim:** The study aimed to identify patients' satisfaction towards different aspects of urodynamics study (UDS) and areas of improvement in care delivery.**Methods:** This prospective study was conducted with a convenience sample of subjects undergoing UDS at an outpatient urology centre. Questionnaires comprised 7 subscales which included overall patient satisfaction, interpersonal skills, technical skills, pain and discomfort, availability of care, physical environment and information related to UDS.**Results:** A total of 55 subjects were recruited. The mean of the total scores was 4.1. A mean score of 4.1 or above indicated that the subjects were satisfied with the particular subscales as indicated in overall patient satisfaction (4.3), interpersonal skills (4.4), information related to UDS (4.3), physical environment (4.2) and technical skills (4.1). A mean score of 4.1 or less indicated that the subjects were not satisfied with the particular subscales as indicated in availability of care (4.0) and pain and discomfort (3.9). Patients' satisfaction in interpersonal skills had the highest mean score followed by overall patient satisfaction, information related to UDS, physical environment and technical skills, which indicated that these factors played major role in attaining patients' satisfaction undergoing UDS. However, emphasis on greater need to focus on improvement in care delivery from the aspects of availability of care, pain and discomfort by providing better measures to relieve pain and discomfort to ensure satisfactory outcomes.**Conclusion:** The subjects were generally satisfied with the experience of undergoing UDS. The findings indicated that all subscales were important factors that can affect patients' satisfaction.

## NUR435

**An Analysis of Skin Prick Test Results of Rhinitis Patients at the ENT Centre, Singapore General Hospital****A LATIFF<sup>1</sup>, JL LEONG<sup>2</sup>, D LAU<sup>2</sup>, S DHARAMBAIR<sup>2</sup>**<sup>1</sup>Nursing, <sup>2</sup>Otolaryngology, Singapore General Hospital, Singapore**Aim:** To analyse the skin prick test (SPT) results of patients presenting with allergic rhinitis (AR) at the ENT Centre, Singapore General Hospital.**Methods:** A retrospective chart review of consecutive patients who had SPT performed for AR symptoms from 1 January 2004 to 1 January 2005 was carried out, with clinical features suggestive of AR. A screening panel, consisting of 17 aeroallergens, was used.**Results:** A total of 1000 patients underwent SPT during that period of time. The sex distribution was 54.6% males and 45.4% females. The average age was 32.87 years (range, 1 to 81 years). Ten per cent of patients did not have any positive SPT results and 86.5% had 2 or more positive SPT results. The commonest allergens were house dust mites, *dermatophagoides farine* (83.9%) and *dermatophagoides pteronyssinus* (81.7%), followed by American cockroaches (60.7%) and German cockroaches (55.1%). 15.6% of patients were children and young adults (age, <21 years). They were found to be significantly more reactive to the house dust mite allergen ( $P < 0.05$ ) and significantly less sensitive to outdoor grasses Bahia and Bermuda ( $P < 0.05$ ). No other significant differences were found between sex and age. However, among the different races, Malays had the lowest positive SPT results (4.1%) compared to other races – Chinese (76%), Indians (13.6%) and others (6.3%).**Conclusion:** From the study, we have determined the common allergens affecting the local allergic rhinitis population. Our population is more sensitised to indoor than outdoor inhalant allergens. The younger population was also found to be more sensitised to indoor allergens as compared to the older population.

## NUR436

**A Retrospective Study on an Intervention on Phosphate Levels in Patients Undergoing Peritoneal Dialysis****A MOHD BASIR<sup>1</sup>, SF NG<sup>2</sup>, SHK QUEK<sup>2</sup>**<sup>1</sup>Nursing, <sup>2</sup>Renal Medicine, Singapore General Hospital, Singapore**Aim:** The aim of the study was to determine the effect of an educational intervention on renal patients' serum phosphate levels and to examine factors that affect education.**Methods:** This retrospective study was conducted at the peritoneal dialysis centre in the Singapore General Hospital. Sixty-two per cent of patients who had evaluated the feedback form from the education workshop were selected for this study. Data checklist and patients' casenotes were used to provide information to examine the relationships between variables and compliance with the patient's medication and diet. The researchers used Statistical Package for Social Sciences (SPSS 11.0) for data analysis.**Results:** Following the educational intervention, the patients' phosphate level was 46% compared to the pre-phosphate level of 54%. Before the educational intervention, the majority of the patients scored below the normal range of albumin level which was <37.0; however, after the intervention, the majority was within the normal range of >37.0. No significant changes were noted in their calcium levels. In view of their KT/V (adequacy of dialysis), the results were below normal range level of <1.7. The results also showed that the effectiveness of patient education on peritoneal dialysis is more positive than it is for patient education in general. When data were compared, there were improvements in patients' physical activity, mental well-being and nutritional awareness.**Conclusion:** The results suggested that the educational intervention had helped patients make some changes in their diet and reinforced the correct way of taking phosphate binders. Educational interventions that include counselling, reminders, close follow-up, supervised self-monitoring and rewards for success can improve both patients' adherence and treatment outcomes.

#### NUR437

##### Nurses' Perception on Elderly Abuse

**N NEELA<sup>1</sup>, SL WEE<sup>1</sup>, M JOSEPHINE<sup>1</sup>, LY NG<sup>1</sup>**

<sup>1</sup>Nursing, Singapore General Hospital, Singapore

**Aim:** The aim of this study was to define elderly abuse, to identify the risk factors of elderly abuse and to identify the barriers to reporting elderly abuse.

**Methods:** The study used a qualitative phenomenological design. Data were collected through non-standardised scheduled interviews of a purposeful sample of 8 nurses who were employed in Singapore. Data were analysed by qualitative content analysis through the Colaizzi method.

**Results:** Elderly abuse was discussed in both the home and institutional context. The data revealed important themes on the definition of elderly abuse, and subthemes on the types, possible factors and barriers to reporting elderly abuse, management and tension in decision-making in the Singapore context.

**Conclusion:** The most important findings of this study were the commonly held naïveté about elderly abuse and the expectation of societal interventions. However, the findings did throw new light on how to perceive and approach elderly abuse. As nurses, there are ways we can help the elderly and their family to prevent elderly abuse.

#### NUR438

##### Closing the Communication Gaps Between Patients and Nurses

**HH PNG<sup>1</sup>, SH LIM<sup>1</sup>, LK LIM<sup>1</sup>, LH TAN<sup>1</sup>, FC LIM<sup>1</sup>, SD ONGKOJOYO<sup>1</sup>**

<sup>1</sup>Nursing, Singapore General Hospital, Singapore

**Aim:** To improve communication between patients and nurses due to language barriers, medical conditions or environment. Communication is a problem for patients who only speak dialects. With many regional patients, communication difficulties are more prominent. Communication is also a problem for patients who had surgeries or were too ill to talk.

**Methods:** A project team of nurses spent 2 weeks observing the daily activities (based on nursing care records) of 100 patients and 65 nurses.

**Results:** The results showed that 30% of elderly patients, 5% of foreign patients who do not speak English and 7% of the patients who underwent surgery or were too ill to talk had difficulty communicating. There are also 38% of non-speaking dialect nurses and 8% of nurses who were unable to speak common dialects. The daily activities were graphically illustrated and described in 9 different languages compiled in a book known as the "Pictorial Communication Aid" (PCA), which was used by the nurses to communicate with the patients. A post-evaluation survey was conducted after 1 week of implementation. All the patients and nurses interviewed were very satisfied with the PCA as it enhanced the communication between the patients and nurses.

**Conclusion:** The PCA helped to alleviate anxiety, and improved patient care and safety. It also made their hospital stay more pleasant and sped up patients' recovery, thus shortening the length of stay. Two thousand copies of the PCA have been printed and distributed to all the 3 hospitals under SingHealth and NHC.

#### NUR439

##### Retrospective Study on the Epidemiology of Patient Falls in an Acute Care Setting

**KK SIM<sup>1</sup>, BY GEH<sup>1</sup>, KH SEOW<sup>1</sup>, I WARNO<sup>1</sup>, C LEONG<sup>1</sup>, S YEAP<sup>1</sup>, K KAUR<sup>1</sup>**

<sup>1</sup>Nursing, Singapore General Hospital, Singapore

**Aim:** To identify, from the data collected, the gaps in the existing strategies for the prevention of falls, and the significant predisposing causes and risk factors that had complicated the falls. The findings derived from the study will be translated into re-designing changes to the existing safety measures, so as to devise more effective strategies to prevent patient falls.

**Methods:** Data were collected from the medical wards from the first 6 months of 2004. Convenience samples from all falls were collected from data recorded in the Risk Management System, and used for the study. Data were

again collected prospectively for another next 6 months. Data from these 2 periods were then compared to identify the consistency of the epidemiology related to patient falls and whether there was a decrease in the number of fallers.

**Results:** There were 129 fallers for the first 6 months of 2004, and 79 fallers for the same period in 2005. Significant contributory risk factors for falls included age >65 years, multiple diagnoses, physical impairments, impaired cognition/mobility, polypharmacy (or side effects from medications), incontinence of bladder, history of falls, and a Morse Fall Scale score of more than 26. There was also more male than female fallers. Most patients fell at their bedside, followed, in order, by: in the toilet, in the room area, in the bathroom and along the corridor.

**Conclusion:** Patient falls in any acute setting are a continuing source of concern and frustration. Our study found that few of the fallers suffered from physical injuries, and that those injuries were all "minor" in nature. Although injury from falling is seen by some as an inevitable part of ageing, falls in older people are preventable. New strategies for diminishing the risks for fall must therefore be designed to meet this challenge.

#### NUR440

##### Competency-based Staff Orientation Model

**AP TAN<sup>1</sup>, KR KWEK<sup>2</sup>, M LEE<sup>1</sup>**

<sup>1</sup>Nursing, Singapore General Hospital, Singapore, <sup>2</sup>Nursing, National Heart Centre, Singapore

**Aim:** The objective of the competency-based staff orientation initiative is to strengthen the capabilities of all new nurses in order to improve patient outcomes. Staff orientation encompasses more than training or continuing education. A competency-based model focuses on day-to-day staff orientation and development efforts of skill building and performance improvement.

**Methods:** The Orientation and Competency checklists are based on the competency-based job responsibilities/essential functions that are specific to the nursing job description and workplace and relevant to the nursing practice at the institution. The checklist is organised into 2 sections: general and specific skills. Evaluations are completed at 60 and 90 days to provide feedback to progress and to identify areas of further learning. These checklists become a permanent part of the personnel file upon completion.

**Results:** The results of the competency-based staff orientation process clearly articulates what tasks must be executed, explicitly defines what general and specific skills are required and permits differentiation of nursing skills and knowledge from those of other disciplines.

**Conclusion:** This model places competency as its axis and offers several advantages: serves as a vehicle to create a training process that defines knowledge, core skills and values; defines the desired outcomes of performance standards and adequacy in addressing the nurses' competency and nursing care needs of patients.

#### NUR441

##### A Descriptive Study on Factors that Influence the Decision of Postnatal Mothers to Breastfeed

**CY YU<sup>1</sup>, LB NG<sup>1</sup>, AH NEO<sup>1</sup>**

<sup>1</sup>Nursing, Singapore General Hospital, Singapore

**Aim:** To identify the difficulties concerning continuing breastfeeding. Evaluation of these findings would help to identify ways of improving the current situation on breastfeeding.

**Methods:** Two hundred postnatal mothers were invited to participate in the study. The study included a descriptive study design and telephone interview for a period of 6 to 8 months. Qualitative interpretive methods were used in data analysis, using open-ended questions.

**Result:** Out of the 327 deliveries, 269 (82%) mothers wished to breastfeed, 17 had refused and 41 gave no definite answers. One hundred and ninety-two mothers participated in the study. There were 19 dropouts. Among the 173 mothers, 47 (27.2%) breastfed till 6 months or longer. Factors that caused the dropout were lack of family support, no favourable breastfeeding working environment, hospitalisation of baby, and other factors such as mothers' high

expectations and a lack of confidence or low self-esteem. Suggestions and recommendations may be through frequent home visit, frequent telephone follow-up, education, favourable working environment and breastfeeding support group.

**Conclusion:** Despite increasing evidence of the advantages of breastfeeding, it remains an unacceptable long-term option for many women. Women moved from breast to formula feeds soon after delivery because of problems that are usually preventable. Our findings showed that factors within the social environment, such as the need to return to work and the lack of support from family and friends, are significant influences on early cessation. As health professionals, we look forward to increasing the rate of breastfeeding to have a healthier new generation.

#### NUR442

##### To Improve the Body Restrainer

**HY ZAINAF<sup>1</sup>, HK HO<sup>1</sup>, SH YUN<sup>1</sup>, MW WONG<sup>1</sup>, SI NORALINA<sup>1</sup>, HB LIM<sup>1</sup>**

<sup>1</sup>Nursing, Singapore General Hospital, Singapore

**Aim:** 1. To secure patient by convenient access. 2. To increase patient safety. 3. To enhance cost effectiveness.

**Methods:** The cause and effect diagram was used to analyse problems of the current body restrainer. The problems identified included the design of the body restrainer, which was not suitable for restless and confused patients, frequent adjustment in tying knots, frequent adjustment of patients and time spent in wearing body vest. The team brainstormed to generate ideas on a new design. We used the tree diagram approach to grade various ideas based on criteria such as effectiveness, time savings, cost savings and team ability. Assistance from the Housekeeping Department was also sought for recommendations on quality of material and durability.

**Results:** The team re-designed and implemented using the abdominal strapping restrainer with 2 wide straps on each side. The back straps were crossed on the patient's back and secured with the front flap on the patient's side with knots. The ends of the straps were then secured to the bed. The time taken to wear this new body restrainer was reduced by 8 minutes and cost savings on manpower were achieved. This resulted in nurses being able to channel their energy and resources to providing quality nursing care to patients who have greater need of their professional services.

**Conclusion:** Confused and restless patients could be easily secured using the new design, ensuring safety and enhancing effectiveness and efficiency in their care.

#### NUR443

##### A Study to Determine Cancer Patients' Concern about Pain Management

**B SHIREMENI<sup>1</sup>, CE ONG<sup>1</sup>, ZZ XU<sup>1</sup>**

<sup>1</sup>Oncology, Singapore General Hospital, Singapore

**Aim:** To study the concerns about pain management among cancer patients in the oncology ward (Ward 48) of Singapore General Hospital.

**Methods:** A descriptive quantitative study was conducted on 31 English-speaking inpatient cancer patients. The common cancer site was lung (n = 8), breast (n = 6) followed by osteosarcoma and liver (n = 4 each) and a variety of different sites were involved in the other 9 patients. This data did represent the current cancer status in Singapore, where lung cancer in male and breast cancer in female is the leading cancer. The main tool used was the 27-item Barriers Questionnaire II (BQ-II), which has 4 subscales: the physiological effects, fatalism, communication and harmful effects. The pain intensity was measured using the visual analogue scale (VAS). A demographic data sheet was included and an additional open-ended question was added to identify concerns other than the 4 in the subscales.

**Results:** The total BQ-II score was 2.54, which indicated that our participants had a lot of concerns about reporting pain and using pain medication. For the scores on the 4 subscales, the highest was concern about harmful effects (2.73); followed by concern about physiological effects (2.41) and communication (1.72). The least concern expressed was about fatalism (1.21). This study was able to identify the existing concerns among cancer

patients in Singapore by using the BQ-II.

**Conclusion:** This study was able to demonstrate that cancer patients do have concerns about reporting pain and taking pain medications, especially concerns about harmful effects and physiological effects.

#### NUR444

##### Patients' Satisfaction Level: A Study of Patients with Total Knee Replacement Surgery

**R DARI<sup>1</sup>, M ABDULLAH<sup>1</sup>, A SAMAH<sup>1</sup>, R JANTAN<sup>1</sup>**

<sup>1</sup>Orthopaedic Surgery, Singapore General Hospital, Singapore

**Aim:** The purpose of this study was to measure patients' satisfaction level after knee replacement surgery

**Method:** One hundred and ninety patients who had undergone knee replacement surgery were selected for participation in this descriptive study. The Newcastle Satisfaction with Nursing Scale was distributed to eligible patients on the fourth day after their operation. Written consent was sought from the participants prior to commencement of the interview

**Results:** Of the 190 completed forms, only 168 were usable (88.4%). Although participants were satisfied with the information provided preoperatively, 37% felt that nurses made them do things before they were ready. Forty per cent felt nurses had no time to talk to them and 33% felt that nurses only provided information when asked. The majority of participants were satisfied with the discharge teaching and instructions. Overall, 98.8% were satisfied with the nursing care received. The participants' responses indicated that they were more satisfied with the preoperative and discharge instructions and teaching than the actual care provided during hospitalisation. Most of the participants who were unsatisfied were in the middle-aged group.

**Conclusion:** We need to focus on the nursing care given during hospitalisation, and to be more attentive in understanding our patients' needs. Communication between nurses and patients appears to be key in improving patients' satisfaction with nursing care.

#### NUR445

##### The Effectiveness of Diabetic Counselling for Patients with Diabetic Retinopathy

**AT AW<sup>1</sup>, CY WONG<sup>1</sup>, SC CHOO<sup>1</sup>, KY SHAU<sup>1</sup>, EYM WONG<sup>1</sup>**

<sup>1</sup>Nursing, Singapore National Eye Centre, Singapore

**Aim:** To assess the effectiveness of the diabetic counselling provided for patients with diabetic retinopathy in improving their knowledge of their condition.

**Methods:** This was an interviewer-administered, prospective, masked, non-randomised, questionnaire-based study to assess the knowledge, attitude and practice of diabetic patients regarding diabetes mellitus and diabetic retinopathy. Fifty-five patients requiring laser at the Singapore National Eye Centre for advanced diabetic retinopathy or macular oedema were recruited. Recruited patients were tested before and 1 week after diabetic counselling performed by a trained diabetic nurse counsellor using a standardised counselling chart. The trained diabetic nurse counsellor was masked to the questionnaire contents.

**Results:** Of the 55 patients, there were 43 (78.2%) Chinese, 6 (10.9%) Malays and 6 (10.9%) Indians. Twenty-five of the patients (44.5%) had received primary education whereas 19 patients (34.5%) had had secondary education. Only 3 patients (5.5%) had had tertiary education. Eight patients (14.5%) had not received any form of education. Forty-six patients (83.6%) verbalised that they had received some form of diabetic counselling, mainly from the polyclinic or general physician. Out of the 55 patients, 29 (52.7%) had not received any form of laser treatment previously for their eye condition. Mean pre-counselling questions test score was 14.15, compared to post-counselling test score of 16.67 ( $z = -4.494, P < 0.05$ ), indicating that nurse counselling significantly increased the knowledge of these patients about their disease. Another factor found to be associated with the improved post-counselling test score was the patients' education level ( $r = 0.47$ ).

**Conclusion:** Diabetic counselling provided by the trained nurse counsellor significantly improved the patients' knowledge of diabetes and diabetic retinopathy.



**QLY446**

**Reducing Diagnostic Blood Tests Performed in the Neurosurgical ICU**

**TK KWEK<sup>1</sup>, R HAWKINS<sup>2</sup>, E WANG<sup>3</sup>, V YEO<sup>1</sup>, R KAUR<sup>4</sup>, S TAN<sup>4</sup>, MA WAHAB<sup>4</sup>**

<sup>1</sup>Anaesthesia, <sup>2</sup>Laboratory Medicine, Tan Tock Seng Hospital, Singapore, <sup>3</sup>Neurosurgery, National Neuroscience Institute, Singapore, <sup>4</sup>Nursing, Tan Tock Seng Hospital, Singapore

**Aim:** Intensive care unit (ICU) patients reportedly have a mean of 4.6 blood draws per day for diagnostic testing with a mean volume per draw of 10.3 mL. This frequently leads to anaemia and a need for blood transfusion. In the Neurosurgical ICU (NICU), we found that patients had on average 11.3 blood tests performed per patient day. We sought to reduce the number of diagnostic blood tests performed per patient day in the NICU by 20% within 6 months without complications.

**Methods:** A multidisciplinary team was formed and using the quality improvement model (Plan, Do, Check, Act), brainstormed and voted on the possible reasons for performing excessive blood tests. We identified that many of the tests performed were unnecessary and resulted from excessive routine testing, a lack of guidelines on ordering tests and ordering of tests in bundles. The following interventions were planned and carried out to address this problem: 1. Implement guidelines for ordering blood tests 2. Conduct staff education 3. Conduct regular audit of progress

**Results:** Following implementation of the interventions, the average number of tests performed per patient day over the next 2 months fell to 7.6 (fall of 32.7% from the previous 6-month average). No patient complications were reported (through direct staff feedback and through monitoring unscheduled returns to the ICU) as a result of these interventions.

**Conclusion:** We reduced the number of blood tests performed in the NICU by 32.7% through implementation of guidelines to guide the appropriate ordering of diagnostic blood tests. We hope to share these achievements with the other ICUs in TTSH.

**QLY447**

**To Achieve 50% Ambulation on 1st Postoperative Day (POD) in Major Laparotomy Postoperative Patients in Tan Tock Seng Hospital**

**B LEE<sup>1</sup>**

<sup>1</sup>Anaesthesia, Tan Tock Seng Hospital, Singapore

**Aim:** A multidisciplinary team, established with the mission to achieve 50% ambulation in major abdominal surgery patients on 1st POD in Tan Tock Seng Hospital (TTSH) within 6 months.

**Methods:** Using the quality improvement model (Plan, Do, Check, Act), the team brainstormed and multi-voted on the leading possible causes of postoperative immobilisation in the particular service unit under study. Interventions were then planned to address them: 1) manage patient's expectations by correcting, communicating and educating on pain control – starting from pre-admission care evaluation (PACE) and early ambulation postoperatively (from PACE and continue in wards); 2) obtain surgeons' support for default protocol in 1st POD ambulation. To establish surgeons' support to convince patients the advantages of early postoperative ambulation; 3) good pain control postoperatively; 4) establish protocol to ambulate patients on 1st POD together with the physiotherapist and nurses. Early ambulation, on 1st POD, has been shown to be effective in reduction of morbidities and mortalities. A retrospective chart review showed that 85% of our patients in TTSH were not ambulated on 1st POD.

**Results:** Following the interventions, the percentage of patients who started ambulation on the 1st POD has increased from 13% to 69%.

**Conclusion:** Observing the success of these measures to improve postoperative ambulation in patients, the team collaborated with other surgical units to roll out these interventions. To ensure such good practices are continued, the team also decided to continue to monitor and shared their achievements with the NHG cluster.

**QLY448**

**Implementation of Perioperative Beta-blockade in Selected Patients for Elective Orthopaedic Procedures — Tan Tock Seng Hospital's Experience**

**KC ONG<sup>1</sup>, KM KWAN<sup>1</sup>**

<sup>1</sup>Anaesthesia, Tan Tock Seng Hospital, Singapore

**Aim:** To institute perioperative beta-blockade (PBB) in appropriately selected orthopaedic patients scheduled for elective surgery.

**Methods:** From December 2004 to March 2005, patients who were scheduled for elective orthopaedic procedures were screened for suitability for perioperative beta blockade at the Pre-Admission Counselling and Evaluation (PACE) clinic by an anaesthesiologist. Those with medical and surgical indications were started on atenolol 50 mg om. The dosage was adjusted by 25 mg after 1 week if target blood pressure and heart rate were not met. The intraoperative anaesthetic management was left to the individual anaesthesiologist managing the case. Intravenous metoprolol 5 mg was given if the anaesthesiologist deemed it necessary. In the postanesthetic care unit, intravenous metoprolol was given according to a haemodynamic protocol. The patients were given a further 2 weeks of oral atenolol postoperatively. They were followed up by the respective orthopaedic team for adverse myocardial events or complications from the beta blockade.

**Results:** Of the 171 patients assessed at the PACE clinic, 20 patients were started on PPB. Of these, 19 (11.1%) patients turned up for operation and were successfully beta-blocked. Out of the 19 patients, 11 (57.9%) were not on beta blocker previously. All patients completed the full course of PPB with no complications. There were no adverse myocardial events as well.

**Conclusion:** With careful selection of patients with cardiac risks, PPB can be administered safely. Next, we aim to extend the implementation of PPB to all surgical disciplines.

**QLY449**

**Prevalence of Atherosclerotic Vascular Disease and Use of Antithrombotic Therapy in Singapore: A Single Centre-based Study**

**JS TAY<sup>1</sup>, M DA COSTA<sup>1</sup>, HC TAN<sup>2</sup>, CN LEE<sup>1</sup>, PA ROBLESS<sup>1</sup>**

<sup>1</sup>Cardiac, Thoracic and Vascular Surgery, <sup>2</sup>Cardiology, National University Hospital, Singapore

**Aim:** To obtain baseline epidemiological data for the prevalence of atherosclerotic vascular disease with respect to coronary, cerebrovascular and peripheral vascular beds and concomitant use of antithrombotic therapy in Singapore.

**Methods:** The study population included 437 patients referred to the Cardiac Centre in National University Hospital from January 1998 to May 2005 for non-invasive cardiovascular diagnosis and assessment in more than one vascular bed. Retrospective data extraction was performed through systematic review of the digitalised databases (4D and CPSS) and medical records for this single tertiary centre-based retrospective epidemiological survey. The prevalence and inter-relationships between coronary artery (CAD), cerebrovascular (CVD) and peripheral vascular disease (PVD), hypertension, dyslipidaemia, diabetes mellitus were analysed. The prevalence of antithrombotic therapy with antiplatelet agents and/or anticoagulation was also examined.

**Results:** The prevalence of CAD was 75.3%, PVD 18.1% and CVD 38.2%. The prevalence of concomitant CVD and CAD was 29.1%, CVD and PVD was 4.1%, while 14.2% had CAD and PVD. Disease in all 3 vascular beds was present in 2.5% of all patients. 379/437 (86.7%) patients had vascular disease, out of which 337/379 (88.9%) patients were on antithrombotic therapy (aspirin 56.5% vs clopidogrel 16.4% vs ticlopidine 13.7% vs warfarin 11.6%). Amongst the patients with vascular disease, prevalence of hypertension was 88.9%, dyslipidaemia 81.8% and diabetes mellitus 56.7%. The majority (79.9%) of treated patients were on antithrombotic monotherapy.

**Conclusion:** This study provides baseline epidemiological data for atherosclerotic vascular disease, its cardiovascular risk factors and

antithrombotic therapy in Singapore. Further prospective studies are required to maximise secondary prevention.

#### QLY450

##### Imaging Features and Incidence of Breast Stromal Fibrosis in Asian Populations

**V BAKSA REYNOLDS<sup>1</sup>, V KRISHNAPILLAI<sup>2</sup>**

<sup>1</sup>DDI, <sup>2</sup>Diagnostic Imaging, National University Hospital, Singapore

**Aim:** Awareness of breast stromal fibrosis mimicking a malignancy, as diagnosed through imaging-guided biopsies, defined by the Breast Imaging Reporting and Data System (BIRADS).

**Methods:** A retrograde study of the incidence of breast stromal fibrosis represented as a mass, diagnosed by imaging-guided biopsies, has been conducted in the National University Hospital of Singapore from the beginning of 2002 to the end of 2004. Variations of features of the masses in breast stromal fibrosis were described and defined by BIRADS.

**Results:** Of the total number of biopsies done within the period of 2 years, about 80 cases of breast stromal fibrosis were diagnosed. Approximately 40% of them were represented as masses, mostly indeterminate.

**Conclusion:** The results of the study should raise the awareness of the different features of stromal fibrosis mimicking the malignancy.

#### QLY451

##### Improve the Response Time for Inpatient Plain Radiography

**GC CHUA<sup>1</sup>**

<sup>1</sup>Diagnostic Radiology, Tan Tock Seng Hospital, Singapore

**Aim:** We aimed to reduce the response time for inpatient plain radiography to within 3 hours for at least 80% of patients.

**Methods:** The response time is defined as the time from which the doctor ordered the radiograph to the time when it was performed. Patients in ward 7C requiring plain X-ray were enrolled in the study. A questionnaire survey was also conducted to determine the level of dissatisfaction amongst the patients, relatives and managing team doctors. A baseline audit of the response time was conducted, including timeline survey, determining the time taken for each steps in the process to be completed. A brainstorm session was conducted to determine the bottlenecks and propose interventions. Interventions were implemented with continual surveillance of results.

**Results:** Relatives/patients dissatisfaction was 19%. Delay in diagnosis and implementing treatment was noted in 10%. The baseline audit revealed 43% of cases with response time of >3 hours and the major bottlenecks were lack of porters to fetch patients (average time, 132 minutes), and delay in dispatching request forms (average time, 32 minutes). The interventions implemented were: redeploy an extra porter during peak hours, returning casenotes together with patients; porters to dispatch transport tubes back to ward; and porter supervisor to schedule cases with appropriate timings. With implementation of the interventions, the response time was reduced to less than 3 hours in about 70% of cases.

**Conclusion:** Patient movement within the hospital demands manpower resources and close collaboration between the clinical departments and portage system is crucial.

#### QLY452

##### Clinical Practice Improvement Programme (CPIP): Reducing Intravenous Contrast Extravasation Rates in Computed Tomography Studies

**J GOH<sup>1</sup>**

<sup>1</sup>Diagnostic Radiology, Tan Tock Seng Hospital, Singapore

**Aim:** To reduce the rate of intravenous contrast extravasation in the CT scan suite through application of CPIP principles. Extravasation is potentially associated with serious complications and is an unexpected complication of a study.

**Methods:** Extensive workflow analysis was performed using the PDSA cycles of CPIP.

**Results:** We were able to dramatically decrease the rate of contrast extravasation that occurred.

**Conclusion:** The practices that we implemented using CPIP methodology were successful. Lessons learnt can be shared with other imaging departments as well.

#### QLY453

##### Knowledge, Attitude and Perceptions of Mental Health among Singaporeans

**KS CHONG<sup>1</sup>, BH HENG<sup>2</sup>, LY WONG<sup>2</sup>, SA CHONG<sup>3</sup>, S VERMA<sup>3</sup>, J CHEAH<sup>4</sup>**

<sup>1</sup>Disease Management, <sup>2</sup>Health Services and Outcomes Research, National Healthcare Group HQ, Singapore, <sup>3</sup>Early Psychosis Intervention, <sup>4</sup>Clinical Project Management and Planning, Institute of Mental Health/Woodbridge Hospital, Singapore

**Aim:** To examine the level of knowledge, attitude and perceptions on mental illness among Singapore residents.

**Methods:** A population-based survey of knowledge, attitude and perceptions on mental illness involving residents aged 15 to 69 years was carried out between December 2004 and June 2005 by face-to-face interviews. Data were analysed using SPSSv13.

**Results:** An analysis of 1407 respondents whose demographic characteristics (age, ethnicity and educational status) were similar to and representative of the general population, found that (a) the majority (67.8%) attributed mental illness to stresses in life and physiological cause, i.e., brain disorder; (b) 90% believed that anyone could suffer from mental health problems; (c) 74.1% of respondents recognised that people with mental health problems are not to be blamed for their condition; (d) 61.7% were sympathetic towards them; and (e) 71.4% felt that they should be given equal rights as anyone. However, 52.4% of the respondents would not want people to know if they themselves were suffering from mental health problems. Unfortunately, 58.2% of the respondents felt they would find it hard to talk to people with mental health problems as they believed these people are usually dangerous (42.3%) and that the public should be better protected from them (55.1%).

**Conclusion:** Although Singaporeans seem to be aware of and sympathetic towards those suffering from mental illness, the stigma attached to it is still very prevalent.

#### QLY454

##### The Impact of Case Management on Improving Patient Outcomes, Compliance, and Reducing Healthcare Utilisation for Heart Failure Patients in the National Healthcare Group

**HN TAN<sup>1</sup>, KC NG<sup>2</sup>, MPHS TOH<sup>3</sup>, LM WONG<sup>1</sup>, BH HENG<sup>3</sup>, TS CHEAH<sup>4</sup>**

<sup>1</sup>Disease Management, National Healthcare Group HQ, Singapore, <sup>2</sup>Cardiology, Tan Tock Seng Hospital, Singapore, <sup>3</sup>Health Services and Outcomes Research, <sup>4</sup>Clinical Project Management and Planning, National Healthcare Group, Singapore

**Aim:** The aim of this retrospective study was to evaluate the impact of case management on improving patients' clinical outcomes; reducing healthcare utilisation; and no-show rate at Heart Failure Clinics, among patients enrolled in the NHG Heart Failure Disease Management Programme.

**Methods:** Patients with definite or possible diagnosis of heart failure with LVEF <50% and/or documented diastolic dysfunction, and who fulfilled the inclusion criteria were recruited into the programme. Analysis was conducted on the rate of improvement in patients' clinical outcomes and compliance with outpatient follow-up, after receiving case management interventions in the programme. Average length of hospital stay (ALOS), outlier percentage of hospital days and cost per inpatient episode were compared in patients who were enrolled in the programme and those who were not.

**Results:** A total of 1212 patients were enrolled into the programme from October 2002 to March 2005. Interim evaluation of the programme showed that the majority of the patients (89.2%) showed improvement in their NYHA class status 6 months after enrolment. Patients who were case-managed achieved more favourable results than patients who were not, in (a) ALOS (4.5 days versus 4.8 days); (b) outliers percentage of hospital days (6.2% versus 11.3%); and (c) cost per inpatient episode (10% lower). No-show rate at the heart failure clinic was also reduced from 47.5% in March 2003 to 28.1% in March 2005.

**Conclusion:** Case management has proven to be an effective intervention tool in improving patient outcomes and reducing healthcare utilisation in NHG's Heart Failure Disease Management Programme.

#### QLY455

##### Impact of Family History on the Knowledge, Attitude, Belief and Practice of Stroke and its Risk Factors Among Singaporeans

A YIN<sup>1</sup>, BH HENG<sup>2</sup>, MPHS TOH<sup>1</sup>, LY WONG<sup>2</sup>, N VENKETASUBRAMANIAN<sup>3</sup>, TS CHEAH<sup>4</sup>

<sup>1</sup>Disease Management, <sup>2</sup>Health Services and Outcomes Research, National Healthcare Group HQ, Singapore, <sup>3</sup>Neurology, National Neuroscience Institute, Singapore, <sup>4</sup>Clinical Project Management and Planning, National Healthcare Group HQ, Singapore

**Aim:** To compare the knowledge, attitude, belief and practice (KABP) of stroke and its risk factors among Singaporeans with and without family history of stroke.

**Methods:** Singaporeans aged 15 to 69 years were randomly selected to participate in a population-based survey from December 2004 to May 2005. Trained survey officers conducted direct interviews on demographic characteristics, family history of stroke, presence of risk factors, lifestyle behaviour and practices. Findings of respondents with at least 1 family member with stroke (group A) were compared with that without (group B), using SPSS v13.

**Results:** A total of 1309 respondents were analysed. It comprised 169 respondents (12.9%) with a family history of stroke (group A). Knowledge was better in this group; 90.5% knew that stroke was due to blood vessel blockage (vs 82.2%,  $P < 0.01$ ) or bursting in the brain (81.1% vs 63%,  $P < 0.001$ ). More in group A knew that stroke could be prevented (86.4% vs 78.5%,  $P = 0.018$ ) and also believed that they were at risk of having stroke (77.5% vs 70.7%). Group A also had fewer smokers (5.9% vs 14.8%,  $P = 0.002$ ). There was no difference in other lifestyle behaviour like alcohol consumption and exercise; or screening for risk factors of stroke such as diabetes mellitus and hypertension between the 2 groups.

**Conclusion:** There was better knowledge among people who had a family member with stroke and this correlated with more favourable attitude. However, these did not translate into favourable lifestyle behaviour and practices with impact on stroke prevention.

#### QLY456

##### A Population-Based Survey on the Knowledge, Attitude and Practices Associated with Smoking among Singaporeans

MPHS TOH<sup>1</sup>, BH HENG<sup>1</sup>, LY WONG<sup>1</sup>, ASL TAN<sup>2</sup>, J CHEAH<sup>3</sup>

<sup>1</sup>Disease Management/Health Services and Outcomes Research, <sup>2</sup>Disease Management, <sup>3</sup>Clinical Project Management and Planning, National Healthcare Group HQ, Singapore

**Aim:** To assess the knowledge, attitude and practice (KAP) of smoking and intra-household influence on smoking among Singapore residents.

**Methods:** A population-based survey was conducted from December 2004 to May 2005 and involved Singapore residents aged 15 to 69 years through direct face-to-face interviews. A standard questionnaire was used to illicit information on demographic characteristics, smoking status, lifestyle behaviour and practices, and whether there was any smoker living in the same household. Findings of smokers' KAP were compared with that of non-smokers using SPSS v13, where  $P < 0.05$  was considered statistically significant.

**Results:** A total of 1322 respondents were analysed and their demographic characteristics were representative of that of the Singapore population. There were 182 (13.8%) current smokers with smoking rates being significantly higher among males (25.5%) vis-à-vis females (3.7%); those below 45 years of age (15.7%) vis-à-vis 45 years and above (12.1%); and those with up to secondary education/Institute of Technical Education (16.6%) vis-à-vis 6.9% with pre-university/junior college and university education. About 98.9% of all respondents had been told that smoking was harmful and more non-smokers believed that it could harm one's health (99.0% vs 97.3%,  $P < 0.05$ ). Compared to non-smokers, smokers had significantly higher rates of having another smoker in the household (30.8% vs 23.8%) and engaged in regular drinking (8.8% vs 2.2%).

**Conclusion:** Although most respondents were aware that smoking was harmful to health, this did not translate into adoption of a "smoke-free" lifestyle and was associated with significantly higher rates of regular drinking. Smoking prevalence was also associated with experience of intra-household smoking.

#### QLY457

##### Asthma Treatment and Control among Adult Singapore Residents

MPHS TOH<sup>1</sup>, BH HENG<sup>2</sup>, LY WONG<sup>2</sup>, LS YEO<sup>3</sup>, J ABISHEGANADEN<sup>4</sup>, TK LIM<sup>5</sup>, J CHEAH<sup>6</sup>

<sup>1</sup>Disease Management/Health Services and Outcomes Research, <sup>2</sup>Health Services and Outcomes Research, <sup>3</sup>Disease Management, National Healthcare Group HQ, Singapore, <sup>4</sup>Respiratory Medicine, Tan Tock Seng Hospital, Singapore, <sup>5</sup>Medicine, National University Hospital, Singapore, <sup>6</sup>Clinical Project Management and Planning, National Healthcare Group HQ, Singapore

**Aim:** To appraise the degree of asthma symptom control among adult Singapore residents.

**Methods:** A population-based survey on asthma was conducted from December 2004 to May 2005 among Singapore residents aged 15 to 69 years. Respondents with asthma were asked about their experience and perceptions of asthma. Data were analysed using SPSS v13.

**Results:** A total of 1278 respondents participated in the survey; their demographic characteristics were similar to and representative of the population. Overall, prevalence of asthma was 4.5% (57/1278), being disproportionately higher among the Malays (12.1%) and Indians (9.0%) compared with the Chinese (2.3%) ( $P < 0.001$ ). Among them, 40.4% (23/57) of asthmatics were ever prescribed long-term preventor medication. There were no differences between those with long-term preventor medication and those without in perceptions of asthma symptoms, limitations in daily activities and unplanned clinical utilisation. However, fewer (39.1%) on preventor medication perceived improvement in their asthma control compared with those (64.7%) without it. Overall, half reported having symptoms of asthma in the day (54.4%) and night (54.4%), and on exertion or exercise (52.6%). Respondents perceived limitations in their lifestyle (54.4%), physical (73.7%) and social (49.1%) activities and career opportunities (52.6%) as a result of asthma. In the preceding 12 months, 22.8% reported having an unscheduled visit to a healthcare facility, 12.3% visited an emergency department and 5.3% had been hospitalised.

**Conclusion:** Management of asthma among Singaporeans is still not optimum; and efforts to improve should aim at reducing acute exacerbations of symptoms that result in unplanned visits to healthcare facility.

#### QLY458

##### Increasing the Participation of Families of First-episode Psychosis Patients in Multiple-family Psychoeducation Workshop

C LIM<sup>1</sup>, S VERNA<sup>1</sup>, LY POON<sup>1</sup>, M KAUR<sup>1</sup>, BJ WENG<sup>1</sup>, H LEE<sup>1</sup>, SA CHONG<sup>1</sup>

<sup>1</sup>Early Psychosis Intervention, Institute of Mental Health/Woodbridge Hospital, Singapore

**Aim:** Multiple-family psychoeducation (MFP) is an evidence-based practice for use to reduce burden of caregiving among the families and to allow for a more enduring recovery among psychiatric patients. Past efforts by the Early

Psychosis Intervention Programme (EPIP) to organise MFP workshops were met with disappointing results. Hence, EPIP has piloted a project under the Clinical Practice Improvement Programme (CPIP), with the aim of achieving a higher participation level such that at least 50% of the families of patients who are newly accepted into EPIP between April and September 2005 will attend a MFP workshop.

**Methods:** Possible barriers to participation in MFP workshop were identified and interventions were implemented to overcome the respective barriers. A questionnaire to measure the changes in perceptions of the families' own knowledge and understanding regarding mental illness and its treatment was administered at the beginning and at the completion of each workshop.

**Results:** Within the last 2 months, a total of 28 patients were accepted into EPIP. To date, 21% of the families have attended a MFP workshop. Families who participated in the workshop experienced an improvement in their perceptions of their knowledge and understanding of mental illness and its treatment.

**Conclusion:** Preliminary data show that the interventions implemented so far have not been effective in increasing participation level to 50%. Nonetheless, this project demonstrates that MFP workshop is effective in enhancing knowledge and understanding of mental illness among families of people with major psychiatric illnesses.

#### QLY459

##### Reducing Unnecessary Skull X-ray Ordering in Mild Head Injury

**YK TAN<sup>1</sup>, SBS OOI<sup>1</sup>, LL PENG<sup>1</sup>, DIMAMA HIT<sup>1</sup>, PT KAO<sup>1</sup>, J SOONG<sup>1</sup>, M AHMED<sup>2</sup>**

<sup>1</sup>Emergency Medicine, <sup>2</sup>Diagnostic Imaging, National University Hospital, Singapore

**Aim:** To reduce the use of skull X-rays (SXR) in mild head injury (HI) patients with a Glasgow Coma Scale (GCS) 15 by 50% within 4 months.

**Methods:** Using the CPIP approach, we studied current evidence-based literature on the management of mild head injury and the use of SXRs in the management of these patients. Based on the literature review, we changed our algorithm in the management of mild head injuries and further limited the indications of SXRs. The new indications were then disseminated to the rest of the clinical staff in the Emergency Medicine Department of National University Hospital. This was followed by monthly retrospective audits and the results were disseminated to the clinical staff for necessary action.

**Results:** At the end of 4 months, we have managed to reduce the number of SXRs/month from 45% to 10% of mild HI patients i.e. >50% target reduction, with its attendant cost savings. There has also been a decrease in mild HI admission and CT ordering rate in our department. Further audits have shown that this is sustainable in the department.

**Conclusion:** We have shown that using evidence-based medicine, we managed to change and sustain the SXR-ordering habits of clinicians in a major hospital in Singapore with its attendant cost savings.

#### QLY460

##### Audit on Transfers of Emergency Department (ED) Admissions to High Dependency and Intensive Care Units (HDU/ICU) Within 24 Hours of Admission

**SHANG<sup>1</sup>, GH LIM<sup>1</sup>**

<sup>1</sup>Emergency Medicine, Tan Tock Seng Hospital, Singapore

**Aim:** The Emergency Department (ED) at Tan Tock Seng Hospital (TTSH) has admitting rights for patients into the general ward (GW) across most in-patient disciplines. The aim of this study was to review the transfers of patients from GW to HD/ICU within 24 hours of admission from the ED.

**Methods:** The study period was from 1 January 2004 to 31 December 2004. All patients who had been admitted from the ED to the GW but were later transferred to HD/ICU within 24 hours of admission were identified. The ED clinical notes and in-patient discharge summaries were reviewed for all the identified patients.

**Results:** Eight hundred and seventy-six patients were transferred during the study period, of whom 74.9% were Chinese, 15.3% Malays, 8.3% Indians and 1.5% from the other ethnic groups. 65.4% of the patients were male and 34.6% were female. The mean age was 62.7 years (95% CI, 61.6-63.8). The main reasons for the transfer were due to: 1) the natural progression of illness (53%), 2) availability of results of further investigations such as computed tomography and cardiac markers (16.5%), 3) ED management issues including incorrect diagnoses and failure to recognise the severity of the condition (17.6%), 4) the availability of HD/ICU beds (8.2%), and 5) others (4.7%).

**Conclusion:** This study serves to highlight the high-risk ED admissions to the general ward. It can be used to improve ED practice such that the number of unscheduled transfers of patients could be reduced.

#### QLY461

##### Are Emergency Physicians in Singapore Ready for 360-degree Feedback?

**KY THAM<sup>1</sup>**

<sup>1</sup>Emergency Medicine, Tan Tock Seng Hospital, Singapore

**Aim:** To determine whether Singapore emergency physicians (EPs) are ready for 360-degree feedback.

**Methods:** Conventional performance appraisal is based on self-assessment and feedback from supervisor. 360-degree feedback is from subordinates, peers, supervisor and other colleagues to the EP about his/her work performance. 360-degree feedback was presented to EPs in all adult emergency departments in Singapore and an anonymous self-administered questionnaire was distributed. Data collected were age, gender, and responses to questions on whether colleagues should be chosen by EPs or randomly assigned to provide feedback and how feedback should be used. Responses were based on 5-point Likert scale (very acceptable through to very unacceptable).

**Results:** Thirty-one out of 45 (69%) EPs responded. There were 20 (64.5%) men and 11 (35.5%) women. The mean and median age was 36 years. An overwhelming majority (93.5%) agreed that colleagues were best people to give feedback, not just supervisors. If 360-degree feedback was implemented, 77.4% found it acceptable to personally choose the colleagues to give feedback while only 51.6% found it acceptable if colleagues were randomly chosen for them. If implemented, 90.3% wanted feedback to be confidential, 58.1% were prepared to share findings with supervisor to improve performance but only 35.5% would accept feedback being factored into pay and bonus consideration.

**Conclusion:** EPs in Singapore seemed ready for 360-degree feedback as part of performance management. If implemented, they want to choose colleagues whose feedback they value. The majority want feedback to be confidential and used for self-improvement and not for salary or bonus review.

#### QLY462

##### Informed Consent for Clinical Trials — Still Some Way to Go

**B MAK<sup>1</sup>, A CHEOK<sup>1</sup>, MO AUNG<sup>1</sup>, CT WAI<sup>1</sup>, SG LIM<sup>1</sup>**

<sup>1</sup>Gastroenterology and Hepatology, National University Hospital, Singapore

**Aim:** We set out to determine patients' understanding of the informed consent process in patients with chronic hepatitis B.

**Methods:** Seventy-seven Chinese patients with chronic hepatitis B from 12 clinical trials were asked to participate. They had given informed consent at an earlier date and were interviewed on a 10-item questionnaire on the meaning of informed consent, randomisation, placebo and reason for participation. Data were expressed in mean  $\pm$  S.D. In univariate analysis, Mann-Whitney U test and Kruskal-Wallis test were used.

**Results:** Age of subjects was 40.32  $\pm$  12.07 years, 66 (85.7%) were male. On a visual analogue scale of 1 (minimum) to 5 (maximum), comprehensiveness and complexity of the consent form was 3.67  $\pm$  0.82 and 2.56  $\pm$  1.04, understanding of the informed consent was 3.84. Twenty-two (28.6%) subjects thought their trials were randomised. Twenty-six (33.8%) knew placebo was a non-active drug, 20 (26.0%) knew their clinical symptoms might not be due to side effects of the study drug. Seventy-

six (98.7%) felt they had benefited from the trials: 65 (84.4%) felt they had better medical attention, 45(58.4%) felt they had benefited from the new drug, and 51(66.2%) felt they had benefited from the free treatment and blood tests. The correct concept of the informed consent were summarised by given scores (0-4). The mean score of the study group was  $1.7 \pm 0.9$ . In univariate analysis, the differences of the score were seen only in education level ( $P = 0.01$ ).

**Conclusion:** Although all subjects in this study gave an earlier informed consent for the respective clinical trials, many had an incorrect idea about the meaning of placebo and randomisation. More time is needed to explain to patients with lower education level.

#### QLY463

##### Reducing the Ventilator-associated Pneumonia Rate in a Medical Intensive Care Unit

BHO<sup>1</sup>, SMCHAN<sup>2</sup>, G PATTATH<sup>2</sup>, SMENG<sup>2</sup>, B RAMOS<sup>3</sup>, ATPETERS<sup>3</sup>, LH GOH<sup>4</sup>

<sup>1</sup>General Medicine, <sup>2</sup>Nursing, <sup>3</sup>Respiratory Therapy, <sup>4</sup>Pharmacy, Tan Tock Seng Hospital, Singapore

**Aim:** Ventilator-associated pneumonia (VAP) is a common and serious complication in critically ill patients who require mechanical ventilation. This results in increased patient morbidity and mortality, prolonged hospital stays and increased treatment costs. The mean VAP rate for the Medical Intensive Care Unit (MICU) of our hospital was 14.8 per 1000 patient-ventilator days in the pre-SARS epidemic period (January 2002 to March 2003), and in the post-SARS epidemic period (August 2003 to July 2004), the rate fell to 7.4 per 1000 patient-ventilator days. A multidisciplinary team of healthcare professionals was established with the aim to reduce the VAP rate in the MICU by a further 50% in 6 months.

**Methods:** Applying Clinical Practice Improvement Programme (CPIP) methodology, the team brainstormed and multi-voted on the leading possible causes of VAP in the unit. Using PDSA (Plan, Do, Study, Act) cycles, the following interventions were instituted: (1) To increase compliance for semirecumbent positioning (head of bed elevated at 30 degrees) of patients; (2) Delivery of bronchodilators using Metered Dose Inhalers (MDI) instead of a nebulisers; (3) Use of a Ventilator Bundle checklist.

**Results:** Following the implementation, the mean VAP rate dropped from 7.4 to 3.1 per 1000 patient-ventilator days for the period August 2004 to March 2005. Upper control limit also decreased from 24.4 to 15.9 per 1000 patient-ventilator days.

**Conclusion:** Even though these interventions were simple to implement, they led to a reduction in the VAP rate in the MICU. These approaches can be easily adopted by other ICUs.

#### QLY464

##### Factors Improving the Diagnostic Related Grouping Model's Ability to Predict the Cost of Hospitalisation and Length of Hospital Stay in the Frail Elderly

WC WONG<sup>1</sup>, S SAHADEVAN<sup>2</sup>, YY DING<sup>1</sup>, HN TAN<sup>1</sup>, SP CHAN<sup>3</sup>

<sup>1</sup>Geriatric Medicine, <sup>2</sup>Medicine, Tan Tock Seng Hospital, Singapore, <sup>3</sup>Health Promotion Board, Singapore

**Aim:** To determine factors that can improve the current Diagnostic Related Grouping (DRG) model in predicting the cost of hospitalisation and length of hospital stay in the frail elderly.

**Methods:** Prospective, observational cohort study of 397 patients aged 65 years and above admitted under the geriatric medicine and general medicine services. Demographic information, function-linked variables, referral to the medical social worker, cost of hospitalisation, actual length of hospital stay (LOS) and discharge DRG codes with their corresponding trimmed average length of stay (ALOS) were recorded. The overall illness severity score (modified from Horn et al's original severity of illness index) for each patient was also recorded.

**Results:** Fourteen patients died during their hospital stay. Three hundred and eighty-three patients were included in the final analysis. The mean age of the cohort was 80.3 years. Trimmed ALOS alone predicted 21% of the variation in cost of hospitalisation and actual LOS. The addition of an illness severity score, number of referral to therapists and referral to medical social worker into the trimmed ALOS predicted 30% and 31% of the variation in cost of hospitalisation and actual LOS, respectively.

**Conclusion:** The current DRG model is able to explain 21% of the variations in cost of hospitalisation and length of hospital stay in the frail elderly. Incorporation of an illness severity score, number of referral to therapists and referral to the medical social worker can increase the ability of the current DRG model in predicting the cost of hospitalisation and length of hospital stay in the frail elderly.

#### QLY465

##### Reducing the Unscheduled Re-admission Rate of Patients Referred to the Palliative Care Service of an Acute Hospital

HY WU<sup>1</sup>, AOK LEE<sup>1</sup>, NY KOH<sup>2</sup>, S CHAN<sup>3</sup>, TW NG<sup>4</sup>, LM LEE<sup>5</sup>, L GOH<sup>6</sup>

<sup>1</sup>Geriatric Medicine, <sup>2</sup>Medicine, <sup>3</sup>Nursing, <sup>4</sup>Care and Counselling, <sup>5</sup>Pharmacy, <sup>6</sup>Case Management, Tan Tock Seng Hospital, Singapore

**Aim:** Patients admitted to the acute hospital with advanced illnesses/terminal conditions frequently face challenging physical, psychosocial and spiritual issues. Many of them get re-admitted shortly after discharge from the hospital for different reasons, some of the re-admissions are unavoidable but many can be prevented. Besides being an indicator of quality care; unscheduled re-admission also adds to the stress faced by these patients and their loved ones. This project, led by a multidisciplinary group of healthcare professionals, aimed to reduce the unscheduled re-admission rate (within 15 days of discharge) of patients referred to the Palliative Care Service by 50% over a period of 6 months.

**Methods:** Using the quality improvement model of "Plan, Do, Study, Act", the team brainstormed and came up with the possible causes for all unplanned re-admissions. Poor communication with the community hospice team was identified as a major and preventable factor. Interventions were then planned to address the issues, namely: 1) identification of patients at high risk for re-admission through a checklist; 2) arranging earlier outpatient appointments for high-risk patients; and 3) establishing good communication with the community hospice team.

**Results:** Prior to the intervention, the mean re-admission rate from May 2004 to October 2004 was 19.3%. Post-intervention, the mean re-admission rate was reduced to 9.9%.

**Conclusion:** Several reasons for unscheduled re-admissions were identified in this project. Of these, we targeted our interventions mainly on the poor communication with the community hospice team and were able to demonstrate a significant reduction in the re-admission rate.

#### QLY466

##### Design of a Care Plan for Cost-effective Management of Community-acquired Pneumonia among Elderly Patients in the National Healthcare Group (NHG)

BH HENG<sup>1</sup>, WF CHONG<sup>2</sup>, TK LIM<sup>3</sup>, E SEOW<sup>4</sup>, J CHEAH<sup>5</sup>

<sup>1</sup>Health Services and Outcomes Research, <sup>2</sup>Disease Management, National Healthcare Group HQ, Singapore, <sup>3</sup>Medicine, National University Hospital, Singapore, <sup>4</sup>Emergency Medicine, Tan Tock Seng Hospital, Singapore, <sup>5</sup>CPMP, National Healthcare Group HQ, Singapore

**Aim:** To design a care plan for cost-effective management of elderly patients with pneumonia.

**Methods:** Using SPSS v13, data from NHG's data warehouse in 2004 were analysed to evaluate the burden of pneumonia among elderly patients among NHG institutions. Recent developments in evidence-based management of pneumonia and administrative policies were considered in design of the plan.

**Results:** In 2004, pneumonia among elderly patients was the top cause of emergency admissions, contributing 25,000 patient days and costing NHG



\$14 million. The average length of stay was 5 to 10 days; 7.5% stayed 1 day and 15.5% stayed 2 days. A programme was designed aimed at managing such patients more cost-effectively without compromising quality of care and patients' safety. It comprised an algorithm for (a) mandating hospitalisation; or (b) a home care plan. The home care plan, residing in the Emergency Department, identified patients for assessment of clinical severity using a validated tool (Fine Pneumonia Severity Index), administration of oral antibiotics, observation for clinical stability and finally discharging them with an advisory and an appointment for clinic review. A telephonic contact, and home visits for selected cases, would follow within 24 to 48 hours. If the management goals could not be achieved in the home care plan or if the treatment plan was failing, the patient would be transferred back to hospital. Measures of both effectiveness and patients' safety were incorporated in the plan.

**Conclusion:** We have designed an evidence-based and cost-effective home care plan for community-acquired pneumonia in the elderly appropriate for the local setting.

#### QLY467

##### Knowledge, Attitude and Belief Associated with Diabetes Mellitus and Health Practices of Singaporeans with Diabetes

LY WONG<sup>1</sup>, BH HENG<sup>1</sup>, MPHS TOH<sup>2</sup>, TSJ CHEAH<sup>3</sup>

<sup>1</sup>Health Services and Outcomes Research, <sup>2</sup>Disease Management, <sup>3</sup>Clinical Project Management and Planning, National Healthcare Group HQ, Singapore

**Aim:** To study the knowledge, attitude and belief (KAB) pertaining to diabetes mellitus and associated cardiovascular diseases among Singapore residents, and health practices among diabetics.

**Methods:** A population-based survey was conducted from December 2004 to May 2005 involving Singapore residents aged 15 to 69 years. Using a standard questionnaire, Health Survey Officers interviewed household members on their KAB towards diabetes mellitus and associated cardiovascular risk factors. Respondents with diabetes mellitus were compared with those without it. Data were analysed using SPSS v13.

**Results:** Of the 1278 respondents, 165 (12.9%) have diabetes mellitus. Compared to non-diabetic respondents, their knowledge levels were higher; 80% knew that a person can be totally well and suffering from diabetes (vs 69%,  $P = 0.004$ ); and 73% were aware that diabetes is incurable (vs 58%,  $P < 0.001$ ). More diabetic respondents had screened for hypertension (97.6% vs 88.9%,  $P = 0.001$ ) and cholesterol (89.7% vs 65.1%,  $P < 0.001$ ), and had other co-existing chronic conditions such as heart disease (5.5% vs 1.7%,  $P = 0.002$ ), hypertension (48.5% vs 22.8%,  $P < 0.001$ ), hypercholesterolaemia (21.2% vs 8.3%,  $P < 0.001$ ) and stroke (4.2% vs 0.5%,  $P < 0.001$ ). Among those with diabetes, 95.8% took medicines as prescribed. They also conducted other clinical measurements as part of their efforts to prevent complications. 87.3% had tested their eyes, 78.2% had screened their feet and 69.7% had screened for early kidney diseases.

**Conclusion:** Generally, respondents with diabetes had better knowledge of diabetes mellitus than non-diabetic respondents. They are also more likely to be screened for other chronic diseases.

#### QLY468

##### Is an Experience of Unplanned Visits to Healthcare Services for Acute Exacerbation of Asthma Associated with Their Knowledge and Perception of Asthma?

LY WONG<sup>1</sup>, BH HENG<sup>1</sup>, HSMP TOH<sup>1</sup>, LS YEO<sup>2</sup>, J ABISHEGANADEN<sup>3</sup>, TK LIM<sup>4</sup>, JTS CHEAH<sup>5</sup>

<sup>1</sup>Health Services and Outcomes Research, <sup>2</sup>Disease Management, National Healthcare Group HQ, Singapore, <sup>3</sup>Respiratory Medicine, Tan Tock Seng Hospital, Singapore, <sup>4</sup>Medicine, National University Hospital, Singapore, <sup>5</sup>Clinical Project Management and Planning, National Healthcare Group HQ, Singapore

**Aim:** To determine whether an experience of unplanned visit to healthcare

facility is associated with differences in knowledge, perception and symptom control among Singapore residents.

**Methods:** A population-based survey on asthma was conducted from December 2004 to June 2005 involving Singapore residents aged 15 to 69 years, by face-to-face interviews. The knowledge, perception and asthma symptom control of respondents who reported unplanned visits to healthcare facilities for asthma exacerbations (Group A) were compared with those who did not (Group B). Data were analysed using SPSS v13.

**Results:** Asthma was reported by 4.5% (57/1278) of respondents, comprising 15 in Group A and 42 in Group B. Compared to Group B, 26.7% in Group A knew that the underlying cause of asthma was airway inflammation (vs 16.7%); 46.7% had ever heard of long-term preventor medication for asthma control (vs 19%,  $P = 0.037$ ); and 73.3% believed that asthma symptoms could be prevented effectively (vs 57.1%). More in Group A (80.0%) reported exercise-induced asthma in the preceding 12 months (vs 35.2%,  $P = 0.003$ ), asthma symptoms in the day (66.7% vs 38.1%) and night (53.3% vs 40.5%) in the past 4 weeks. There was no difference in alcohol consumption and exercise; however, smoking prevalence was significantly higher in Group A (40% vs 11.9%,  $P = 0.018$ ). Also, significantly fewer (40%) perceived that their asthma was completely/well controlled in the preceding month (vs 69%,  $P = 0.047$ ).

**Conclusion:** Persons with unplanned visits to healthcare facility have higher awareness level, but this does not translate into favourable lifestyle practices (smoking) that lead to symptom control.

#### QLY469

##### Engraftment Kinetics of Autologous Peripheral Blood Stem Cell (PBSC) Transplants at NUH

P LAW<sup>1</sup>, N YUSOF<sup>2</sup>, SK KEE<sup>1</sup>, B MOW<sup>2</sup>, CS CHEN<sup>2</sup>, TC LIU<sup>1</sup>, LK TAN<sup>1</sup>

<sup>1</sup>Laboratory Medicine, <sup>2</sup>Haematology-Oncology, National University Hospital, Singapore

**Aim:** Autologous peripheral blood stem cell (PBSC) transplantation has become the standard of care for many haematological and non-haematological malignancies. The aim of this analysis was to summarise engraftment kinetics of patients receiving autologous PBSC transplantation as part of the ongoing quality improvement activities at our institution.

**Methods:** A total of 28 adult patients received autologous PBSC transplantation between January 2004 and April 2005. The median age was 51 (range, 29 to 60) years, and diagnosis included non-Hodgkins lymphoma (n = 13), multiple myeloma (8), acute myeloid leukaemia (5) and other diseases (2). All patients were mobilised using chemotherapy plus G-CSF. Leukapheresis was initiated when circulating CD34+ cells reached 5/ $\mu$ L, and continued until at least  $3 \times 10^6$  CD34+ cells/kg were collected. One patient mobilised poorly and required marrow harvest (with combined dose of  $1.06 \times 10^6$  CD34+ cells/kg). PBSCs were thawed and infused without manipulation. Neutrophil and platelet engraftments were defined as first of 3 consecutive days when neutrophil and unsupported platelet counts reached  $\geq 500/\mu$ L and  $\geq 20,000/\mu$ L, respectively.

**Results:** A median dose of  $5.09 \times 10^6$  CD34+ cells/kg (1.06-18.7) was infused into the patients. All 28 patients achieved neutrophil and platelet engraftments in a median of 14 (9-33) and 13 (8-28) days, respectively. There was no correlation of either neutrophil or platelet engraftment to WBC/kg, CD34+ cells/kg dose, or percentage of CD34+ cells in the PBSC grafts. Patients with different diseases engrafted with similar kinetics.

**Conclusion:** Patients receiving autologous transplantation have neutrophil and platelet engraftment kinetics similar to international benchmark reports. Engraftment tracking is incorporated as part of the quality control process at our institution.

**QLY470**

**Mycobacterial Studies on Cerebrospinal Fluid: Only Half are Evidence-based**

**JPJ CHAN<sup>1</sup>, T BARKHAM<sup>1</sup>**

<sup>1</sup>Laboratory Medicine, Tan Tock Seng Hospital, Singapore

**Aim:** To promote evidence-based requests for mycobacterial (TB) studies on cerebrospinal fluid (CSF).

**Methods:** An audit on TB studies requested on CSF showed an opportunity for improvement. Evidence-based rejection criteria were developed. The sensitivity of TB investigations rises from 40% with 2 mL of CSF to 80% with 8 mL. Submission of less than 1 mL is common. Educational material was disseminated and rejection criteria imposed such that samples of less than 1 mL and samples with normal cell count, protein and glucose were rejected. Concurrently, the laboratory began saving all CSF for at least a week to allow ward staff to request TB investigations after checking these parameters.

**Results:** Of the 283 requests received over 12 months, all 3 CSF parameters were normal in 124 (44%). Rejection of these requests would have saved S\$10,813 with only a 0.1% to 1.5% probability of missing a true case of tuberculous meningitis. After rejection criteria were imposed, 9 of 51 requests were rejected over 2 months, although 17 met the criteria.

**Conclusion:** The extent of over-requesting of CSF TB investigations suggests poor control at the ward level. This wastage of resources may be just as common across all investigations with many opportunities for improvement. Automated rejection at the level of the requesting doctor, when ward-based computerised requesting and expert IT systems are introduced, would be more efficient than laboratory-based rejection, educate the ward staff and allow senior clinicians to overrule rejection policies when clinically warranted.

**QLY471**

**Lost in Cyberspace: The Search for TB Reports**

**MTL KEE<sup>1</sup>, S/D/O ATHIMOOLAM<sup>1</sup>, PU KRISHNAN<sup>1</sup>, T BARKHAM<sup>1</sup>**

<sup>1</sup>Laboratory Medicine, Tan Tock Seng Hospital, Singapore

**Aim:** To reduce the number of "missing" TB culture reports.

**Methods:** TB cultures are sent to the Central TB Laboratory (CTBL). Reports take up to 12 weeks and many go missing. We spend a lot of time searching for them.

**Old Workflow:** All TB culture reports were printed in duplicate in the TTSH Laboratory by the CTBL computer system. These 2 copies were sent all over the hospital, including to the wards, outpatient clinics and the Medical Records Office (MRO). For positive or overgrown reports, the CTBL sent a third copy to the TTSH laboratory which forwarded them to the MRO or clinics if the patient had been an inpatient or an outpatient respectively.

**New Workflow:** Printing at TTSH by CTBL was cancelled. All TB reports were printed once at CTBL and sent to the TTSH laboratory with an acknowledgement list. Upon receipt, TTSH staff checked whether all reports were present, transcribed results into the laboratory computer, which automatically printed a copy at the requesting location, then signed and faxed the acknowledgment list back to CTBL.

**Results:** Outstanding reports were reduced from 38 cases to 2 cases per month.

**Conclusion:** This exercise has reduced work and costs, benefiting the laboratory, MRO, clinics and medical staff.

**QLY472**

**Impact of NUH Multidisciplinary Team for Diabetic Foot Problems (DFPs) and Use of Clinical Pathway on Management of Patients with DFPs**

**AH TORNG<sup>1</sup>, N AZIZ<sup>2</sup>, SB CHIONH<sup>3</sup>, BY CUI<sup>1</sup>**

<sup>1</sup>Medical Affairs, <sup>2</sup>Orthopaedic Surgery, <sup>3</sup>Medicine, National University Hospital, Singapore

**Aim:** Diabetic foot problems (DFPs) accounted for 10% to 20% of emergency

cases admitted to NUH Orthopaedic wards. Every year, about 700 limb amputations are performed in Singapore because of DFPs. NUH established the first multidisciplinary team for DFPs in Singapore in January 2003. The team also launched the clinical pathway for DFPs in March 2003. The aims of this study were to evaluate the effectiveness of NUH multidisciplinary team and use of clinical pathway in managing patients with DFPs; and to improve the management and reduce the ALOS and major amputation rates by 10% of patients admitted with diabetic foot infections, without significantly increasing the unscheduled re-admission rates.

**Methods:** To compare the patient's wound classification, co-morbidities, average length of stay (ALOS), major amputation rate, unscheduled re-admission rate, and hospitalisation cost over 3 years.

**Results:** There was significant increase of patients with gangrene foot by 19% ( $P = 0.015$ ) in 2003. There was significant increase of patients with ulcerated foot by 15% ( $P = 0.024$ ) in 2004. Patients had comparable co-morbidities over 3 consecutive years. There was a significant decrease of ALOS by 32% ( $P = 0.005$ ). The ALOS in 2002 was 20.4 days, 19 days in 2003, and 14 days in 2004. There was a significant decrease of stump infections from 3% to 0% ( $P = 0.027$ ). Major amputation rates decreased by 11% ( $P = 0.071$ ). The major amputation rate was 31% in 2002, 26% in 2003, and 20% in 2004. No significant difference in unscheduled re-admission and cost for all patients.

**Conclusion:** Formation of multidisciplinary team and use of clinical pathways has enhanced the management of patients with DFP.

**QLY473**

**Enhancing the Discharge Process and Supply of Medications for Endocrine Patients**

**AH TORNG<sup>1</sup>, S LIEW<sup>2</sup>, C SIN<sup>3</sup>, SL LIM<sup>4</sup>, ST LIM<sup>5</sup>, AL TAN<sup>6</sup>, D KOH<sup>7</sup>**

<sup>1</sup>Medical Affairs, <sup>2</sup>Medicine, <sup>3</sup>Administration, <sup>4</sup>Dietetics, <sup>5</sup>Nursing, <sup>6</sup>Pharmacy, <sup>7</sup>Medical Social Work, National University Hospital, Singapore

**Aim:** Diabetes is the leading cause of kidney failure, blindness and limb amputation in Singapore, and is a major risk factor for cardiovascular disease. Poorly controlled diabetes can progress steadily to cause complications such as blindness, nerve damage, kidney failure, heart disease and limb amputations. In January 2005, a Diabetes CareNode workgroup was formed to review the inpatient process and to identify areas that require improvements. One problem identified was that the endocrine patients were discharged from the ward without sufficient medications supplied to last until their next NUH follow-up appointment. The aim was to improve the discharge process of all endocrine patients in Ward 64 by ensuring 90% of patients were supplied sufficient medications until their next NUH appointment, and providing follow-up appointments according to doctors' discharge request.

**Methods:** (1) Several interventions were implemented to alleviate the problem. (2) Pre- and post-implementation data were collected to monitor and evaluate success of interventions to address: provision of follow-up appointments accordingly to meet doctors' appointment request prior to discharge; supply adequate medication until their next follow-up appointment.

**Results:** The baseline results showed the ward staff were only able to provide follow-up appointments (48%) to patients according to doctor's appointment request upon discharge. Hence, 62% of endocrine patients were supplied insufficient medications to last till their next NUH follow-up appointment. Several interventions were implemented and our preliminary results in May 2005 showed that we were able to improve the ward staff ability to provide appointments according to doctor's request (>21%) and supply sufficient medications to 77% endocrine patients (>39%) prior to discharge.

**Conclusion:** We continue to monitor the results every month to achieve our target.

## QLY474

**Continual Commitment of Health Care Staff to Family-centered Neonatal Care will Increase Parental Satisfaction of Communication in the Neonatal Intensive Care Unit/Special Care Nursery****YPM NG<sup>1</sup>, ASM IQBAL<sup>1</sup>, A CHINNADURAI<sup>1</sup>, PI LIM<sup>2</sup>, SY LEE<sup>2</sup>, C CHEW<sup>3</sup>, R JOSEPH<sup>1</sup>**<sup>1</sup>Neonatology, National University Hospital, Singapore, <sup>2</sup>Nursing, National University Hospital, Singapore, <sup>3</sup>Parent Representative, Singapore**Aim:** Family-centred Neonatal Care puts the family in the centre of services as part of the healthcare team. Our previous questionnaire on family-centred care identified several deficiencies in communication.**Methods:** A CPIP project was initiated in August 2004 with the mission statement: To increase parents' satisfaction of communication by healthcare team about their sick newborn from 7.5 to 8.5 (on a 9-point Likert scale) within 6 months. Team members were doctors, nurses and an ex-NICU parent. Pareto voting demonstrated inadequacies in doctor(s)-nurse(s) communication; orientation process; admission workflow; nurses' attitude/busyness as the causative 80%. At 72 to 96 hours after baby's admission, parents completed a "Parental Satisfaction Survey" on a 9-point Likert scale. Preinterventional score in September 2004 was 7.5 (7 denoted "satisfied" and 9, "strongly satisfied").**Results:** Three interrelated interventions targeting main 80% causes were done simultaneously in October-November 2004. Each neonate was allocated a primary team of doctors/nurses. Staff were educated about their new roles. A new orientation process facilitated flexible parental visitation and open communication with healthcare team. The postinterventional score was 7.9 within 3 months of intervention. Ineffective processes were changed during the final month: primary nurses scheme was discontinued and a printed orientation pamphlet was prepared.**Conclusion:** We were unable to meet our target because changes in habits were required. Our baseline scores were also high due to preexisting efforts on family-centredness in our unit. With continual commitment to family-centredness, we should achieve our targets in the future.

## QLY475

**Discharging General Anesthesia (GA) Patients from Day Surgery Ward within 2.5 Hours after End of Surgery****YP CHIA<sup>1</sup>**<sup>1</sup>Nursing, Tan Tock Seng Hospital, Singapore**Aim:** To have 90% of GA patients' discharged from the day surgery ward within 2.5 hours after end of surgery in 6 months.**Methods:** The team found that less than 30% of patients who had surgical procedures performed under GA were discharged within 2.5 hours after end of surgery. Using Clinical Practice Improvement (CPI) methodology, the team found that waiting for a doctor to certify patients fit for discharge, incomplete documentation of medical certificates and prescriptions, waiting for relatives to fetch patients and postoperative nausea and vomiting were the main reasons for the delay. With the support from the Medical Board, Anaesthesiology and Nursing Departments, the team implemented these interventions, application of the Patient Anesthesia Discharge Scoring (PADS) system to safely discharge patients; training of nurses in this new tool and the re-design of the process flow to expand the role of the Registered Nurses. The Nursing record was also revised to include the PADS as well as to ensure all documentation were ready before patient arrived at day surgery.**Results:** The percentage of patients discharged within 2.5 hours after end of surgery increased from an average of 53.5% pre-intervention (November 2003 to April 2004) to an average of 94% post intervention (May to December 2004).**Conclusion:** The team surpassed the aim and achieved greater than 90% of GA patients' discharged from the day surgery ward within 2.5 hours after the end of surgery. There was also no difference in the rate of unplanned admission following ambulatory procedures with the nurse-discharge initiative.

## QLY476

**Mobile Phone Text Messaging — A Reasonable Replacement for the Pager?****AEJ CHEAH<sup>1</sup>, YK TAN<sup>2</sup>, CH HO<sup>3</sup>, CT HENG<sup>4</sup>, SJ CHIA<sup>4</sup>**<sup>1</sup>Orthopaedic Surgery, Tan Tock Seng Hospital, Singapore, <sup>2</sup>Emergency Medicine, National University Hospital, Singapore, <sup>3</sup>Special Projects, National Healthcare Group HQ, Singapore, <sup>4</sup>Surgery, Tan Tock Seng Hospital, Singapore**Aim:** As mobile-phone text messaging becomes an increasingly integral part of the way people communicate, we felt an impetus to examine if this modality of communication was robust enough to replace the hospital pager system. Our aims were to survey user satisfaction, system viability and safety.**Methods:** A web-based computer to mobile-phone interface was commissioned. Doctors from the general surgery department as well the hospital's nurses were recruited and given questionnaires. Message transmission data were collected over 11 weeks. Safety precautions were taken and adverse events recorded.**Results:** Time spent on using the pager system was considerable. Nurses surveyed reported making an average of 18 pages per shift and average wait to reply at 9.7 minutes. Doctors surveyed reported receiving an average of 14 pages a day and average time spent per page at 5.6 minutes. The average number of text messages received per doctor per day was 7 with house officers having double the average at 14. 43.2% of these messages were authenticated with an average response time of 4.26 minutes. Five blind spots to mobile phone signals were identified and rectified. Message transmission lag times were between 57 seconds and 2 minutes. There was only 1 instance of mobile-phone interference with medical equipment which could not be replicated and was without adverse consequences. Satisfaction scores were approximately equal for both systems, although we are confident that text messaging will gain acceptance after teething problems are resolved.**Conclusion:** Mobile phone text messaging should be considered as a replacement for the hospital paging system, as it is effective, transparent and safe once end-user satisfaction is further improved.

## QLY477

**Intraoperative Examination of Sentinel Lymph Nodes for Breast Cancer in National University Hospital, Singapore****CL CHENG<sup>1</sup>, TC PUTTI<sup>2</sup>, SAE CHANG<sup>1</sup>**<sup>1</sup>Pathology, National University Hospital, Singapore, <sup>2</sup>Pathology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore**Aim:** Intraoperative frozen section (IFS) examination of sentinel lymph node (SLN) biopsy for patients with operable primary breast cancer has been regarded as a standard of care to allow the surgeon to decide if axillary lymph node dissection needs to be performed. The aim of this study was to look at factors influencing the detection of metastatic carcinoma in SLN for breast cancer, with emphasis on false negative findings in IFS.**Methods:** All cases of IFS performed for SLN in breast cancer from January 2003 to March 2005 were included. SLNs were detected using radiocolloid and/or patent blue dye and processed according to standard laboratory protocol for frozen section, paraffin-embedded sections and immunohistochemical study with epithelial marker (AE 1/3).**Results:** SLN biopsy was performed in 109 cases of breast cancer. Twenty-four cases were positive for metastasis. Fifteen cases were detected during IFS and a further 9 cases were identified on subsequent paraffin-embedded sections and/or immunohistochemical study, yielding a false negative rate of 37.5%. The IFS detection rate for macrometastasis was 92.3% (12/13), while that for micrometastasis and isolated tumour cells was 27.2% (3/11). The false negative rate for IFS of metastatic lobular carcinoma or carcinoma with lobular component was 50% (2/4).**Conclusion:** The false negative rate of IFS in SLN in breast cancer in our institution is comparable to that of published figures (11% to 56%). IFS detection of metastasis from lobular carcinoma is particularly challenging for the pathologist, and use of rapid immunohistochemistry may enhance the

detection rate.

#### QLY478

##### Improving the Standard of Care for Patients with Spinal Cord Compression

**KMLEE<sup>1</sup>, T SHAKESPEARE<sup>1</sup>, YN LOH<sup>1</sup>, I TSOU<sup>2</sup>, A WONG<sup>3</sup>, CS YU<sup>4</sup>**  
<sup>1</sup>Radiation Oncology, <sup>2</sup>Diagnostic Radiology, <sup>3</sup>Medical Oncology, <sup>4</sup>Orthopaedic Surgery, Tan Tock Seng Hospital, Singapore

**Aim:** Metastatic/malignant spinal cord compression (MSCC) is a dreaded urgent complication of cancer affecting 5% to 10% of all patients presenting as an oncological emergency. Delays in acute management in a multi-disciplinary setting often lead to poor clinical outcomes. (DJ Husband. *BMJ* 1998;317:18-21). We aimed to improve the standard of care for patients presenting with MSCC at Tan Tock Seng Hospital over 6 months by 1) ensuring that 90% of patients receive definitive treatment within 24 h of clinical suspicion and confirmation of diagnosis; and 2) ensuring at least 90% compliance to a standard treatment protocol.

**Methods:** Using the quality improvement model "Plan, Do, Check, Act", the team brainstormed and studied the current workflow to identify possible gaps and delay in the system. Interventions were then planned to address them: 1) set up a Multidisciplinary Acute Cord Crisis Team (ACCT); 2) fine-tuned the inter-disciplinary reporting and referral processes for MSCC; and 3) formulated a standard protocol for the acute management of MSCC patients.

**Result:** Since the interventions, the overall response time to starting patients with radiation and steroid therapy has improved for patients presenting with MSCC tracked sequentially prior to, during and following the implementation of the CPIP project. Individual hospitalisation-stay and charges were also tracked as surrogate-clinical parameters and these correlated well with the improvements seen.

**Conclusion:** With the evidence that the interventions were successful, a proposal is made for the formalising of a dedicated multi-disciplinary ACCT and use of a standardised protocol at TTSH for the treatment of MSCC as an oncological emergency.

#### QLY479

##### Day Surgery TURP: Our Initial Experience

**WJ CHUA<sup>1</sup>, MJB TIBUNG<sup>1</sup>, DT CONSIGLIERE<sup>1</sup>**  
<sup>1</sup>Urology, National University Hospital, Singapore

**Aim:** The current gold standard surgical treatment for benign prostate hypertrophy (BPH) is transurethral resection of prostate (TURP), using a monopolar loop electrode for resection. We aimed to convert this in-patient procedure (average 3.5 days' stay) into a day surgery procedure using a new energy source – Plasmakinetic bipolar.

**Methods:** All ASA 1/2 patients, aged 80 and below, with significantly obstructed BPH requiring surgical intervention, from a single institute (NUH), were recruited into this study. Standard pre-operative investigations were done. TURPs were done using the Gyrus Superpulse Plasmakinetic bipolar loop electrode. Patients were placed on continuous bladder irrigation and were observed for a few hours in the day surgery ward post-operative. Stable patients were discharged within the same day of admission. They would then return as outpatients 2 days later for removal of catheter.

**Results:** Twelve patients have been recruited so far. The surgeries were uneventful and all were discharged on the same day with no unexpected re-admission. All had their urinary catheter removed on the second postoperative day. One patient required intermittent catheterisation because of detrusor failure. Ten patients showed improvement in their validated symptoms and satisfaction scores and/or uroflowmetry at a mean follow-up of 6 weeks. One patient developed urethral stricture that required urethral dilation. Cost-benefit analysis showed significant cost savings.

**Conclusion:** We hope that successful implementation will reduce healthcare costs without compromising quality care and service to our patients. This may further reinforce Singapore's position as a leading centre for advanced medical practice demonstrating progress and innovation.

#### QLY480

##### To Prevent Patient Fall from Commode Chair

**AIW NG<sup>1</sup>, NA TAN<sup>1</sup>, J LIM<sup>1</sup>, LD LIAN<sup>1</sup>, P TAN<sup>1</sup>, SR MOHD<sup>1</sup>**  
<sup>1</sup>Biomedical Engineering, Changi General Hospital, Singapore

**Aim:** Patients usually place their feet on the footrest of the commode chair. The nurses assist the patients to get onto and off the commode chair. However, there have been instances whereby patients tried to get up from the commode chair without the nurses' assistance. As the body weight would be placed on the footrest, this could cause the chair to topple, leading to patient injury. A patient may also place his/her foot within the gap of the front steel structure of the commode chair, which could also cause the chair to topple as well. Our aim was to improve patient safety and comfort by achieving 0% occurrence of patient fall with the design improvement. This is also in line with the Environmental, Health and Safety (EHS) policy.

**Methods:** 1) The team designed and fabricated 2 stainless steel supports, which was welded on the footrest to prevent toppling of the commode chair. This acted as a safety feature for patients who tried to get up from the chairs independently. 2) There was a trial in 1 ward for 2 weeks and users liked the design for its focus on patient safety. Thus, all the commode chairs were modified and used in all the wards subsequently. 3) All staff affected were briefed during roll-calls, meetings or via e-mails.

**Results:** There has been 0% incidence of patient falls with the implementation of this safety feature.

**Conclusion:** Patient safety has improved tremendously with the innovative modification of the commode chair.

#### QLY481

##### To Implement a System which would Create a Safe Environment for Users Retrieving the Business Office (BO) Folders from the Business Office Compactus

**MC CHENG<sup>1</sup>, A SABAPATHY<sup>1</sup>, S MARSTOKI<sup>1</sup>, MC TAN<sup>1</sup>, M TAN<sup>1</sup>, N HARYONO<sup>1</sup>**  
<sup>1</sup>Business Office, Changi General Hospital, Singapore

**Aim:** Staff in Changi General Hospital use the compactus room in the Business Office (BO) for filing and retrieval of patient folders. Staff faced the following hazards while retrieving folders: 1) getting "crushed" by the moving compactus by other staff who did not check whether the slots are empty; 2) encountering collapse of shelves as some staff climbed on the shelves to retrieve files on the higher shelves, instead of using the step stool provided. Our aim was to implement a system that is safe for staff, in line with our Environmental, Health and Safety (EHS) policy.

**Methods:** 1) A colour code system of red and white, attached to each compactus, was introduced. Staff would flip the card to red when the compactus was in use and to white when it was not in use. 2) Staff were reminded during BO departmental briefings to use the colour code system and step stools. 3) All users were informed by e-mail and notices displayed in the compactus room on the use of the colour code system and step stools.

**Results:** 1) Productivity improvement: staff knew straightaway whether there were any staff in any of the compactus. 2) Workplace safety improvement: the chances of staff being "crushed" was eliminated as staff would not move the compactus when they see the red colour card. 3) System efficiency: The system cost less than S\$5.00 to implement.

**Conclusion:** Workplace safety for staff using the compactus room has improved tremendously with the implementation of the new cost-effective system.

## QLY482

**To Reduce Usage of Linen Wrappers to Wrap Instrument Sets****P LIEW<sup>1</sup>, Y LEW<sup>1</sup>, T RUIZ<sup>1</sup>, HF ZHU<sup>1</sup>, K GANESAN<sup>1</sup>**<sup>1</sup>CSSD, Changi General Hospital, Singapore

**Aim:** Instrument sets were packed with 2 linen wrappers that were sequentially folded. The linen quality deteriorated with repeated laundering and sterilisation. Linen also contains lint and other undesirable objects, which, if not removed, can become potential sources of infection to patients. The team explored new materials that could be used to overcome the linen wrappers problem. The aims were to 1) enhance patient and staff safety, 2) improve workflow, and 3) save time, energy and labour costs.

**Methods:** 1) The non-woven Spunbonded Meltdown Spunbonded (SMS) material was selected through literature reviews and benchmarking. Spunbonded fabrics have good strength characteristics whereas meltdown fabrics are known for their filtration capability. The combination of these 2 processes yields a third non-woven web that has functional characteristics of both fabrics. 2) Education and training were given to all users on the use of the selected wrappers. 3) Implementation was carried out in phases from OT to non-OT areas.

**Results:** 1) Improved patient safety: The water-repellent hydrophobic characteristics of non-woven material reduced absorption properties, thereby minimising the potential for contamination. The contents of the sterilised package will remain sterile, unless the package is opened or damaged. This sterility maintenance is event-related and recognised by AORN, AAMI and JCIA. 2) Improved staff safety: with reduced inhalation of lint and dust, allergy and occupational (respiratory) hazards were minimised. 3) Improved care of the environment: Water pollution and resources were greatly reduced. 4) Improved workflow: There was less sorting and delinting of linen wrappers.

**Conclusion:** With the implemented changes, the team achieved its targets.

## QLY483

**Optimising Breast Cancer Care—The Integrated Breast Service****HH TIAN<sup>1</sup>, SM TAN<sup>1</sup>, KH TAY<sup>1</sup>**<sup>1</sup>General Surgery, Changi General Hospital, Singapore

**Aim:** The integrated breast service was established in January 2002 to improve workflow and increase diagnostic and treatment efficiency for patients with breast disease. An audit was performed to evaluate the effectiveness towards meeting these objectives.

**Methods:** The records of 396 patients (174 before and 222 after the service was started) with breast cancer managed at Changi General Hospital between January 1999 and December 2004 were reviewed from a prospectively collected database. Outcome measures included lead time, time to reach diagnosis (TTD), time to start of treatment (TTT), bill size, length of inpatient stay (LOS), postoperative complications and unscheduled re-admissions.

**Results:** Patient demographics, co-morbidities and class status were similar in the 2 groups. Both the median lead time (4 vs 7 days) and the median TTD (5 vs 10 days) were shorter after the service began. More patients (60.8%) reached a definitive diagnosis after 2 visits, compared to 46.5% before the service began. There was less delay in instituting definitive treatment (45.9% had treatment by the third visit, compared to 36.6% before the service). The mean LOS was also significantly shorter (3.91 vs 9.24 days), resulting in lower ward costs (\$352 vs \$873) and total bill size (\$2105 vs \$3476). There were no significant differences in the incidence of postoperative complications (2.3% vs 1.8%) or unscheduled re-admission (2.9% vs 3.6%).

**Conclusion:** The integrated breast service improves the efficiency of the management of breast cancer patients. It shortens the TTD and TTT, resulting in shorter hospitalisation and lower bill size.

## QLY484

**To Reduce the Usage of Plastic Bags in Soiled Linen Disposal****S SAMION<sup>1</sup>, ZA DURAI<sup>1</sup>, J CHEANG<sup>1</sup>, N TAY<sup>1</sup>, S SAHMAT<sup>1</sup>**<sup>1</sup>Housekeeping, Changi General Hospital, Singapore

**Aim:** Soiled linen were packed into plastic bags before being disposed into the linen chute. Due to overpacking and poor plastic quality, many linen plastic bags broke along the way down the pneumatic chute system. This had resulted in 1) damage of soiled linen, 2) repacking of soiled linen by linen attendant, 3) disruption to the entire pneumatic chute system, and 4) manual transporting of soiled linen by linen attendants when the chute system was down. It cost S\$2,300 monthly to purchase these non-recyclable plastic linen bags. Our aims were to 1) improve the existing work flow and linen staff productivity; 2) eliminate plastic wastage; 3) reduce cost; 4) be more environmentally-friendly, in line with Environmental, Health and Safety (EHS) policy.

**Methods:** Plastic bags were changed to canvas bags and there was a trial for 2 days of 10 throws. All the areas were provided with canvas bags after the successful trial.

**Results:** As canvas bags do not break easily, the following are achieved: 1) protection and elimination of repacking of soiled linen; 2) no down time or disruption of the pneumatic chute system; 3) cost savings of S\$15,000 per year with the switch from plastic to canvas bags; 4) environmentally-friendly as canvas bags are reusable.

**Conclusion:** Our team achieved its targets with the use of the canvas bags.

## QLY485

**To Improve the Function of Plastic Stoppers used in Patients' Pyjamas Pants****S SAMION<sup>1</sup>, S TAN<sup>1</sup>, J CHUA<sup>1</sup>, AM TAN<sup>1</sup>, KW FONG, JH TAI**<sup>1</sup>Housekeeping, Changi General Hospital, Singapore

**Aim:** Patients pyjamas pants were fixed with plastic stoppers which melted and become distorted under prolonged washing and exposure to heat during the drying process. This damaged and jammed the metal spring catch inside the stoppers, making it difficult to release the stoppers when fastening the pyjamas drawstrings. Thus, patients had to tie a knot instead to fasten their pants. As the metal spring catch appeared in MRI images, patients had to change to a sarong or tape the stopper to one side. This affected the productivity of the Radiologists. Linen staff spent a lot of their time replacing the damaged plastic stoppers. The aims were to 1) improve patient satisfaction, safety and comfort, and 2) cut cost by at least 20%.

**Methods:** The stopper was redesigned and the material used was changed from plastic to cotton for all the pyjamas pants in phases. The trial was implemented in 2 wards for 4 days.

**Results:** 1) Improvement of patients' comfort they were able to use the cotton stoppers with ease. 2) Improvement of patients' satisfaction as they did not need to tie a knot to secure the pyjamas pants. 3) The metal spring catch did not appear in the MR imaging. Thus, radiologists could perform the scan more efficiently and effectively. 4) Linen staff did not need to spend time changing the damaged plastic stoppers. 5) There was a cost reduction of 26%.

**Conclusion:** The following are achieved 1) patient satisfaction, safety and comfort; 2) staff efficiency and effectiveness; 3) cost efficiency.

## QLY486

**Online Incident Reporting System****M RAMANY<sup>1</sup>, EC TAN<sup>1</sup>**<sup>1</sup>Information Services, Changi General Hospital, Singapore

**Aim:** To consolidate the different types of incident reports into an online system that is accessible to all staff and ensure prompt corrective and preventive action.

**Methods:** A workgroup was formed to implement a web-based incident reporting system with 1) customised forms for different types of incidents,



e.g., medication errors, patient falls; 2) ease of recording features with questions that apply specifically to that incident with input validations, drop-down lists. Efficient routing using integrated rule-based workflow system and email notification; and 3) management reports.

**Results:** 1) Centralised database: online IRS captures all types of incidents. Previously, pressure ulcers and medication errors were not centralised. 2) Consolidation of incidents reporting: with the online IRS system, the number of incidents reported increased from 43 per month in 2004 to 416 per month in 2005. The increase was mainly due to consolidation of different incidents into 1 system (especially prescribing error report and pressure ulcer report). 3) Anonymous reporting was implemented using a common department ID. This encouraged the staff to report incidents and supported CGH's no-blame culture. 4) Customised reports: regular reports by incident category, department and incident type are available.

**Conclusion:** The new online Incident Reporting System (IRS) is a significant step forward in the hospital's patient safety efforts as it facilitates a more proactive approach towards errors and other unanticipated incidents. This helps the hospital to analyse the root cause of the problem and take steps to prevent them from recurring instead of reacting to problems as they arise.

#### QLY487

##### To Reduce the Rejection Rate of Blood Samples

**SP TAN<sup>1</sup>, PS CHAN<sup>1</sup>, YY CHEN<sup>2</sup>, D LIM<sup>2</sup>, GM QIU<sup>2</sup>, YL KNG<sup>1</sup>, SK TAN<sup>1</sup>**

<sup>1</sup>Laboratory, <sup>2</sup>Ward Nursing, Changi General Hospital, Singapore

**Aim:** The Department of Laboratory experienced increasing numbers of rejected blood specimens from 303 cases in February 2004 to 355 cases in September 2004. This had led to 1) delay in the reporting of patients' results; 2) repeated blood testing, leading to patients' discomfort and inconvenience as additional blood had to be obtained; 3) blood wastage from the rejected specimens; and 4) inefficient work processes. The aims were to reduce 1) the rejection rate of blood samples due to insufficient blood volume by at least 50%; 2) the volume of blood needed for all in-house coagulation tests; 3) the inherent risks of repeat phlebotomy; 4) the frequency of ordering rejection codes; 5) the costs of needles, syringes, vacutainer tubes etc for repeat testing. The overall aim was to improve patient safety and comfort as well as to improve workflow.

**Methods:** 1) Blood sample tube of other design, which required lesser blood, was adopted. The accuracy of the blood tests was not affected by the change in design. 2) Staff were educated through posters on the draw sequence and required sample volumes. 3) A 4-month trial was conducted with the blood samples from areas that had the highest number of rejection samples.

**Results:** All targets set were achieved, particularly 1) blood sample rejection rate dropped by 57.4% from May to October 2004; and 2) the volume of blood needed for all in-house coagulation tests dropped from 4.5 mL to 2.7 mL.

**Conclusion:** With the implemented changes, the team achieved its targets.

#### QLY488

##### To Prevent the Disappearance of Wheelchair Parts

**SH TING<sup>1</sup>, R BOK<sup>1</sup>, S LEUNG<sup>1</sup>, HA RAHIM<sup>1</sup>, SK CHAN<sup>1</sup>, N WIN<sup>1</sup>, SL MAUNG<sup>1</sup>**

<sup>1</sup>Maintenance, Changi General Hospital, Singapore

**Aim:** The Department of Maintenance experienced missing wheelchair parts such as foot rest, arm rest or drip pole periodically as most of the parts were detachable. This posed a problem in a hospital setting as patient care and operations were disrupted due to the non-availability of wheelchairs. As there were different wheelchair models used over the years, it made the stocking of spare parts expensive and cumbersome, especially with the high rate of change of the spare parts. The cost of the parts ranged from S\$350 to S\$500 each. Furthermore, the lead-time for delivery of parts was at least 1½ weeks, resulting in a slow replacement process. The aims were: 1) to improve patients and staff satisfaction by ensuring that wheelchairs, with all the parts intact, are available to patients whenever needed; 2) to reduce the cost of missing wheelchair parts.

**Methods:** The detachable wheelchair parts were fastened to the wheelchair by securing them with stainless steel wire or chain and hose clip. A trial was conducted before the modifications were rolled out to all the wheelchairs in the hospital.

**Results:** The cases of missing parts dropped from 8 in 2003 to 0 in 2004. As there was no need to replace the missing wheelchair parts, there was cost savings of S\$2070, after taking into consideration modification costs.

**Conclusion:** The team achieved the following with the wheelchair modifications: 1) patient and staff satisfaction as wheelchairs, with parts intact, are available when needed; and 2) cost reduction.

#### QLY489

##### To Improve Workflow of Blood Sampling via Intra-arterial (IA) Line

**M CHIANG<sup>1</sup>, I MARDIANAH<sup>1</sup>, S HIEW<sup>1</sup>, A SURAYA<sup>1</sup>, C YEOH<sup>1</sup>, A SIM<sup>1</sup>**

<sup>1</sup>MICU, Changi General Hospital, Singapore

**Aim:** Patients in the Intensive Care Unit (ICU) and Operating Theatre (OT) of Changi General Hospital were subjected to frequent blood sampling via the open intra-arterial (IA) line system. An IA line is the insertion of a cannula directly in the artery. It serves as an access for blood sampling of the patient and allows continuous monitoring of blood pressure. An open IA line system had the following problems: 1) Wastage of patients' blood. 2) Risk of potential infection for patients, arising from the open I/A line system. 3) Risk of needlestick injuries and potential infection from contact of patients' blood for nurses. The aim is to improve the workflow of the existing blood sampling via the open IA line system as well as eliminate the problems associated with it.

**Methods:** 1) The blood sampling method for ICU and OT patients was changed from an open IA line system to a closed IA line system, after consultations with internal and external stakeholders. 2) Staff using the closed IA line system were trained in the system.

**Results:** 1) Minimised blood loss as initial blood discarding is not necessary. 2) No incidence of needlestick injury during blood sampling. 3) Annual cost savings of S\$7700 from elimination of syringes under the open IA line system. 4) Annual manpower savings of S\$4700 with time saved in blood sampling for the open IA line system.

**Conclusion:** The following are achieved: 1) Patients' comfort and satisfaction, 2) Staff safety and satisfaction, and 3) Savings for the hospital.

#### QLY490

##### To Reduce Needlestick Injuries in Changi General Hospital

**J CHOO<sup>1</sup>, SE LOH<sup>2</sup>, H OH<sup>2</sup>, RU SINGH<sup>2</sup>, AE CHEW<sup>3</sup>, SM GOH<sup>4</sup>**

<sup>1</sup>Nursing Administration, <sup>2</sup>Infection Control, <sup>3</sup>Ward Nursing, <sup>4</sup>Quality Management, Changi General Hospital, Singapore

**Aim:** There was a sharp increase in needlestick injuries from 45 cases in FY 2002 to 78 cases in FY 2003. A team was appointed to reduce needlestick injuries by benchmarking against the hospital with the lowest needlestick injury rate (within 3 cases per month).

**Methods:** (1) Use of the vacutainer — a system that minimises needle-exposure and elimination of transfer of blood specimen to specimen container. (2) Implemented blood-taking tray with customised sharps container so that needles can be disposed of immediately after procedures. (3) Roadshows were conducted to improve needlestick injury awareness. (4) Awards given to departments which were needlestick injury free for 3 months. (5) Needlestick injury reduction as key performance indicator. (6) Every needlestick injury was followed up to ensure corrective actions were taken.

**Results:** (1) Reduction to 2.9 cases per month (from June 2004 to May 2005). (2) Mental trauma, potential serious consequences on staff and compromise of patient care was significantly reduced. (3) Estimated time savings per year is 23,798 hours, with the elimination of 3 activities by using the vacutainer system and sharps containers. (4) Estimated cost savings from investigations and treatment per year is S\$14,520. (5) Project was highly commended by the

JCIA surveyors during the survey in June 2005. (6) Shared practices at the Asia Pacific Society of Infection Control Training Course.

**Conclusion:** The team has achieved the target to reduce needlestick injury and are piloting the use of other safety devices. Increasing staff awareness and the existing needlestick prevention strategies have created a sense of caution and compliance to proper handling and disposal of sharps.

#### QLY491

##### To Improve on the Device used to Raise Patients with Injured Lower Limbs

**C FERNANDEZ<sup>1</sup>, AYH SIM<sup>1</sup>, R YAYIT<sup>1</sup>, R HASSAN<sup>1</sup>, LALITHA D/O G<sup>1</sup>, C TAN<sup>2</sup>**

<sup>1</sup>Nursing, <sup>2</sup>Material Management Department, Changi General Hospital, Singapore

**Aim:** Patients with lower limb injuries would usually be put on traction where a pillow was placed under the affected limb to promote comfort and reduce swelling. However, prolonged use of the pillow placed pressure on the heel. Furthermore, the flattened pillow also resulted in the lower limb moving out of position frequently. This consumed a considerable amount of the nurses' time, as they had to keep checking on the alignment of the pillow. Patients also risked developing skin breaks due to prolonged contact of the heel against the pillow. The aim was to improve the safety and comfort of patients as well as to improve existing workflow.

**Methods:** 1) The team worked with a vendor to design a pillow that fit the shape of the leg, so to prevent the leg from sliding off. 2) The pillow was made of a softer material (a mid-density cosmetic foam) that absorbed moisture and kept cool. 3) The new device was put on trial in 5 wards before being implemented to all relevant wards.

**Results:** 1) Improvement of patients' comfort and safety: a) There was no skin redness with prolonged usage. b) There was no sliding off of affected leg from the pillow. c) The foam-like material promoted air circulation and comfort. 2) Improvement of nurses' productivity as they did not need to check on the position of patients' injured limbs on the pillow.

**Conclusion:** With the implemented changes, the team achieved its targets.

#### QLY492

##### To Reduce the Discomfort of Bedridden Patients when Lifting Them in Bed

**FM KING<sup>1</sup>, HI NEO<sup>2</sup> S NG<sup>1</sup>, SL LIM<sup>1</sup>, ZH WANG<sup>1</sup>, N SAINI<sup>1</sup>**

<sup>1</sup>Nursing, <sup>2</sup>Cardiac Catheterisation Lab, Changi General Hospital, Singapore

**Aim:** Patients, whose conditions require them to be confined to their beds or who are bedridden, need to be shifted by the nurses periodically to ensure that there are no bedsores and to ensure comfort for the patients. In addition, patients who sustain bedsores are also at a higher risk of contracting other infections during their stay in the hospital. During the shifting by the nurses, patients could be dragged by their trousers due to the weight of the patients. This method of shifting was not satisfactory as the patients were not shifted to the desired position, with inadequate turning. Furthermore, the thin linen material made it difficult to roll in and was also not ideal to grip to. All these led to patients' discomfort and nurses suffering from back strain. The aims were to improve the safety, comfort and satisfaction of patients as well as to improve existing workflow so that staff would not sustain work-related injuries.

**Methods:** 1) The team used a piece of soft rubberised sheet (known as patlift), when shifting or lifting the patients on or out of the bed. The material was good for rolling and staff had a good grip on the patlift. 2) It was put on trial for 2 weeks and implemented in all wards subsequently.

**Results:** 1) Improved patient safety, comfort and satisfaction. 2) Improved staff satisfaction. 3) Improvement of nurses' working environment, especially those handling shifting and lifting of patients.

**Conclusion:** With the implemented changes, the team achieved its targets.

#### QLY493

##### To Facilitate the Mobility of Surgical Patients who Are Attached to Multiple Drips and Lines

**B LAU<sup>1</sup>, F MAK<sup>1</sup>, MM ABBAS<sup>1</sup>, HW CHEN<sup>1</sup>, J KONG<sup>1</sup>, J SU<sup>1</sup>, H HASSAN<sup>1</sup>**

<sup>1</sup>Rehabilitative Services, Changi General Hospital, Singapore

**Aim:** Patients who have undergone major surgical procedures often require physiotherapy. At this acute stage of recovery, they are usually attached to multiple I/V drips, lines or drains (referred as attachments). Physiotherapists faced the following problems during therapy sessions: 1) Handling of multiple attachments, mobile drip stand, chairs, guiding of the walking framework (referred as equipment) and assisting patients simultaneously. 2) Spend extra time to set up the necessary equipment. Thus, patients may not be keen to ambulate as they may find therapy sessions cumbersome with the time-consuming equipment setup. This could delay their treatment and care and possibly increase their length of stay. The aim of the team was to find a solution that would help patients to ambulate earlier and improve their recovery process.

**Methods:** 1) The team modified the existing rollator to accommodate the multiple attachments, mobile drip stand, sitting and walking aid, leading to more effective therapy sessions as the setup time was eliminated. 2) Preoperation education for patients on the importance of ambulation and the use of the rollator after surgery.

**Results:** 1) Improvement in satisfaction rating for both patients (46%) and physiotherapists (50%) as they found it more convenient to ambulate with the modified rollator. 2) Average length of physiotherapy session decreased by 50.8%. 3) Manpower cost savings of 67.8% as physiotherapists were able to ambulate patients independently.

**Conclusion:** The team modified the rollator which helped patients to ambulate earlier. The therapy sessions are now more effective for both patients and physiotherapists.

#### QLY494

##### To Improve Patient and Carer Education for Patients with Stroke

**SS LEE<sup>1</sup>, A YAP<sup>1</sup>, CH GOH<sup>1</sup>, N ABUSUJAD<sup>1</sup>, YL KWONG<sup>1</sup>, M LOW<sup>1</sup>, H BINDIN<sup>1</sup>**

<sup>1</sup>Rehabilitative Services, Changi General Hospital, Singapore

**Aim:** Stroke patients require the support of carers when they are discharged from the hospital. However, when patients and carers are not adequately trained in the post-hospital recovery setting, the recovery progress of the patients is affected. Carer stress may also result when carer is unable to cope with the care of the patient. The aim is to improve patient and carer education for stroke patients, as information is not disseminated in a centralised and organised manner.

**Methods:** 1) All relevant information for the carer was made available in a package during the first encounter with therapist. An information sheet, with pictorial guides, on basic bed mobility and bed transfers' information were also included. 2) A standardised checklist was used by the therapist, to ensure that all relevant information was provided to patients and carer during carer's training. 3) Therapists were trained on prompt carer's identification and initiation of early carer's training, instead of upon patient's discharge. 4) Related videos on stroke management were aired in the wards during visiting hours.

**Results:** 1) Patients and carers were more informed in handling post-hospital recovery situations in the home setting. 2) Carers' tendency to sustain carer-related injuries were also dramatically reduced and carer stress was better managed. 3) Therapists worked more efficiently with the early identification of carers' training. The average length of stay for patients was reduced for patients who received early carers' training.

**Conclusion:** With the implemented changes, the team achieved its targets.

#### QLY495

##### Care of Antenatal Patients Referred to KK Women's and Children's Hospital from SingHealth Polyclinics

**TYK LIM<sup>1</sup>, CGP TAN<sup>2</sup>, LP TAN<sup>3</sup>, D TSE<sup>3</sup>, J TAN<sup>1</sup>, KH TAN<sup>1</sup>, SH YEO<sup>1</sup>**

<sup>1</sup>Maternal Fetal Medicine, KK Women's and Children's Hospital, Singapore, <sup>2</sup>Quality Management, SingHealth HQ, Singapore, <sup>3</sup>Medical, SingHealth Polyclinics, Singapore

**Aim:** To identify the characteristics of antenatal patients referred to a tertiary institution from SingHealth polyclinics

**Methods:** Random samplings of patients referred by SingHealth polyclinics for antenatal care from June 2002 to January 2003 were audited.

**Results:** A total of 80 cases were reviewed. 47.6% (38/80) were referred to KKH before 20 weeks' gestation, of which 27.5% (22/80) were referred for routine antenatal care. Outcome analysis revealed that 90% (72/80) delivered above 37 weeks' gestation and 76.3% (61/80) had a vaginal delivery. 48.8% (39/80) of cases who booked at polyclinics did not have a dating scan and 9% (7/80) did not have a screening scan. Only 21.3% (17/80) had received Down syndrome screening before 20 weeks' gestation. 57.5% (46/80) of the pregnancies referred to KK Hospital were uncomplicated with normal outcome at delivery.

**Conclusion:** The results suggest that a systematic process is necessary to streamline the delivery of antenatal care services between polyclinics and tertiary institutions to ensure a seamless integration of optimum care for obstetric patients. Better utilisation of limited resources in a tertiary institution may be achieved by reducing early referral of uncomplicated antenatal cases through a shared care programme. Clinical outcomes may be improved through proactively encouraging dating and screening scans as well as Down syndrome screening.

#### QLY496

##### A Consortia Approach to Electronic Resources in Hospital Libraries

**P FONG<sup>1</sup>, WC HING<sup>2</sup>**

<sup>1</sup>Medical Library, KK Women's and Children's Hospital, Singapore, <sup>2</sup>Pharmacy, National University Hospital, Singapore

**Aim:** The Joint Commission on Accreditation of Hospitals standards call for the development of library services that could dynamically respond to the information needs of healthcare personnel. The aim of this paper was to share KKH's 5-year experience in SingHealth libraries consortia initiative in the paradigm shift to e-access at the click of the mouse.

**Methods:** 1) Charted growth of 49 full-text journals in 2001 to >500 titles in 2005. 2) Studied effect of dramatically expanded e-resources in the face of drastic budget cuts. 3) Identified current barriers and problems that inhibit easy access to Internet-based information. 4) Evaluated feasibility of an interoperable library system that identifies resources held at member institutions in addition to a union catalogue for collectively owned resources.

**Results:** Consortia arrangements have a definite appeal for administrators who were under increased pressure to respond to the growing needs of their own constituencies. However, effectiveness of the "pooling approach" has, as yet, been tested only to a limited extent. Chances for success were greater in institutions where top administrators view libraries as contributing, rather than as consuming, members of the system.

**Conclusions:** Information services growing from a consortium effort will begin to ultimately upgrade all hospital library services. The "haves" will initially help the "have nots". In time, the "have nots" will become contributing members. Also the "haves" were motivated to be leaders in adopting technology like NLM's LinkOut to seamless linking from Medline to full-text documents.

#### QLY497

##### To Reduce Communication Barriers Between Non-English-Speaking Patients and Staff

**SMLIEW<sup>1</sup>, CK CHANG<sup>1</sup>, PGC WEE<sup>1</sup>, HA AHMAD<sup>1</sup>, HABUHASSAN<sup>1</sup>, HM TAY<sup>1</sup>, J ZHANG<sup>1</sup>**

<sup>1</sup>Nursing, National Heart Centre, Singapore

**Aim:** The objective of this project was to improve the effectiveness of communication between our nurses and the non-English-speaking patients during their hospital stay.

**Methods:** The team adopted the PDCA approach to achieve their objective. Various quality improvement tools were used. The team brainstormed and identified communication as an urgent problem between non-English-speaking patients and staff. The root causes were a) foreign nurses who did not speak local languages and dialects; b) elderly patients who understood only local dialects; and c) local nurses who did not speak dialects. A survey was conducted to determine how comfortable and competent the staff were in using other spoken languages and dialects. Data collected from 10 February 2004 to 12 February 2004 showed a large percentage of the staff were neither comfortable nor competent in speaking the Chinese dialects and Tamil language. Another survey was conducted for the patients between 1 February 2004 and 29 February 2004. It was found that 50% of the patients did not speak English. Staff planned and conducted language lessons for their fellow colleagues.

**Results:** There were significant improvements and savings. Other intangible results include a) improved patient's morale and understanding, b) improved staff morale and confidence, c) increased work efficiency and job satisfaction, and d) enhanced positive hospital image.

**Conclusion:** Better communications with patients improved operational efficiency and patients' safety. It helped to build our organisation's image as a dependable centre with high standards in quality care. The structured lessons developed may also be adopted by other organisations to improve communication between their staff and non-English-speaking customers.

#### QLY498

##### To Reduce the Length of Stay of Elective Patients

**RST SIM<sup>1</sup>, YM YIP<sup>1</sup>, SE LIM<sup>1</sup>, H KAUR<sup>1</sup>, CK LIM<sup>1</sup>, N ABDUL WAHAB<sup>1</sup>**

<sup>1</sup>Nursing, National Heart Centre, Singapore

**Aim:** The main objective of the project was to eliminate the need to admit elective patients coming for coronary angioplasty and angiogram 1 day before the procedure. The project would also improve the bed situation in Ward 44.

**Methods:** We receive regular written and verbal feedback from patients and one of the issues raised is on the need to be admitted 1 day before the procedure. Team members worked on re-designing the activities in order to reduce the length of stay for patients. On the day before admission, activities done on the patient include clerking, consent taking, blood taking, IV needle insertion, skin preparation and instruction on fasting. This takes about 2 hours and there will be no more activity for the patient till the next day. Team members designed a process to have these activities done on the day of admission so that patients do not need to be admitted in advance. The project was termed the "Same Day Admission Programme".

**Results:** a) Cost and time savings for patients, b) improved bed situation, and c) improved staff morale.

**Conclusion:** The process is still in place as the management has given full support for its implementation due to its effectiveness. The number of single-day admission patients is rising.

## QLY499

**To Enhance Apparatus Design used in Transradial Approach during Coronary Angiography and Angioplasty****V KWOK<sup>1</sup>, ESL NG<sup>1</sup>, TPT TEO<sup>1</sup>, P CHIAM<sup>2</sup>, J MOHD SALEH<sup>1</sup>, I KIAMEL<sup>1</sup>, C MANZANO<sup>1</sup>**<sup>1</sup>Nursing, <sup>2</sup>Cardiology, National Heart Centre, Singapore

**Aim:** The aims of the project were a) to improve the efficiency of the procedure in the Cardiovascular Laboratory (CVL) and b) to reduce the waiting time of coronary angiography and angioplasty patients.

**Methods:** The team adopted the PDCA approach to this problem. Various quality improvement tools such as the cause and effect analysis diagram, data collection/analysis and flowcharts were used in the implementation of the solution. The team determined that the root cause of the problem was the design of the transradial board. Due to poor design, the operator had no working space, resulting in a lot of blood spillage onto the floor and delay in transferring patients between procedures as the nurses had to clean the floor with disinfectant. The solution was to design and fabricate a transradial board that would facilitate radial access, increase patient's comfort and reduce the need for the nurses to clean up any blood spillage.

**Results:** a) Cost and time savings for the patients and nurses; b) Improved work efficiency and job satisfaction; c) Improved patient satisfaction; and d) Increased patient load and revenue.

**Conclusion:** The objectives of the project were met and greater patient satisfaction was achieved. The project is in line with our organisation's mission to provide patients with cost-effective and the best possible care.

## QLY500

**To Design Sternal Gadget to Provide Support for Obese Post-cardiac Surgery Patients to Minimise Risks of Sternal Wound Breakdown and Pain****KL TOK<sup>1</sup>, SL HOU<sup>1</sup>, I SHERIFF<sup>1</sup>, MALIGA D/O RC<sup>1</sup>, K D/O SELLAPAN<sup>1</sup>, NUR DIANAH<sup>1</sup>, G WEE<sup>1</sup>**<sup>1</sup>Nursing, National Heart Centre, Singapore

**Aim:** To minimise the risks of sternal wound breakdown for obese patients after cardiac surgery.

**Methods:** In cardiothoracic surgery, a vertical incision is made along the sternum. Postoperatively, obese patients experience an increased strain on their sternal wounds. This compromises their ability to ambulate, breathe or cough effectively, resulting in poor chest expansion, prolonged ventilatory support and longer stay in the intensive care unit. For these obese patients, and those with potential sternal wound breakdown, Heart Hugger is prescribed. The Heart Hugger is expensive. Appointment has to be made between patient's relative and the vendor to purchase the Heart Hugger. Based on feedback received from the patients and healthcare colleagues, members designed a sponge sternal wound support for these patients.

**Results:** Post-implementation survey revealed that the newly created sternal wound support was readily available, comfortable and more user friendly. Patients were able to ambulate early with less anxiety and fear of pain. The new support cost only \$10.75 while the Heart Hugger cost \$120. This resulted in savings of \$109.25 per sternal wound support. A 2-week survey revealed an average request of 182 sternal supports annually. This amounted to total savings of \$19,883.50.

**Conclusion:** By providing an easily available in-house sternal wound support, patients' relatives do not have to be inconvenienced by scheduled appointment with the vendor. Nursing staff do not have to spend time liaising with patients' relatives and the vendor regarding payment for the Heart Hugger.

## QLY501

**Less Work Better Outcome: To Allow 100% of Patients to be Propped up in Bed upon Return to the Ward after Spinal Anaesthesia, within 4 Months and without Increased Incidence in Post-spinal Headache****BC ONG<sup>1</sup>, NC HWANG<sup>1</sup>, A KAN<sup>1</sup>, HL CHEE<sup>1</sup>, TS HOWE<sup>2</sup>, SC QUEK<sup>3</sup>, A NORHAYATI<sup>3</sup>**<sup>1</sup>Anaesthesia and Surgical Intensive Care, <sup>2</sup>Orthopaedics Surgery, <sup>3</sup>Nursing, Singapore General Hospital, Singapore

**Aim:** Delivering quality care to every patient is our hospital's mission statement. Therefore, we set out to improve the patient's experience after spinal anaesthesia by allowing them to be propped up earlier and therefore eat and drink comfortably without the need for assistance. Indirectly, this reduced work for the nurses and allowed them to attend to more important nursing tasks.

**Methods:** A literature search was done to show that the new practice would be safe for the patients. A survey of the nurses and team members' opinion on why patients were not able to sit up after spinal anaesthesia was then done. A fish bone diagram was constructed and a vote taken for the pareto chart. The area identified was that of an age-old practice or "protocol" which had not been challenged or questioned. The team then educated the nurses in the ward on the proposed change and its safety and provided support if there were problems. We also used reminders and obtained frequent feedback from the nurses to encourage this change.

**Results:** We reached 100% compliance by 4 months. Qualitatively, we interviewed patients and confirmed they were happy and did not have post-spinal headaches.

**Conclusion:** This project successfully challenged and changed an age-old protocol and achieved a mindset change. This benefited both the patients and the nurses. The enthusiasm spread to other wards and we are now introducing this practice to another ward and will soon implement it in the whole hospital and the nursing school.

## QLY502

**Nutrition Intervention Improves the Caloric Intake of Patients with Anorexia Nervosa****MS LIM<sup>1</sup>**<sup>1</sup>Dietetics and Nutrition Services, Singapore General Hospital, Singapore

**Aim:** To determine the effect of nutrition intervention on the caloric intake of patients with anorexia nervosa.

**Methods:** Ten patients with BMI 13-14 (over a period of 12 months) were assessed for their intake during their hospital stay. Nutrition intervention includes meal-planning sessions. The dietitian assessed the oral intake of the patients based on intake/output chart and diet history. Patients were assisted in their selection of higher energy choices from the hospital menu based on individual food preference. Oral intake of patients was charted in the intake/output chart. Most of the patients chose meals from the hospital menu. All the meals served in the hospital were analysed for their nutritional content. From the amount of food charted in the intake/output chart, the caloric intake of the patients was then calculated before and after nutritional intervention.

**Results:** Eight out of the 10 patients seen by the dietitian show marked improvement in oral intake. One patient remained at a satisfactory level while another patient showed no improvement. The average initial energy intake was 840 kcal compared to 1550 kcal post-nutritional intervention (excluding the calories from supplements). There was an average improvement of 132% in oral intake.

**Conclusion:** Weight restoration is required for patients in the Eating Disorders (EDs) programme. Results showed that most patients are able to complete meals that were pre-selected with the help of a dietitian. However, the findings above showed 2 patients with no improvement. One of the patients encountered difficulty in the challenge of completing meals and dropped out of the ED programme subsequently.

**QLY503**

**Dietary Counselling as Part of a Coordinated Clinical Pathway is Effective in Reducing Heart Failure Re-admission**

**TB PHUA<sup>1</sup>, CLS SIA<sup>2</sup>**

<sup>1</sup>Dietetics and Nutrition Services, Singapore General Hospital, Singapore, <sup>2</sup>Singapore Cardiac Data Bank, National Heart Centre, Singapore

**Aim:** To investigate the impact of dietary counselling delivered as part of a multi-disciplinary Coordinated Clinical Pathway (CCP), on the re-admission rate of heart failure patients.

**Methods:** This is a retrospective study using data collected from the Singapore Cardiac Data Bank since the implementation of the Heart Failure CCP in 2002. Five hundred and twenty patients, who were on the Heart Failure CCP from 1 April 2002 to 30 September 2003, were included. Data were collected from the outcome and variance record, including any dietary counselling by the dietitian. All patients were followed for a period of 1 year post discharge and any re-admission into the Heart Failure CCP was tracked, together with the reason(s) for re-admission.

**Results:** Among these 520 patients, 334 (64.2%) were seen by a dietitian for dietary counselling on a reduced fat and salt intake diet and fluid restriction. One hundred and thirty-one (25.2%) patients were not seen and data were unavailable for 55 (10.6%) patients. Amongst these patients, only 11.8% of those who had dietary counselling were re-admitted to the CCP due to poor compliance with salt and/or fluid restriction as compared to 19.0% for those who did not have dietary counselling.

**Conclusion:** Dietary counselling on reduced fat and salt intake diet and fluid restriction is effective in reducing the re-admission rate of patients with heart failure due to poor compliance with salt and/or water restriction. Hence, it is a key component of a multi-disciplinary heart failure CCP.

**QLY504**

**To Increase the Number of Patients Receiving Medical Nutrition Therapy (MNT) in the Neurosurgery Intensive Care Unit**

**LB TAN<sup>1</sup>**

<sup>1</sup>Dietetics and Nutrition Services, Singapore General Hospital, Singapore

**Aim:** This quality improvement project aims to increase the number of patients receiving medical nutrition therapy (MNT) in the Neurosurgery Intensive Care Unit (NICU) through 2 phases of intervention.

**Methods:** The number of dietitian referrals for a period of 4 months was obtained from the dietitian database. A phase I intervention was then implemented from April to May 2004. This includes active participation in the weekly neurosurgery rehabilitation ward round, participation in the HMDP Critical Care forum at the hospital level and sharing of various relevant journal articles and ICU nutrition practice guidelines/protocols with doctors, intensivists, nursing staff and other allied health professionals. After the phase I intervention, the number of dietitian referrals was recorded for the subsequent 4 months. Phase II intervention from February to March 2005 involved implementing the enteral nutrition support protocol for NICU and conducting an in-service lecture for the Critical Care Nursing course. Following the phase II intervention, data were again collected for 4 months.

**Results:** Following the phase I intervention, the number of referrals increased significantly by 250% from 8 to 20 referrals. This number continued to improve to 290% after phase II intervention.

**Conclusion:** The active participation from a dietitian in the hospital critical care team and interaction with medical, nursing and other allied health professionals increase the team's awareness of the role of dietitian in providing nutrition support for the critically ill patients and hence the increase in patients receiving MNT.

**QLY505**

**To Bridge the Communication Gaps between Non-English-speaking Patients and Healthcare Members**

**BL LEAW<sup>1</sup>, LH TAN<sup>1</sup>, FC LIM<sup>1</sup>, KM WONG<sup>1</sup>, ML TAN<sup>1</sup>, LP LOCK<sup>1</sup>**

<sup>1</sup>Haematology/Training and Development, Singapore General Hospital, Singapore

**Aim:** To improve communication in order to provide quality nursing services. When patients are able to communicate with the nurses and have their needs attended to promptly, the satisfaction rate will increase, speeding up their recovery process.

**Methods:** The data were collected and showed that 82% of nursing staff have difficulty in communicating with elderly patients. Forty-two per cent are foreign staff from China, the Philippines and India. Next, a survey was done to identify the most common dialect used by non-English-speaking elderly patients when admitted to hospital. The results showed that 70% of elderly patients spoke Hokkien. Hence, the Hokkien dialect was identified as the main communication barrier between staff and patients. The recommended solution was to teach the nurses to speak and understand Hokkien dialect and we implemented the following: 1) provided pocket-sized booklets for nurses; 2) developed dialect compact disc and e-learning programme in the institution's intranet; 3) conducted courses for trainers, so that they would be able to guide the nurses; and 4) created cue card booklets with illustrations for patients.

**Results:** A post-evaluation survey was conducted for staff and patients based on 6 nursing activities. Based on the comparison with the pre-survey results of communication between staff and patients, we surpassed the target set by 10% to 19%.

**Conclusion:** With improved communication, healthcare members were able to anticipate patients' needs. They were able to provide prompt and caring service to patients in achieving clinical and service excellence. Healthcare workers' morale was also enhanced with improved communication with patients.

**QLY506**

**High Influenza Vaccination Coverage among Healthcare Workers can be Achieved during Heightened Awareness of Impending Pandemic Threat**

**KS YANG<sup>1</sup>, YT FONG<sup>1</sup>, D KOH<sup>2</sup>, MK LIM<sup>2</sup>**

<sup>1</sup>Occupational Health and Epidemiology, Singapore General Hospital, Singapore, <sup>2</sup>COFM, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** To evaluate 1) the influenza vaccination coverage achieved by different categories of healthcare workers; 2) reasons for declining influenza vaccination; and 3) comparison with reported experiences internationally.

**Methods:** We did a cross-sectional study among 5252 healthcare workers in Singapore's largest acute care hospital. Univariate and bivariate analyses were performed, followed by multivariate logistic regression to compute the odds ratios of association, adjusting for age group, gender and different professional categories.

**Results:** Overall vaccination coverage of hospital employees was 56.8%. The rate was highest among the ancillary staff (72.9%) and nursing staff (67.4%), lowest among the paramedical staff (37.4%) and administrative/clerical staff (20.9%). Age of <35 years and being ancillary or nursing staff were significantly associated with higher rates of vaccine uptake.

**Conclusion:** The overall influenza vaccination rate of 56.8%, with our ancillary staff achieving rates in excess of 70%, is unusually high, when compared to reported rates published in medical literature. We believe the highlighted awareness of threat, as well as the physical and cost convenience of being vaccinated, were major factors for the achievement.

**QLY507****Performance Evaluation of Three Commercial Measles IgM ELISA Kits for the Detection of Anti-measles IgM in Human Serum****XL BAI<sup>1</sup>, KP CHAN<sup>1</sup>, AE LING<sup>1</sup>**<sup>1</sup>Pathology, Singapore General Hospital, Singapore**Aim:** To evaluate the performance of anti-measles IgM ELISA kits (Dade Behring, Euroimmun and Denka Seiken) in a virology diagnostic laboratory.**Methods:** Sixty serum samples were tested using 3 commercially available ELISA kits. The results were compared with the current, using method-IFA results.**Results:** Of the 60 samples tested, the same results were obtained on 56 samples by the 4 methods. One sample which was positive by IFA was tested negative by the 3 EIA kits (this sample is from a potential bone marrow transplant donor for screening testing), indicating that the result obtained by IFA was a non-specific reaction. This sample was considered negative when calculating assay sensitivity and specificity. The sensitivity and specificity were both 100.0% with Euroimmun, 92.6% and 96.9% for Dade Behring, 100.0% and 93.9% for Denka Seiken. The Euroimmun kit also showed good precision in both intra-assay and inter-assays with CVs <10%. The agreement between Dade Behring and Virgo IFA was 95.0%, that between Euroimmun and Virgo IFA was 98.3% and that between Denka Seiken and Virgo IFA was 96.6%.**Conclusion:** The Euroimmun anti-measles IgM kit showed better performance in terms of sensitivity, specificity and precision. Its short testing duration enabled the laboratory to report results with shorter turnaround time and improved patient care service quality.**QLY508****Results of the National HIV-Screening Proficiency Programme in Singapore in 2004****KF TANG<sup>1</sup>, LLE OON<sup>1</sup>, SY SE THOE<sup>1</sup>, LS LIM<sup>1</sup>, H JALIL<sup>1</sup>, AE LING<sup>1</sup>**<sup>1</sup>Pathology, Singapore General Hospital, Singapore**Aim:** The aim was to study how the various HIV antibody assays used in Singapore performed in the detection of HIV-1 and HIV-2 antibody samples of varying dilutions, as well as in the testing of replicate samples.**Methods:** The results from the National HIV-Screening Proficiency Programme in Singapore in the year 2004 (panels A, B and C) were studied. Various dilutions (from 1:256 to 1:8192) of a positive HIV-1 and HIV-2 antibody positive sample from patients were prepared at the beginning of the year and stored at -70°C.**Results:** A total of 7 different HIV screening systems from Abbott and Roche were used by the 25 participating laboratories, with 3 systems having more than 5 users. All test systems/kits were able to detect the highly diluted HIV-1 samples except the Roche COBAS CORE HIV Combo which failed to detect the samples at 1:8192 dilution. All systems but the Roche COBAS CORE HIV Combo also successfully detected the diluted HIV-2 sample. From the standard deviation from mean (SD), it was observed that there was 1 laboratory showing consistent negative bias results for all samples of panels A and C suggesting inherent system or equipment problem. There were no significant differences in the OD readings of the same diluted samples tested over 3 panels, which indicated that there was no deterioration in the sera stored in -70°C for 9 months.**Conclusion:** All test systems/kits used by HIV-screening laboratories in Singapore performed satisfactory in the National HIV-Screening Proficiency Test in 2004.**QLY509****Evaluation of the Quality of Oral Anticoagulation Management in an Outpatient Clinic****PL LEE<sup>1</sup>**<sup>1</sup>Pharmacy, Singapore General Hospital, Singapore**Aim:** To evaluate the quality of oral anticoagulation therapy (QOAT) in an Anticoagulation Clinic managed by pharmacists and doctors.**Methods:** All patients with more than 12 months of warfarin therapy were studied from September 2000 to September 2004. During the first year, only doctors managed them. In the latter 3 years, pharmacists were trained to co-manage these patients with the doctors within a predefined protocol. The percentage of time that the INRs were below, within and above therapeutic range was used as a primary measure of the QOAT, while the incidence of hospitalisations as a result of over- or under-anticoagulation was monitored as the secondary outcome measure.**Results:** The number of patients studied each consecutive year was 173, 173, 220 and 212, respectively. Overall, the male-to-female ratio was 1.24, with a mean age of 58.2 ± 13. The racial distribution was 83.5% Chinese, 12.3% Malays, 3.3% Indians and 0.8% others. The indications for anticoagulation were venous thromboembolism (33.5%), stroke (11.5%), atrial fibrillation (24.7%), mechanical heart valves (15.3%) and other cardiovascular diseases (15%). Baseline demographic data were similar for each of the 4 consecutive years. Percentage time within the target INR range improved significantly each year from 48.1%, 50.8%, 55.4% to 62.9% (*P* < 0.001). The incidence of major complications was small and not significantly different between each study year.**Conclusion:** Co-management by pharmacists has resulted in increased percentage time within the target INR range. There is continual improvement each year, as the pharmacists become more competent. The pharmacists have helped to reduce the workload of doctors, enabling them to spend more time with new patients and on more complicated cases.**QLY510****Reducing Methicillin-resistant *Staphylococcus aureus* Infections in High Endemicity Setting****ML LING<sup>1</sup>, KL OOF<sup>2</sup>, KY TAN<sup>2</sup>, U GUNADISASTRA<sup>1</sup>, LC LEE<sup>2</sup>, KS NG<sup>2</sup>**<sup>1</sup>Quality Management, <sup>2</sup>Infection Control, Singapore General Hospital, Singapore**Aim:** Nosocomial methicillin-resistant *Staphylococcus aureus* (MRSA) infection is one of the major causes of healthcare-associated infections. Several multi-pronged measures were adopted in an attempt to reduce the nosocomial MRSA infection rates in a high endemicity setting.**Methods:** The senior management supported the programme by ensuring adequate resources to run the programme. The appointment of infection control liaison officers was expanded to include doctors and allied health staff. Increased awareness and understanding of multiply-resistant bacteria with the appropriate infection control measures were shared with all staff regularly. Audit programmes were modified and conducted at increased frequency. Hand hygiene compliance was set as a top priority with regular feedback of the data to respective process owners. For statistical analysis, the paired *t*-test was used to determine the difference in nosocomial MRSA infection rates before interventions (January 2002 to February 2003) and after interventions (August 2003 to September 2004).**Results:** There was a reduction in the mean nosocomial MRSA infection rates from 1.0 per 1000 patient-days before intervention to 0.7 per 1000 patient-days after intervention. This is statistically significant using the paired *t*-test (*P* < 0.01).**Conclusion:** We have demonstrated the effectiveness of an active infection control programme with the strong support of the hospital leadership in reducing the transmission of nosocomial MRSA in a high endemicity setting.**QLY511****Impact of the Patient Safety Walkabouts****ML LING<sup>1</sup>, KS NG<sup>1</sup>, D HO<sup>1</sup>, LL CHONG<sup>1</sup>, SH LIM<sup>2</sup>, MM LIM<sup>3</sup>, HJ FOO<sup>4</sup>**<sup>1</sup>Quality Management, <sup>2</sup>Nursing, <sup>3</sup>Pharmacy, <sup>4</sup>Executive Office, Singapore General Hospital, Singapore**Aim:** This paper illustrates the value of the Patient Safety Leadership



Walkabouts in leading cultural change in the hospital's patient safety programme.

**Methods:** A Patient Safety Leadership Walkabout was established in September 2003 at the Singapore General Hospital. This team comprising the Patient Safety Officer, Director of Department Quality Management, Chief Operating Officer, Director of Nursing Administration and Head of Pharmacy visited patient care areas fortnightly. The ward/area manager was contacted a week beforehand and asked to discuss with staff the questions to be raised during the walkabouts. Heads of Department were also notified and invited to join the walkabouts. Issues captured at the walkabouts were entered into a database for ease of tracking and follow-up.

**Results:** We have since completed 2 rounds of walkabouts in all patient areas of the hospital. The walkabouts have resulted in greater staff awareness on patient safety and acted as a resource for quality improvement initiatives. Some of the changes made included the installation of digital locks on the doors of rooms where medications are stored, improved lighting at critical patient care areas and distribution of hand hygiene booklets to inpatients.

**Conclusion:** The walkabouts have been steadily refined since its launch in 2003. They have become an integral part of the hospital's quality and patient safety programme. The visible support of the leadership demonstrates the organisational commitment to patient safety. We hope, over time, to be able to include patients in these walkabouts so that their concerns may be heard.

#### QLY512

##### Lessons Learnt in the Building of the Patient Safety Culture

**ML LING<sup>1</sup>, KS NG<sup>1</sup>**

<sup>1</sup>Quality Management, Singapore General Hospital, Singapore

**Aim:** With the release of the National Institute of Medicine's report on patient safety, several healthcare organisations have developed strategies towards building cultures of safety. We discuss the lessons learnt in the process of building this culture in an acute tertiary care hospital.

**Methods:** The review of the patient safety culture since the initiation of the patient safety programme in 2002 was made using the Bolman and Deal's organisational analysis tool, whilst the success of the cultural change was measured using a patient safety culture survey tool.

**Results:** Using existing structures to implement, monitor and institutionalise the process of change helped to increase our chance of success in an organisation steeped in tradition and history. In a complex institution with more than 100 departments, available resources were procured using political behaviours, e.g. bargaining, negotiation and compromise. Practising a no-blame approach in the review of sentinel events and involving recognised opinion leaders in patient safety initiatives helped staff to see that the change was meaningful. Recognising and rewarding staff for their contributions to the organisation was effective symbolic leader behaviour. Our patient culture survey results confirmed a healthy culture as evidenced by the high scores in the areas of commitment to safety (4.24/5), employee/management collaboration on safety (4.08/5) and safety training (4.08/5).

**Conclusion:** A vibrant safety culture requires continuous reassessment of status and establishing a norm of continuous learning. Since change is a dynamic process, the lessons learnt helped us to implement a strategy for change.

#### QLY513

##### Improving the Care of Colectomy Patients through Enhanced Utilisation of the Clinical Pathway

**ML LING<sup>1</sup>, WK WONG<sup>2</sup>, KS HO<sup>3</sup>, HE NG<sup>1</sup>, J TING<sup>1</sup>, D LIM<sup>1</sup>, T ONG<sup>1</sup>**

<sup>1</sup>Quality Management, <sup>2</sup>General Surgery, <sup>3</sup>Colorectal Surgery, Singapore General Hospital, Singapore

**Aim:** This paper describes the measures taken by the colectomy clinical pathway team in improving the care of their patients. The colectomy pathway was launched in the Department of Colorectal Surgery on 2 January 1998.

**Methods:** A review of the utilisation rate (47.4%) of the colectomy pathway in 2002 by the team prompted an urgent initiative for improvement. Analysis

showed that the Department of General Surgery (GES) undertook some of the colectomy procedures. An invitation was extended to GES to participate in the review of the pathway and its implementation in their patient care in July 2003.

**Results:** With the introduction of quarterly communication sessions with team members as well as feedback at the departmental and organisational levels, the pathway's utilisation rate improved to 63.2% in 2003, and 87.2% in June 2005. Although there was no change in the average length of stay, the reduction in cost per case was seen (\$8022 for 2002 and \$7187 in 2005).

**Conclusion:** The pathway team adopted the PDCA cycle in their regular reviews of key performance indicators. The collaboration and teamwork helped in getting the necessary buy-in from key stakeholders. These are critical measures that helped towards successful implementation of the pathway, resulting in improved patient care at both departments.

#### QLY514

##### Managing No-show Patients at the Specialist Outpatient Clinics (SOCs)

**HS YEO<sup>1</sup>, U GUNADISASTRA<sup>2</sup>**

<sup>1</sup>Specialist Outpatient Clinics, <sup>2</sup>Quality Management, Singapore General Hospital, Singapore

**Aim:** About 16,000 or about 26% of the 62,000 monthly appointments given are no-shows, resulting in wastage of time and resources to follow up with the patients. The team reviewed the Specialist Outpatient Clinic (SOC) no-show data, looked at past study initiatives and decided that with the initial no-show rate (period: January 2002-March 2004, excluding the SARS period) at 25.3%, a target of 20% no-show rate would be reasonable and achievable.

**Methods:** The team implemented ideas based on their impact and the ease of implementation: 1) Guidelines on handling no-show patients. 2) SMS services to remind patients of their appointments and missed appointments. 3) Reminders to patients to call for changes and cancellation of appointments. 4) Enhanced the appointment system to prompt for duplicate appointments. 5) Flagged high-risk patients in the appointment system so as to track and monitor their appointments. 6) Medical records of no-show patients reviewed by doctors to ensure timely treatment and continuum of care.

**Results:** Post implementation outcomes: 1) Reduction of no-show mean rate from 25.3% to 20.3% after implementation. 2) In June 2005, the no-show rate was 18.9%. 3) Increase in average monthly attendance from 46,849 to 51,960 after implementation. 4) Cost savings of \$113,340. 5) Compliments from patients on our reminder services. 6) Spin-offs when other departments adopted our ideas for implementation.

**Conclusion:** Failed appointments posed financial as well as administrative problems for the hospital. More importantly, proper and timely treatment and continuum of care could be compromised. Proactive measures helped to promote patient attendance, thereby ensuring timely and continuum of their treatment.

#### QLY515

##### Co-relationship between the Size of the Prostate, the Intravesical Prostatic Protrusion and Benign Prostatic Obstruction

**KT FOQ<sup>1</sup>, KB LIM<sup>1</sup>, H HO<sup>1</sup>, S FOOK<sup>1</sup>**

<sup>1</sup>Urology, Singapore General Hospital, Singapore

**Aim:** Intravesical prostatic protrusion (IPP) has been shown to be strongly related to bladder outlet obstruction by Chia et al, IPP <5 mm 21% obstructed; IPP >10mm, grade 3, 94% obstructed on pressure flow study. The aim of this study was to explore the relationship between the size of the prostate gland, IPP and benign prostatic obstruction (BPO).

**Methods:** From 1997 to 2003, 452 men above 50 years of age with lower urinary tract symptoms suggestive of BPH were included. IPSS, QOL, uroflowmetry, residual urine, volume of prostate (PV) and degree of IPP were measured by transabdominal ultrasound. PV classified as (a) <20 cc, (b) 20 to 40 cc, and (c) >40 cc; IPP classified as grade 1, <5 mm; grade 2, 5 to 10 mm; and grade 3 >10 mm.

**Results:** There was good correlation between the size of the prostate and IPP ( $r = 0.465$ ,  $P < 0.0005$ ), where the bigger the prostate, the greater the IPP. Using peak uroflow as a surrogate of obstruction, the bigger the prostate, the greater the obstruction. There was negative correlation between volume of prostate and flow rate ( $r = 0.193$ ,  $P < 0.0005$ ), as well as IPP and flow rate ( $r = 0.284$ ,  $P < 0.0005$ ). IPP is better correlated with BPO than prostate volume.

**Conclusion:** In BPH, size does matter, but the IPP, distorting the configuration of the bladder neck, is a better predictor of BPO.

#### QLY516

##### The Role of Prostate-specific Antigen (PSA) and Prostate Volume (PV) in Non-invasive Investigations for Bladder Outlet Obstruction (BOO)

**KT FOO<sup>1</sup>, KB LIM<sup>1</sup>, H HO<sup>1</sup>, M WONG<sup>1</sup>**

<sup>1</sup>Urology, Singapore General Hospital, Singapore

**Aim:** Prostate-specific antigen (PSA) testing has been used increasingly in the management of patients with clinical benign prostatic hyperplasia (BPH). Studies have shown that PSA  $>1.5$  ng/mL implies risk of progression of BPH. We present our own data on relationship between prostate volume (PV), PSA and bladder outlet obstruction (BOO) as defined by standard urodynamic studies (UDS).

**Methods:** Between November 2001 to 2002, 101 patients above 50 years were assessed by DRE, IPSS, PSA, urine microscopy, uroflowmetry, RU measurement and IPP by transabdominal ultrasound. PV was measured with comfortably full bladder. PV classified as: (a)  $\leq 20$  mL, (b)  $>21$  to 40 mL, (c)  $>40$  mL. All had UDS. Those with raised PSA levels had transrectal ultrasound (TRUS) biopsy to exclude prostate carcinoma.

**Results:** We had stratified PSA level as group 1,  $\leq 1.5$  ng/mL; group 2, 1.6 to 3.5 ng/mL; group 3,  $>3.5$  ng/mL. Both PV and PSA showed correlation with BOO and statistically significant. Spearman rho correlation coefficients were 0.408 and 0.314 for PSA and PV, respectively. Good correlation between PSA and PV with correlation coefficient 0.579. Sensitivity and specificity of PSA were 30% and 70%, 51% and 38% for PV. Positive and negative predictive values of PSA were 68% and 38%, 65% and 42% for PV.

**Conclusion:** PSA and PV seem to be related and could be used in clinical evaluation of BPH and BPO. The bladder outlets of patients with PSA levels  $\leq 1.5$  ng/mL were usually not obstructed while those with higher PSA tended to be. Larger prostate glands also tend to cause obstruction.

#### QLY517

##### Ethnic Variations of Prostate Cancer in Singapore

**PM SHRESTHA<sup>1</sup>, W LAU<sup>1</sup>**

<sup>1</sup>Urology, Singapore General Hospital, Singapore

**Aim:** To study the epidemiological and clinical differences of carcinoma prostate among the different races of Singapore.

**Methods:** A retrospective review of prostate cancer cases diagnosed between 1995 and 2004 at Singapore General Hospital was performed using the departmental cancer database. All parameters of the disease were compared using SPSS 11.0.

**Results:** There were 952 patients: 802 (84.2%) Chinese, 54 (5.7%) Indians, 72 (7.6%) Malays and 24 (2.5%) others. The mean age at diagnosis was 69.9/9.2 years for Chinese, 68.9/8.4 years for Indians and 69.0/8.7 years for Malays. There was no statistically significant difference. Besides lower urinary tract symptom (LUTS) being the most common presenting symptom in all groups, acute retention of urine was more common in the Malay group (Chinese 16.8%, Indian 14.8%, Malay 29.2%) ( $P < 0.001$ ). Among the 3 ethnic groups, the Malay group presented at diagnosis with higher prostate-specific antigen (PSA) (PSA  $>20$  at diagnosis among Chinese 51.7%, Indian 50%, Malay 68.1%) ( $P < 0.002$ ), higher Gleason score (Gleason score  $>7$  among Chinese 26.6%, Indian 18.5%, Malay 38.9%) ( $P < 0.002$ ), advanced clinical stage (Stage  $>T3$  among Chinese 24.4%, Indian 14.8%, Malay 34.7%) ( $P < 0.002$ ) and metastasis (M1 disease among Chinese 19.7%, Indian 27.8%, Malay 34.7%) ( $P < 0.006$ ). The choices of different modalities of

treatment for each stage of disease among 3 ethnic groups did not show any statistically significant differences.

**Conclusion:** Overall when comparing the 3 ethnic groups, Malays presented with more advanced stage of disease than Chinese and Indians. There was no difference in the preferences of different modalities of treatment for carcinoma prostate.

#### QLY518

##### Patient's Choice of Hormonal Treatment for Prostate Cancer

**PA SUNGA<sup>1</sup>, WY SIOW<sup>1</sup>, W LAU<sup>1</sup>**

<sup>1</sup>Urology, Singapore General Hospital, Singapore

**Aim:** Hormonal therapy remains the mainstay of treatment for patients with locally advanced and metastatic prostate cancer. Two modalities of hormonal treatment exist, i.e., surgical and medical castration. Although they are of equal efficacy, they differ in other respects e.g., invasiveness, reversibility, cost and emotional impact. We studied the factors that affect the patient's choice of modality of hormonal treatment.

**Methods:** This was a prospective, descriptive study performed in a single institution between August 2003 and December 2004. Consecutive patients newly diagnosed with advanced prostate cancer and treated primarily with hormonal therapy were recruited. They were referred to dedicated staff nurses who then provided them with printed patient information detailing the medical and surgical treatment options. This was followed by an interview 1 week later, during which the patient would be requested to fill in the questionnaire survey. Ten factors and their relative importance in the decision making process were studied.

**Results:** Approximately two-thirds of the patients opted for medical castration, while the remainder chose surgical castration. Treatment efficacy was the chief consideration in the patient's choice of treatment modality but that being equal, the preference for non-invasive treatment prevailed.

**Conclusion:** Advanced prostate cancer is a significant disease for which 2 treatment modalities of equal efficacy exist. Patients' concerns regarding the treatment options should be specifically addressed in order for them to make an informed decision with regard to the choice of modality of hormonal treatment.

#### QLY519

##### Optimising Redosing Interval of Goserelin in Patients with Metastatic Prostate Cancer

**PA SUNGA<sup>1</sup>, WY SIOW<sup>1</sup>, CK NG<sup>1</sup>, W LAU<sup>1</sup>**

<sup>1</sup>Urology, Singapore General Hospital, Singapore

**Aim:** Patients with metastatic prostate cancer on medical hormonal therapy are currently being given subcutaneous goserelin on a 3-monthly basis. We studied the feasibility of redosing goserelin based on serum testosterone levels.

**Methods:** Patients newly diagnosed with metastatic prostate cancer, deemed suitable for first-line hormonal therapy and agreeable to the study protocol were recruited. Following the first subcutaneous depot goserelin 10.8 mg injection, clinical parameters (height, weight, ECOG performance score, PSA, disease status and QOL) were assessed. Bicalutamide 50 mg once a day was prescribed for 1 week following the first injection to cover the flare phenomenon. Three months after the initial dose, the patient's clinical parameters were reassessed. In addition, serum testosterone level was checked. Thereafter, serum testosterone was monitored on a monthly basis until the value reached or exceeded 0.7 nmol/L. At this juncture, the patient's clinical parameters were reassessed and a repeat dose of goserelin given. Patients were then given the option of withdrawing from the study and resuming the standard three-monthly goserelin injections.

**Results:** Fifteen patients were recruited from a single institution between August 2003 and August 2004. During the study period, serum testosterone levels remained at castrate levels for all patients. Forty per cent of patients developed hormone refractory prostate cancer; 30% had sustained PSA levels less than 4 uG/L, while another 30% had PSA levels with plateau above 4 uG/L.

**Conclusion:** Redosing of goserelin based on serum testosterone level did not alter the natural history of metastatic prostate cancer. Redosing of goserelin is feasible for patients on close monitoring of their primary condition.

## QLY520

### Stop! It's Time for Action!

#### **SFOO**<sup>1</sup>

<sup>1</sup>Administration, Singapore National Eye Centre, Singapore

**Aim:** To implement an established quality management system that consistently enhances customers' confidence and satisfaction in the provision of SNEC's medical services (including optometric, ophthalmological and optician services, treatment, surgery, clinical investigations and trials relating to eye disorders and diseases) through strict conformance to the specified requirements of the audit standard to achieve SNEC's policy objectives.

**Methods:** A management committee meeting was used as a platform to communicate SNEC's plans to embark on ISO 9001:2000 accreditation. We partnered with consultants to assist and advise SNEC in our Business Excellence journey. SNEC's Quality Policy, Quality Manual and Quality Procedures were mapped out through concerted efforts of key taskforce members. Based on the results of our internal quality audit, SNEC's current status was established and gaps between our quality management system and the requirements of ISO 9001:2000 were determined. Thereafter, members worked collaboratively to close the gaps. The ISO certification processes were conducted by external and independent auditors for both the centre and our offsite offices.

**Results:** SNEC was granted the ISO 9001:2000 management system certification in 9 March 2005.

**Conclusion:** SNEC has established and maintained its management system in line with the standard requirements, and demonstrated the ability of the system to systematically achieve agreed requirements for the services within the scope and the organisation's policy and objectives.

## QLY521

### Speak the Same Language

#### **SFOO**<sup>1</sup>

<sup>1</sup>Administration, Singapore National Eye Centre, Singapore

**Aim:** Attainment of the Singapore Quality Class (SQC) Award.

**Methods:** SNEC assessed our organisation using the BEACON (Business Excellence Assessment for Continuous Improvement) Scoring System based on the SQA Excellence framework. The 7 dimensions of the SQA framework were Leadership, Planning, Information, People, Processes, Customers and Results. These dimensions translated into 21 items which equated to 100 statements to be addressed. Every single SQC taskforce member was empowered with the role of being in-house assessors to stringently cross-examine colleagues on each specific statement during the evaluation process. Through review of findings, strengths were identified and areas for improvement established and action taken. A team from SPRING conducted the SNEC SQC audit assessment.

**Results:** It reinforced SNEC's commitment to adopt a business excellence model to managing people, processes and customers to achieve our vision as the leading eye centre of choice.

**Conclusion:** An environment to consistently speak the same language of improvement has resulted and will continue to facilitate and accelerate SNEC's improvement efforts. By introducing systems and/or processes that enable us to increase our stakeholders' satisfaction and our competitiveness, SNEC can benchmark against world-class standards of excellence.

## QLY522

### SNEC C.A.R.E. Sparks

#### **IWEE**<sup>1</sup>

<sup>1</sup>Administration, Singapore National Eye Centre, Singapore

**Aim:** To show appreciation and give recognition to SNEC staff who

exemplified the Spirit of Caring Aloud to Reach Everyone of their internal customers.

**Methods:** The Quality Service (QS) Department kicked off this yearly affair with advertisements of a nomination exercise. This was opened to all full-time, part-time and visiting staff and its branches. Collection of nomination forms were made available via multiple channels, including SNEC's intranet. Staff were encouraged to reciprocate the CARE they had received by nominating different CARE Sparks and submitting their entries to QS Department over a period of time. An independent panel of committee comprising of medical and non-medical staff undertook the selection task.

**Results:** "Caring Staff + Appreciated Staff = Happy Workplace + Happy Customers". We continued SNEC's existing HR policy to recognise and retain good role models. This complemented SNEC 5Cs programme by putting the 5Cs into actions. This exercise provided a mechanism to recognise individual employee's selfless effort and created a positive work environment that enhanced employee recognition and satisfaction.

**Conclusion:** By Caring Aloud to Reach Everyone during their course of work, these CARE Sparks have gone the extra mile, treated colleagues as how they would want to be treated, shown concern, respect and provided needed assistance. It only takes one person to ignite that spark and make a difference in the workplace.

## QLY523

### We Exemplify the SNEC 5Cs, While You Experience It

#### **IWEE**<sup>1</sup>

<sup>1</sup>Administration, Singapore National Eye Centre, Singapore

**Aim:** To give recognition to SNEC Service Champions who consistently embodied and delivered the exemplary service behaviour standards of SNEC 5Cs – Compassion, Communication, Commitment, Collaboration and Consistency.

**Methods:** SNEC 5Cs are aligned with our core values and incorporated into our Customer Service Training Programme. Service Champions were individually interviewed on their winning formulas. These winning formulas were published and circulated.

**Results:** A total of 116 SNEC staff were nominated for the Excellent Service Award Year 2005. Out of the 116 staff who were nominated, 59 were STAR recipients, 32 were Gold recipients and 25 were Silver recipients.

**Conclusion:** For staff at every level, demonstration of such commitment by their colleagues reinforces the service quality mindset and a "Can-Do" attitude. For our Service Champions, it encourages them to forge ahead in the journey to provide excellent customer service. After all, this is not a number game. It is all about the human touch.

## QLY524

### Improving Nursing Care of Children with Autism Spectrum Disorder (ASD) in SNEC Paediatric Clinic

**YHLE LING**<sup>1</sup>, **GH CHUA**<sup>1</sup>, **ZBY SIM**<sup>1</sup>, **SK TEONG**<sup>1</sup>

<sup>1</sup>Paediatric Ophthalmology and Strabismus Service, Singapore National Eye Centre, Singapore

**Aim:** To equip nurses with the skills and knowledge to understand children with autism spectrum disorder (ASD) and through hands-on application to facilitate these patients' eye examinations.

**Methods:** 1) Attended a training course to learn about ASD. 2) Learned to identify children in the SNEC Paediatric Clinic who have autism. 3) The team of nurses collaborated to establish a standard operating practice (SOP) when children with ASD were identified. For instance, collation of useful data such as interviewing parents on patients' likes and dislikes and the child's favourite toys.

**Results:** Increased understanding and application of knowledge ensured that staff obtained patient's cooperation and more efficiency and quality of care was rendered, resulting in a more pleasant and fruitful hospital experience for all concerned, especially for patients and their family members. Time savings, effective transfer of learning and improved work performance were

evidently demonstrated.

**Conclusion:** Nurses in the SNEC Paediatric Clinic embarked on this project with the needs of ASD children in mind. As they applied their newfound knowledge and improved their treatment of care instead of being constrained by current ways of working, it became a win-win situation for all. The success of this project greatly encouraged the staff and reinforced SNEC's learning culture of innovation and continuous improvement.

#### QLY525

##### Improving Acceptance for Arterio-venous Fistula (AVF)/Graft (AVG) in Pre-end-stage Renal Disease (ESRD) Patients

**SN NOOR<sup>1</sup>, HK TAN<sup>2</sup>, KM YONG<sup>2</sup>, JST NG<sup>2</sup>, LWW LIM<sup>2</sup>**

<sup>1</sup>Quality Management, SingHealth HQ, Singapore, <sup>2</sup>Renal Medicine, Singapore General Hospital, Singapore

**Aim:** To reduce the incidence of patients needing emergency dialysis without vascular access by increasing the acceptance for arterio-venous fistula/graft (AVF/AVG) creation in renal patients at the pre-end-stage renal disease (ESRD).

**Methods:** A multidisciplinary team was formed to look at the processes involved in the education of patients with pre-ESRD. The work process for the running of the pre-ESRD clinic, which had been set up to educate patients on the preparations for ESRD and the need for dialysis, was mapped out. This process flow looked at the steps involved from the referral of patients to the clinic until subsequent patient follow-up. Following cause and effect analysis, the team identified a need to modify the content of the education session to emphasise the importance of early creation of an AVF/AVG, thereby improving patients' psychological preparedness. A pre- and post-session survey on patients' awareness of the importance of early vascular access creation was also implemented. Patient attendance at the vascular surgery clinic after the education session was used as an indirect marker for acceptance to have early creation of either an AVF or AVG.

**Results:** Since implementation of the modified education session in October 2004, the rate of attendance at the vascular surgery clinic after the pre-ESRD session has gradually increased from 30.8% (October 2004) to 62.5% (in May 2005). Results of the pre- and post-session survey also indicated that patients were more aware of the importance of early vascular access creation after each education session.

**Conclusion:** The acceptance of early vascular access creation was improved with a more focused education content.

#### QLY526

##### Improving the Hypertension Care in a Polyclinic Setting

**SL WEE<sup>1</sup>, SU WONG<sup>2</sup>, SC POO<sup>3</sup>, CGP TAN<sup>1</sup>**

<sup>1</sup>Quality Management, SingHealth HQ, Singapore, <sup>2</sup>Medical, SingHealth Polyclinics, Singapore, <sup>3</sup>Nursing, SingHealth Polyclinics, Singapore

**Aim:** Hypertension control is difficult to achieve in routine practice. We describe an improvement programme at a single polyclinic setting.

**Methods:** A retrospective review on hypertension was conducted in May 2004 at a polyclinic. A project to improve % with BP <140/90 mm Hg in patients diagnosed with hypertension was initiated in November 2004. Provider factors were identified as the main cause of inadequate BP control. In November 2004, a cardiologist delivered a seminar on hypertension control to all clinic staff. In December 2004, the clinic staff also agreed upon and followed 3 messages: 1) target for blood pressure is 130/80 mm Hg, measure accurately without rounding off; 2) early treatment early and medicate aggressively and 3) use multiple drugs, if necessary. All new hypertension cases were referred to attend a nurse education session. The BP of a random sample of 50 from the average monthly hypertension attendance of about 3200 served as the indicator for BP control. The % with BP <140/90 mm Hg was shown as a monthly run chart to all clinic staff as a feedback. The number of nurse health education session and quantity of hypertension medication dispensed per month were also monitored.

**Results:** In the May 2004 survey, and the most recent BP reading was <140/

90 mm Hg in 38%. Results to date showed that BP control improved from 28% in September 2004 to 56% in June 2005.

**Conclusion:** We showed that steps introduced into routine clinical practice improved rate of hypertension control. This may partly be attributed to the increased amount of selected medication dispensed.

#### QLY527

##### Improving Asthma Care in a Polyclinic

**MH CHOW<sup>1</sup>, NC TAN<sup>1</sup>, A NGOH<sup>2</sup>, HC LIM<sup>1</sup>, CC GOH<sup>3</sup>**

<sup>1</sup>Medical, <sup>2</sup>Nursing, <sup>3</sup>Pharmacy, SingHealth Polyclinics, Singapore

**Aim:** To develop clinic processes such that all persistent asthmatics attending SHP-Pasir Ris will be on inhaled corticosteroids. Persistent asthmatics were those patients who had daytime symptoms more than once a week, or nighttime symptoms more than twice a month.

**Methods:** A Quality Improvement Project was carried out in SHP-Pasir Ris to improve the quality of asthma care. A team with fundamental knowledge of asthma care processes at SHP-Pasir Ris and improvement methodology was formed. The main reasons contributing to persistent asthmatics not using inhaled corticosteroids included: clinicians unable to remember classification of asthma severity, inadequate treatment information, doctors' workload and cost. Rapid cycle testing was applied to evaluate and improve interventions to address the problems. Useful interventions that were eventually implemented included: simplification of classification of severity, doctors' decision support tool, canister chart, symptom calendar and written asthma action plan.

**Results:** Almost all persistent asthmatics attending Pasir Ris Polyclinic were on inhaled corticosteroids within 2 months. Over a period of 4 months, the percentage of persistent asthmatics that were well controlled increased from about 32% to about 38%. The percentage of asthma patients attending each month who required nebulisations also decreased from about 26% to about 18% over 4 months.

**Conclusion:** Effective tools that empower our clinic teams and guide our patients can improve the quality of asthma care. Continued use of these processes is likely to result in further improvement as patients return for review and have their treatment optimised.

#### QLY528

##### Treating High Cardiovascular Risk Patients to Target LDL Cholesterol Level – 3 Primary Care Centres' Collaborative Quality Improvement Project

**SCW HO<sup>1</sup>, HB LIM<sup>1</sup>, KL TAN<sup>1</sup>, SW HWANG<sup>1</sup>**

<sup>1</sup>Medical, SingHealth Polyclinics, Singapore

**Aim:** To raise the percentage of high cardiovascular risk patients achieving LDL cholesterol <2.6 mmol/L over 6 months in 3 primary care centres.

**Methods:** Improvement teams were formed to analyse the barriers and to implement measures. Interventions included doctor and health counsellor education, point-of-care risk stratification tools and reminders, clinical algorithms, counselling skill training, counselling checklists and patient education pamphlets. The percentage of LDL results <2.6 mmol/L among those performed for all high-risk patients was tracked monthly for the 3 clinics. One of the clinics also measured the percentage of patients with LDL <2.6 mmol/L, LDL ≥3.4 mmol/L, medication initiation or adjustment for those with LDL ≥2.6 mmol/L and the prescription profile.

**Results:** The percentage of LDL results <2.6 mmol/L increased from 24% to 37% to 46% to 52% for all 3 clinics. For one of the clinics, the percentage of high-risk patients with LDL ≥3.4 mmol/L decreased from 40% to 28%. The percentage of high-risk patients with LDL ≥2.6 mmol/L not on drug therapy decreased from 32% to 17%. The rate of medication initiation or adjustment increased from 26% to 45%. There was increased usage of statins and prescription of higher dosages. User feedback survey was positive for the interventions.

**Conclusion:** Multi-pronged interventions with the involvement of a multi-disciplinary team is an effective strategy for quality improvement projects. PDSA cycles are useful to identify effective measures that can be sustained.

Collaboration with other centres is a good way to share and spread the best practices.

#### QLY529

### Designing a Computerised Decision Support and Clinical Information System: A SingHealth Polyclinics Experience

**WCLOKE<sup>1</sup>, A EE<sup>1</sup>, HHTAN<sup>1</sup>, AMHASLIZA<sup>2</sup>, MY LIM<sup>3</sup>, LST LIU<sup>4</sup>, CB TAN<sup>1</sup>**

<sup>1</sup>Medical, <sup>2</sup>Administration, <sup>3</sup>Nursing, <sup>4</sup>Pharmacy, SingHealth Polyclinics, Singapore

**Aim:** Decision support and clinical information systems are 2 important elements in the chronic care model, which states that productive interactions between prepared proactive providers and informed activated patients can improve outcomes. We aimed to design these features into a computerised registry to improve disease management for patients with diabetes, hypertension and hyperlipidaemia in SingHealth Polyclinics.

**Methods:** A multidisciplinary workgroup worked closely with information technology (IT) support and vendors to define system requirements, minimum dataset, and reports to be generated for audit and improvement initiatives. Decision support embedded clinical practice guidelines, provided point-of-care information and programmed reminders for regular monitoring and preventive screening. The chronic care management (CCM) IT module underwent testing, extraction of retrospective diagnostic and demographic data, and its front-end user interface was successfully piloted.

**Results:** In 2004, there were up to 160,000 patients managed for diabetes, hypertension and/or hyperlipidaemia in our polyclinics. Seventy-two per cent of diabetics had all 3 conditions. We were able to compare patient demographics, disease characteristics and rates of preventive screening among different clinics located across eastern and central Singapore. Subpopulations needing specific interventions could also be identified, and programmes in future could be designed to target these at-risk groups. The pilot point-of-care decision support and information system was successful, and would be improved and further developed for other SingHealth Polyclinics.

**Conclusion:** Our decision support and clinical information system helped us better understand our chronic population, and could improve chronic disease management in polyclinics, both at the point-of-care level and at the population levels.

#### QLY530

### Improved Asthma Care in Polyclinics through a Team-based Approach

**M SHAH<sup>1</sup>, S PUSHARANEE<sup>1</sup>, BMS MUSRIFAH<sup>2</sup>, L LIU<sup>3</sup>, LC LIM<sup>2</sup>, JL GOH<sup>2</sup>, WC LOKE<sup>1</sup>**

<sup>1</sup>Medical, <sup>2</sup>Nursing, <sup>3</sup>Pharmacy, SingHealth Polyclinics, Singapore

**Aim:** Asthma is a common problem in Singapore. Many patients are not well controlled in primary care, due mostly to inadequate use of inhaled steroids and inadequate time for the doctor to counsel patients. We aimed to improve asthma control by addressing various constraints using a health care team.

**Methods:** Doctors were educated to prescribe preventers by weeks and relievers by absolute numbers. Polyclinic initiatives such as the doctors' decision tool, the symptom calendar, the canister chart, and the WAAP were tested and adapted for use. One dedicated nurse counsellor, with support from the pharmacy, counselled asthmatics with respect to the disease, alert symptoms and inhaler use. The counselling sessions were graded according to a custom-designed asthma protocol. The monthly preventer/reliever ratio based on drugs dispensed was used as a measure of asthma control. The data were collected over a 5-month period.

**Results:** The team-based approach allowed for implementation of different techniques in improving asthma care. The rise in the number of patients counselled by the nurse reflected a rise in awareness by patients with regard to management of their disease, which in turn was reflected by a rise in the preventer/reliever ratio. The percentage of patients counselled increased from 19.8% in January 2005 to 37.6% in May 2005. The figures for the preventer/

reliever ratio increased consistently by the month from 0.81 in January 2005 to 1.18 in May 2005 in our polyclinic.

**Conclusion:** Factors such as increased patient awareness, changing doctors' prescribing habits, and intensive nurse counseling helped improve asthma control for our patients. Working as a team, asthma care in the polyclinics improved.

#### QLY531

### A Pilot Project on Mass Screening for Early Colorectal Cancer Detection in Bukit Merah Polyclinic using the Immunochemical Fecal Occult Blood Test (FOBT) Kits

**MTK WONG<sup>1</sup>, MTS NG<sup>2</sup>, B ENG<sup>3</sup>, A EE<sup>1</sup>, CB TAN<sup>1</sup>, CL TANG<sup>4</sup>**

<sup>1</sup>Medical, <sup>2</sup>Nursing, <sup>3</sup>Administration, SingHealth Polyclinics, Singapore, <sup>4</sup>Colorectal Surgery, Singapore General Hospital, Singapore

**Aim:** To conduct a pilot project on mass screening for early detection of colorectal cancer in a typical polyclinic for visitors and patients for a period of 1 month (1 November to 29 November 2004) for Singapore citizens.

**Methods:** The Singapore Cancer Society sponsored all the Fecal Occult Blood Test (FOBT) kits for a period of 1 month. Staff involved in the interviewing of the participants and conducting of FOBT were briefed and trained in advance. Prior to the commencement of screening, publicity materials were put up, video show broadcasted and frequent announcements made to encourage patients and visitors (50 years old or more) to participate in the screening. Participants were interviewed for eligibility, taught how to collect the stool samples (2x FOBT kits) and instructed when to return. Data were recorded in the Excel sheet. Upon returning the kits, participants were informed of results; positive FOBT participants were informed to consult doctors, or to return for annual follow up if both FOBT were negative.

**Results:** FOBT acceptance rate: total patients with FOBT done were 285/291 (97%). FOBT pick-up rate: positive FOBT cases/total numbers of case with FOBT done were 11/285 (3.8%), of which male:female participants was 6:5. Total numbers of male and female participants were 133 and 152, respectively.

**Conclusion:** FOBT test kits are an acceptable mode of mass screening at polyclinics and are also cost-effective. The overall acceptability and ability to detect colorectal cancer at an early stage can significantly reduce the colorectal cancer mortality rate.

#### QLY532

### Empowering Patients and Caregivers to Perform Wound Dressing at Home

**AH HAIRANI<sup>1</sup>, J HENG<sup>1</sup>, M KRISHNAN<sup>1</sup>, WC LOKE<sup>2</sup>**

<sup>1</sup>Nursing, <sup>2</sup>Medical, SingHealth Polyclinics, Singapore

**Aim:** We piloted a holistic approach to empower patients and caregivers in performing wound dressing at home, to provide greater adherence to treatment recommendation and to have a positive outcome in wound healing.

**Methods:** Patients were selected based on their willingness to perform wound dressing at home. The types of wound selected were acute, superficial and uninfected. The education plan by the nurse consisted of advice on nutrition, steps of performing wound dressing and hygiene. The wounds and dressing techniques were reviewed on alternate days to assess the effectiveness of wound management at home. Post-evaluation surveys of the patients were conducted to assess their perspectives and satisfaction levels.

**Results:** A total of 20 patients attending wound dressing in the polyclinic were selected for the pilot education plan. Results from the patients' evaluation survey revealed that 95% of participants benefited from the overall intervention. They felt that the advice and handouts on steps of wound dressing was clear and easy to understand. This empowerment also benefited some patients, as attendance at the polyclinics would mean added inconvenience, transport expenses and taking time off from work. Sixty-five per cent of participants felt confident in performing wound dressing at home; 35% were more comfortable in having their wounds managed by the nurses. All wounds healed within the expected time frame.

**Conclusion:** Patient empowerment in self-wound management benefited patients in their treatment. With active promotion and education on self-wound management, patients and caregivers are able to manage their wounds at home confidently.

#### QLY533

##### Understanding Patients' Perspectives of Diabetes Care in Polyclinics through Patient Focus Groups

**J HENG<sup>1</sup>, PH ONG<sup>1</sup>, P SELAYAH<sup>1</sup>, DM WILD<sup>2</sup>, WC LOKE<sup>3</sup>**

<sup>1</sup>Nursing, SingHealth Polyclinics, Singapore, <sup>2</sup>Quality Management, SingHealth HQ, Singapore, <sup>3</sup>Medical, SingHealth Polyclinics, Singapore

**Aim:** Patients' perspectives of their own care play a crucial role in chronic diabetes control and adherence to treatment. Collaborative care and self-management education emphasise patients as their own principal caregivers, with healthcare professionals as supportive consultants.

**Methods:** The Diabetes Quality Improvement (DMQI) team in the polyclinic examined patients' perspectives on improving care and self-management. Patient focus groups of 10 participants each were conducted in English and Chinese, to gain understanding of factors influencing non-adherence and self-management. Data were analysed qualitatively and categorised based on group consensus.

**Results:** The participants were unanimous about the impact of disease and the need for comprehensive diabetes education. Barriers to self-management included lack of knowledge, ingestion of Chinese herbs, equipment cost and lifestyle factors. Strategies suggested included financial incentives, goal prioritisation, attendance in enhanced care programmes, dietitian appointments and support groups. The participants saw physicians as a source of support and resource, emphasised the need for the providers to show genuine concern and the importance of being assigned to the same physician for continuity of care. The findings led to Quality improvement initiatives such as a new patient education checklist and training in motivational interviewing. These and other changes in the clinic led to an improvement in glycaemic control of all patients over subsequent months.

**Conclusion:** Our focus groups were effective in identifying patients' unique perspectives, and the strategies that might work. The results informed our DMQI team on its next initiatives to develop collaborative care programmes in the polyclinic.

#### QLY534

##### A Nurse-based Health Education Programme for Diabetes Initiation and Improvement (DIP) in SingHealth Polyclinic (Bukit Merah)

**SM LAU<sup>1</sup>, SC TANG<sup>1</sup>, HK LEE<sup>1</sup>, P YONG<sup>1</sup>, J TAN<sup>2</sup>, M WONG<sup>2</sup>, CB TAN<sup>2</sup>**

<sup>1</sup>Nursing, <sup>2</sup>Medical, SingHealth Polyclinics, Singapore

**Aim:** To recruit newly diagnosed patients with poorly controlled diabetes to undergo a 3-session nurse education protocol, which will allow the nurse to do an event audit with respect to DM nursing care and explore any psychosocial issues that may contribute to disease modification.

**Methods:** Doctors were briefed on the availability of the DIP services and were encouraged to refer newly-diagnosed and poorly-controlled diabetes cases, who have a rising HbA1C trend, but do not qualify for DM EPC clinic. The participants will be scheduled to attend 3 sessions with the nurse educator over the next 3 follow-ups. Administrative staff were instructed to direct the participants to the nurse educator prior to seeing the doctor. The first and latest HbA1C levels were noted.

**Results:** A cohort of 214 participants were reviewed between October and December 2004. One hundred and seven were newly diagnosed, while 87 were existing cases that had already been on treatments for a period of time. Of the 87 existing cases, 5 defaulted follow-up after their first session and 1 went to the hospital. Eighty per cent of 45 existing cases that had no medicine adjustment had lower HbA1C level after the counselling sessions.

**Conclusion:** Nurse education formed an important component of DM care in ensuring that newly diagnosed diabetics have the right information at the start of their treatment and poorly controlled cases were given a revision on areas they may have neglected or forgotten. Results have shown that most patients benefited from these sessions, with improved HbA1C levels.

#### QLY535

##### To Increase the Percentage Uptake of Smoking Cessation Clinic amongst Smokers with Newly-diagnosed Hypertension, Diabetes or Asthma in 2 Polyclinics from 0% to 50% within 9 Months

**AM TAN<sup>1</sup>, HH TAN<sup>2</sup>, TS SWAH<sup>2</sup>, M KRISHNAN<sup>1</sup>, M NG<sup>3</sup>**

<sup>1</sup>Nursing, <sup>2</sup>Medical, SingHealth Polyclinics, Singapore, <sup>3</sup>Quality Management, SingHealth HQ, Singapore

**Aim:** To motivate smokers with co-morbid conditions to attend smoking counselling programme to minimise their risk of complications.

**Methods:** This is a Clinical Practice Improvement Project conducted in 2 SingHealth Polyclinics — Bedok and Geylang. A new workflow was developed to facilitate the programme. All newly diagnosed hypertension, diabetes and asthma patients were referred to the nurse for counselling. Those who were currently smoking were identified and their readiness for change were assessed using the Transtheoretical Model. The Precontemplators were given advice and awareness on health risks associated with smoking, whereas the Contemplators were given an appointment to attend the Smoking Cessation Clinic. The nurse would attempt to move smokers who were in the Precontemplation stage to the Contemplation stage and Action stage using tools developed by the team.

**Results:** Four months into the project, there was 50% uptake of the programme at both clinics. They were more likely to attend a smoking cessation programme at the Contemplation stage and trends showed a sustaining pattern.

**Conclusion:** Through early identification and the use of structured tool assessment of patients' behaviour to change, we are able to effectively bring about smoking cessation.

#### QLY536

##### To Decrease Defaulter Rate of Diabetic Foot Screening from 49% to 15% within 5 Months at SingHealth Polyclinics (Bedok)

**AM TAN<sup>1</sup>, TS SWAH<sup>1</sup>, SM LEE<sup>1</sup>, BL ANG<sup>1</sup>, N SAMAD<sup>1</sup>, N WAHID<sup>1</sup>, YK WOO<sup>1</sup>**

<sup>1</sup>Nursing, <sup>2</sup>Medical, SingHealth Polyclinics, Singapore

**Aim:** To improve patient compliance with diabetic foot screening appointment.

**Methods:** This was a Quality Improvement Project conducted at SingHealth Polyclinics at Bedok. A new workflow was developed to ensure all diabetic patients had their feet screened annually. Diabetic foot screening sessions were stepped up from twice a week to daily. The clinic allowed all service points to access the booking system to book appointment for diabetic foot screening. These appointments would be aligned to the doctors' consultation appointment. With greater capacity, doctors and nurses can refer these patients opportunistically for foot screening. The need for foot screening was stressed and the staff were reminded to reinforce this message to the patients.

**Results:** After implementation of the revised workflow, defaulter rate decreased from 52% in June to 5% in November 2004. Uptake of diabetic foot screening increased to 88% in October and 95% in November 2004. Waiting time for foot screening appointment was reduced from 4 weeks to 1 week.

**Conclusion:** Creating greater awareness among the staff and the patients, making appointments more easily available and continuing efforts in stressing the importance of diabetic foot screening are essential elements in improving this aspect of care for diabetic patients.



**SUR537**

**A Survey of Physicians' Familiarity with Brain Death Certification Parameters**

**KJ CHIN<sup>1</sup>, TWK LEW<sup>1</sup>, TK KWEK<sup>1</sup>**

<sup>1</sup>Anaesthesia, Tan Tock Seng Hospital, Singapore

**Aim:** Surveys in the USA and UK have demonstrated wide inter-physician and inter-hospital variations in brain death testing despite national guidelines. We therefore set out to ascertain the familiarity of local physicians with the brain death certification process, and to assess the need for more specific institutional protocols.

**Methods:** Subjects included all physicians listed on the brain death certification roster, and specialist staff of the department of anaesthesia and intensive care in a tertiary neuroscience referral hospital in Singapore. An anonymous questionnaire was sent to the selected physicians, which covered 3 areas: physician demographics and experience, technical aspects of testing, and opinions on the physiological and biochemical limits required as preconditions for testing.

**Results:** One hundred and eleven physicians were surveyed. Thirty-six questionnaires were returned (32%). Brain death testing was an uncommon procedure, with only 17% of the respondents having conducted testing more than 5 times in the last 3 years of clinical practice. Minor variations in the technical performance of tests were common. There was a lack of consensus regarding physiological and biochemical limits that would preclude testing.

**Conclusion:** Although written references are readily available, formal training in the technical aspects of brain death testing is still useful, given the rarity of the procedure. We have therefore initiated a training course on brain death certification. Current legislation sets broad guidelines on preconditions for testing. We suggest that individual institutions or national regulatory authorities should formulate consensus guidelines on the definition of these preconditions. This would minimise disagreement between certifying physicians and unnecessary delay in the certification process.

**SUR538**

**A Multidisciplinary Approach to Endovascular Management of Complex Aortic Pathology: The National University Hospital Experience**

**A ASMAT<sup>1</sup>, M DA COSTA<sup>2</sup>, L TAN<sup>3</sup>, PS WONG<sup>2</sup>, C TAN<sup>1</sup>, CN LEE<sup>2</sup>, PA ROBLESS<sup>2</sup>**

<sup>1</sup>Cardiac, Thoracic and Vascular Surgery, National University Hospital, Singapore, <sup>2</sup>Surgery, National University of Singapore — Yong Loo Lin School of Medicine, Singapore, <sup>3</sup>Diagnostic Imaging, National University Hospital, Singapore

**Aim:** To describe our experience with endovascular therapy for a range of aortic diseases.

**Methods:** All patients undergoing endovascular stenting from January 2002 to June 2005 were analysed using data collected prospectively from our department database.

**Results:** There were 28 patients. Indications included diseases of the thoracic aorta (n = 16), abdominal aorta (n = 10) and thoraco-abdominal aorta (n = 2). Elective endovascular stenting was performed for atherosclerotic aneurysms in 14 patients. Four patients with contained rupture of leaking aneurysms required emergent endovascular stenting. Eight patients with Stanford type A aortic dissection (n = 1) and Stanford type B aortic dissection (n = 7) were treated with endovascular repair. Two patients with post-traumatic aortic rupture underwent emergency endovascular stenting. One patient, who had undergone open repair of an abdominal aortic aneurysm presented with a symptomatic iliac aneurysm, was also treated with endovascular stenting. Hybrid endovascular and open surgical repair was performed on 2 patients with thoraco-abdominal aortic disease. One patient with a juxtarenal abdominal aortic aneurysm required the use of a fenestrated graft for endovascular repair. Technical success was obtained in all patients (100%). Two patients developed strokes. There was 1 hospital death due to stroke-related complications. Median hospital stay was 8 days and freedom from endoleaks was 88%.

**Conclusion:** Aortic endovascular stenting is a promising technique that can be used under a variety of conditions with low morbidity. A multidisciplinary approach, involving cardiothoracic and vascular surgeons, interventional radiologists and anaesthetists, is required. However, this technique remains relatively new and continued surveillance is required.

**SUR539**

**Oculomotor Nerve Palsy after Functional Endoscopic Sinus Surgery**

**E CHNG<sup>1</sup>, CC YIP<sup>2</sup>, J LEE<sup>3</sup>**

<sup>1</sup>Dental Centre, National Cancer Centre, Singapore, <sup>2</sup>Ophthalmology, <sup>3</sup>Otorhinolaryngology, Tan Tock Seng Hospital, Singapore

**Aim:** We report an unusual case of partial oculomotor nerve palsy after functional endoscopic sinus surgery (FESS) without anatomical disruption of the extra-ocular muscles. The clinical course and possible pathogenic mechanisms are also presented.

**Methods:** A 14-year-old boy underwent bilateral FESS for sinonasal polyposis. Postoperatively he developed right oculomotor nerve palsy. CT scan showed a breached right lamina papyracea with a 4.5-mm bone fragment impinging on the medial rectus and optic nerve. Urgent exploration of FESS cavity was done to remove the bone fragment.

**Results:** His diplopia was initially managed with an eye patch and later with frosted glass. Gradual improvement of his ptosis and motility in the right eye were observed; he regained full right ocular motility at the third postoperative month review with no diplopia.

**Conclusion:** Oculomotor nerve palsy after FESS is a rare but significant complication. The spontaneous recovery in our patient indicates that an initial conservative approach may be appropriate in the absence of fat or muscle entrapment. Careful preoperative evaluation, good understanding of the regional anatomy, and meticulous surgical technique are crucial in avoiding ophthalmic complications.

**SUR540**

**Noninvasive MRI Assessment of the Knee Post Cartilage Repair – A Complementary Role to Arthroscopy**

**Y HO<sup>1</sup>, AJ STANLEY<sup>1</sup>, JHP HUI<sup>2</sup>, SC WANG<sup>3</sup>**

<sup>1</sup>Diagnostic Imaging, National University Hospital, Singapore, <sup>2</sup>Orthopaedic Surgery, <sup>3</sup>Diagnostic Radiology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** To discuss magnetic resonance imaging (MRI) technique and illustrate the range of MRI findings of the knee after autologous chondrocyte implantation (ACI).

**Methods:** High-resolution 3D MRI with/without intra-articular contrast was performed on 23 knees before and after ACI for arthroscopically confirmed, isolated full thickness ulcers of the knee articular cartilage. Healthy autologous cartilage, harvested arthroscopically from the edges of the cartilage ulcer, was cultured for a mean of 44 days. At implantation, these chondrocytes were injected beneath a periosteal patch, which has been sutured to the end of the debrided chondral ulcer. MRI was performed preoperatively to define the ulcer, and postoperatively to evaluate healing and in those patients with persistent or recurrent symptoms. Scans were performed with a 1.5T MRI unit and STIR, FSE and 3D gradient echo sequences were undertaken pre-arthroscopy, followed by direct MR arthrography using dilute gadopentetate dimeglumine with a 3D FSPGR sequence.

**Results:** Postoperative findings included near-complete healing at the implantation site, variable filling of the chondral defect, altered signal intensity of cartilage repair tissue, and changes at the integration interface.

**Conclusion:** MRI is valuable in evaluating the novel articular reconstruction technique of autologous cartilage implantation. It is able to confirm technical success and evaluate the state of cartilage healing as well as to assess any possible complications or failure of engraftment. Its role is complementary to arthroscopy.

## SUR541

**Management of Surgical Patients in a SARS Environment — The Tan Tock Seng Hospital Experience**YK TAN<sup>1</sup>, CH HO<sup>2</sup>, SJ CHIA<sup>2</sup>, SP CHEW<sup>2</sup><sup>1</sup>Emergency Medicine, National University Hospital, Singapore, <sup>2</sup>Surgery, Tan Tock Seng Hospital, Singapore

**Aim:** During the SARS period of 2003, the surgical department in Tan Tock Seng Hospital was tasked to provide ongoing surgical support for all quarantined patients and known SARS patients in the hospital and, at the same time, prevent cross infections during any necessary medical procedures.

**Methods:** In this paper, we describe the steps taken to provide the required surgical cover. We also describe changes to the operating theatre and modifications to surgical workflows and procedures that were taken during this trying period.

**Results:** There were a total of 122 inpatients over a 72-day period and a total of 12 surgical/endoscopic procedures were performed on high-risk patients with no incidence of in-hospital cross infections.

**Conclusion:** We were relieved to find that there were no cross infections during the period. We further believe that these modifications will be useful in the event that we are faced with another outbreak of a highly infectious airborne disease, be it SARS or otherwise.

## SUR542

**The True Incidence of an Absent Palmaris Longus — A Study in a Chinese Population and a Review of Literature**S SEBASTIN<sup>1</sup>, AYT LIM<sup>1</sup>, M PUHAINDRAN<sup>1</sup><sup>1</sup>Hand and Reconstructive Microsurgery, National University Hospital, Singapore

**Aims:** 1) To determine the incidence of absence of palmaris longus in a Chinese population. 2) To review the literature regarding ethnic variations of the palmaris longus.

**Methods:** Four hundred and eighteen Singaporeans at a health screening programme were examined for the presence or absence of the palmaris longus using the standard test. In addition, their grip and pinch strengths were measured.

**Results:** The study population comprised 78% Chinese, 10% Malay, 9% Indian and 3% other races. Of these, 70% were women, 96% were sedentary workers and 95% were right-handed. The palmaris longus was absent unilaterally in 4% and bilaterally in 2%, with an overall incidence of absence of 6%.

**Conclusion:** There is no significant difference in incidence of absence with respect to gender, side or unilateral versus bilateral absences. The incidence of absence of the palmaris longus is much lower in the Chinese population compared to the Caucasian population. The values quoted in standard surgical textbooks are not correct for any ethnic group.

## SUR543

**Radial Collateral Ligament Injuries of the Thumb — Anatomy and Biomechanics**S SEBASTIN<sup>1</sup>, LK POH<sup>1</sup><sup>1</sup>Hand and Reconstructive Microsurgery, National University Hospital, Singapore

**Aims:** 1) To study the anatomy of the radial collateral ligament (RCL) of the thumb with regard to the possibility of a Stener-like lesion on the radial side. 2) To construct a biomechanical model to study RCL injuries of the thumb.

**Methods:** The radial aspect of 5 cadaveric thumbs was dissected to study the RCL and the surrounding structures. A jig was constructed to impact load the thumb RCL. Fifteen cadaveric thumbs were impact loaded. An electronic accelerometer and an oscilloscope were attached to the jig to enable precise measurement of the impacting force. The thumbs were then dissected to analyse the RCL.

**Results:** The cadaveric studies revealed that the RCL of the thumb was not fully covered by the extensor aponeurosis during hyperextension of the thumb. The impact loading studies showed that most tears of the RCL occurred in the mid-substance.

**Conclusion:** A Stener-like lesion is possible on the radial side of the thumb in people with hyper extensible thumb metacarpo-phalangeal joints (MCPJ). This is of critical importance to Asian ethnic groups since the thumb MCPJ is intrinsically hyper-extensible in this group of subjects.

## SUR544

**Intra-arterial Injection of Buprenorphine**L TSAI<sup>1</sup>, A LIM<sup>1</sup><sup>1</sup>Hand and Reconstructive Microsurgery, National University Hospital, Singapore

**Aim:** Oral buprenorphine (levo-alphaacetylmethadol), a partial mu-opioid agonist, has been available as an effective medication for opioid detoxification and maintenance. Buprenorphine is marketed as sublingual tablets under the tradename of Subutex®. The abuse of buprenorphine as an intravenous injection was illustrated by our case series of 3 patients who were admitted from March to June 2005 with complications after intra-arterial injection of buprenorphine.

**Methods:** Three patients with vascular complications ranging from distal microemboli to frank gangrene of distal extremity will be described in our poster. The vascular injury was the result of a combination of particulate obstruction of small vessels, vasospasm, thrombosis, chemical endarteritis and direct cytotoxic effects on endothelium. A literature review regarding complications of intra-arterial injection will also be presented.

**Results:** One patient required amputation of all fingers of the left hand at the metacarpo-phalangeal joint and radical debridement with subsequent resurfacing with inferior epigastric flap. One patient was managed with intravenous heparin and iloprost, a stable prostacyclin analogue with satisfactory resolution of ischaemia. The third patient presented late with frank gangrene of the left hand, which required amputation to the distal radius.

**Conclusion:** With a unique pharmacologic profile, oral buprenorphine emerges as a new and effective addition to the available pharmacologic regimen for opioid detoxification and maintenance. The abuse potential of buprenorphine as intravenous injection should prompt practitioners to advise intravenous drug users against crushing and injecting the tablet intravenously.

## SUR545

**Effect of Obesity on Flap and Donor-site Complications in Unipedicle Transverse Rectus Abdominis Myocutaneous Flap Breast Reconstruction**L TSAI<sup>1</sup>, J LIM<sup>2</sup><sup>1</sup>Hand and Reconstructive Microsurgery, <sup>2</sup>Surgery, National University Hospital, Singapore

**Aim:** The purpose of this study was to assess the effect of obesity on flap and donor-site complications in patients undergoing unipedicle transverse rectus abdominis myocutaneous (TRAM) flap breast reconstruction. All patients undergoing breast reconstruction at our institution from September to December 2004 were reviewed. Patients were divided into 2 groups based on their body mass index: normal body mass index = 25. Flap and donor-site complications in the 2 groups were compared. There were no significant differences in age distribution, smoking history, or comorbid conditions among the 2 groups of patients.

**Methods:** A retrospective review of 14 consecutive patients was conducted. This comprised 10 patients who underwent immediate reconstructions and 4 who underwent delayed reconstruction. In our series, 9 patients had normal BMI (20.1 to 24 kg/m<sup>2</sup>) and 5 patients were overweight (27.9 to 31.2 kg/m<sup>2</sup>). The length of follow-up was on average 6 months post-TRAM reconstruction.

**Results:** We reported no major morbidity, i.e., flap loss or mortality in our series. Overweight patients undergoing breast reconstruction using pedicled

TRAM flap had higher incidence of flap seroma, skin flap necrosis, donor site seroma and fat necrosis as compared with normal weight patients. The average length of stay was twice as long for overweight patients (average of 10.3 days) as compared to 5 days for normal-weight patients.

**Conclusion:** In reviewing our experience, we found that both flap and donor-site complication rates were significantly higher in overweight patients undergoing unipedicled TRAM flap breast reconstruction than in normal-weight patients undergoing the procedure.

#### SUR546

##### Fix and Flap: The Radical Orthopaedic and Reconstructive Treatment for Severe Open Fracture of Tibia

L TSAI<sup>1</sup>, A LIM<sup>1</sup>, KP LOOI<sup>1</sup>, YP PENG<sup>1</sup>

<sup>1</sup>Hand and Reconstructive Microsurgery, National University Hospital, Singapore

**Aim:** Microsurgical reconstruction techniques promoted by Godina revolutionised the concept of free tissue transfer for trauma. Free flaps transformed an open fracture acutely into a well-vascularised closed fracture. We aim to present the experience of National University Hospital, a tertiary referral hospital, in providing early flap coverage for severe open tibia fracture.

**Methods:** We performed a retrospective review of 20 consecutive patients who had suffered severe (Gustilo IIIb or IIIc) open fracture of tibia after blunt trauma. All had been managed with a radical protocol of early external fixation as well as early free flap coverage. They were divided into 3 groups for the purpose of review. Group 1 underwent free flap transfer within 72 hours of injury, group 2 between 72 hours and 1 week, and group 3 within 2 weeks.

**Results:** The results were analysed with regard to flap failure, infection, bone healing time, length of hospital stay and number of operative procedures. The flap failure rate for group 1 was 1%, 12% for group 2 and 15% for group 3. Postoperative infection was 1.5% in group 1, 17.5% in group 2 and 10% in group 3.

**Conclusion:** Early free flap coverage should be provided when the conditions are favourable to reduce morbidity to the patient. Our results showed that early flap coverage for severe open fracture of tibia has resulted in lower flap failure rates, lower infection rates, shorter period of hospitalisation and fewer operations.

#### SUR547

##### Preliminary Report on Arthroscopic Ganglionectomy

HL WIN<sup>1</sup>, LK POH<sup>1</sup>

<sup>1</sup>Hand and Reconstructive Microsurgery, National University Hospital, Singapore

**Aim:** To assess the outcome and complications of arthroscopic ganglionectomy

**Methods:** Study design: cross-sectional, descriptive, hospital-based study. Study period: January 2000 to June 2005. Study area: Department of Hand and Reconstructive Microsurgery of the National University of Singapore. Sample size: 14 patients. Data collection methods: preoperative and postoperative data were collected from case files. Patients who had been discharged from clinic were contacted by phone.

**Results:** From January 2000 to June 2005, there were 263 cases. Two hundred and twenty-one (84.03%) were dorsal and 42 (15.97%) were volar wrist ganglion. Only 14 patients with dorsal ganglion received arthroscopic resection; among which 7 patients were males and 7 were females. The stalk was observed in 1 case, 13 arose from scapholunate interval and 1 from STT joint. Other intra-articular abnormalities were found in 4 patients. All the patients were followed up 2 to 60 months after surgery. Two patients had pain and minimal swelling for up to 1 week. No recurrences of ganglion were found in all the cases. All the patients could return to work within 17 days. No intraoperative and postoperative complications were found.

**Conclusion:** Arthroscopic ganglionectomy is a reliable alternative to open resection. It is safe and addresses the main anatomic pathology. Recent

studies have reported that the number of recurrences has decreased and it provides good cosmesis and early return to work. However, there are some limitations such as steep learning curve, costs and instrumentation problem. Although there are limitations, it is an invaluable procedure from which patients benefit more.

#### SUR548

##### Accurate Noninvasive Prenatal Maternal Serum Diagnosis using a Novel Combined Protein-profiling and Antibody-array Approach to Detect Fetal Trisomy 13, 18 and 21

NKOTHANDARAMAN<sup>1</sup>, B VLADIMIR<sup>2</sup>, LL SU<sup>1</sup>, S PONNUSAMY<sup>3</sup>, V GOH<sup>3</sup>, A BISWAS<sup>1</sup>, M CHOOLANI<sup>1</sup>

<sup>1</sup>Obstetrics and Gynaecology, National University Hospital, Singapore, <sup>2</sup> Knowledge Extraction Lab, Institute for Infocomm Research, Singapore,

<sup>3</sup>Obstetrics and Gynaecology, National University of Singapore — Yong Loo Lin School of Medicine, Singapore

**Aim:** Antenatal diagnosis of fetal trisomy involves invasive testing by amniocentesis, which carries significant risk of miscarriage. Hence, 1 in 2 women decline diagnostic testing. Currently, maternal serum testing is not diagnostic, lacks sensitivity, and has a 5% false-positive rate. Ideal diagnostic test combines the noninvasive nature of maternal serum screening with the diagnostic power of amniocentesis. We hypothesised that maternal serum contains a distinctive protein-profile signature and highly specific proteins that would accurately diagnose fetal trisomy noninvasively.

**Methods:** Eighty-six second-trimester maternal serum samples were analysed. The trisomy fetuses:normal fetuses ratio was 5:81. A 1:16 ratio of abnormal:normal ensured sufficient normal samples to determine the normal profile, sufficient abnormal samples for statistical significance, and a one:many ratio nearer the clinical scenario. Serum protein profiles were generated using surface-enhanced-laser-desorption and ionisation (SELDI) time-of-flight (TOF)/mass spectrometry (MS). Cross-spectral analysis of protein-spectra and bioinformatics-based combinatory logic analysis were used to find characteristic features for trisomy 13, 18 and 21. Unique proteins were characterised using gel electrophoresis and Tandem-MALDI-TOF-MS/MS approach, and confirmed by Western blotting.

**Results:** 100% sensitivity, specificity and positive-predictive value were achieved in discriminating between normal and trisomic fetuses by examining the proteomic-spectral profiles (0-20 kDa) within maternal serum ( $P < 0.0001$ ). Trisomy-specific proteins identified included alpha-1-antitrypsin, apolipoprotein-H, transthyretin (chromosome 18), amyloid precursor protein (chromosome 21). A combination (presence/absence) of these proteins successfully predicts fetal trisomy.

**Conclusion:** Ours is the first study that combines the potential use of proteomic signatures with an antibody array as a novel noninvasive strategy for the prenatal diagnosis of fetal trisomy.

#### SUR549

##### The Relevance of Colposuspension in Modern Practice

JWS LEE<sup>1</sup>

<sup>1</sup>Obstetrics and Gynaecology, National University Hospital, Singapore

**Aim:** Mid-urethral tape (MUT) is the current surgery of choice for stress incontinence. It is minimally invasive and effective, but high material cost and significant adverse effect profile limit its use. Colposuspension is technically sound and equally effective. This study determined the efficacy, satisfaction and complication rates of colposuspension in a multi-racial cohort.

**Methods:** This was a retrospective observational analysis of 93 women who had colposuspension. The retropublic space was approached by finger dissection and hemostatic diathermy. Three Ethibond 20 were placed "tension-free", first at the urethrovaginal level (1 cm from UVJ) and the others 1 cm apart and lateral-ward. Patient characteristics, perioperative data, subjective cure and satisfaction rates were analysed.

**Results:** The mean age was  $49 \pm 8$  years; and there were 67% Chinese, 22%

Indians and 10% Malays. The subjective cure rates at 6 and 12 months were 96% and 92% respectively; and at medium-term (~5 years) and long-term (~9 years) follow-up, were 71% and 74% respectively. 12% had postoperative voiding difficulty. 29% had bladder overactivity and 1% had posterior wall weakness at medium term. Ethnic Indians were overrepresented (22% vs 8%) and experienced more irritative symptoms preoperatively.

**Conclusion:** In this multi-ethnic cohort, colposuspension achieved high subjective cure rates at long-term follow-up. Complications were mild and tolerable and the satisfaction rate was high. Colposuspension continues to be relevant today as the operative cost could be significantly lower in under-developed countries. Besides, it may be appropriate with a concurrent abdominal procedure or when a previous MUT has failed. A surgeon ought to be familiar with the space of Retzius before he/she performs essentially "blind" MUT.

#### SUR550

##### Knowledge, Attitude and Perception of Blindness and other Smoking-related Diseases amongst Smokers

S HANDA<sup>1</sup>, HB WONG<sup>2</sup>, AM WAGLE<sup>1</sup>, KG AU EONG<sup>1</sup>

<sup>1</sup>Ophthalmology, Alexandra Hospital, Singapore, <sup>2</sup>Clinical Trials and Epidemiology Research Unit, Singapore

**Aim:** Cigarette smoking is a leading avoidable environmental cause of morbidity and mortality, and quitting smoking promises significant health benefits. This study aimed to evaluate the knowledge, attitude and perception of blindness and other smoking-related diseases amongst smokers and their impact on smoking cessation.

**Methods:** One hundred and seventy current smokers attending an ophthalmology outpatient clinic were randomly selected for interview in person using a standardised questionnaire.

**Results:** The mean age of the respondents was 56.5 years (range, 20-83 years). 93% were male and 7% were female. The proportions of respondents able to attribute specific conditions to smoking were 83% for lung cancer, 78% for other lung diseases, 73% for heart attack, 59% for stroke, 59% for other cancers and 40% for blindness. When smokers were asked which disease they would first seek treatment for if it was only possible to treat 1, heart attack was ranked first (34%) while blindness was second (22%). The likelihood of the smokers quitting smoking within 1 year when told that smoking is related to specific conditions was 80% for lung cancer, 79% for blindness, 78% for stroke, 76% for other lung diseases, 76% for other cancers and 74% for heart attack.

**Conclusion:** The awareness of blindness as a smoking-related condition was lowest amongst 6 conditions or groups of conditions. Smokers place a high priority to treat blindness first and the fear of blindness appears as effective as lung cancer and stroke in motivating smokers to quit smoking. Public education to increase the awareness of blindness as a smoking-related disease could potentially help in motivating smokers to quit smoking.

#### SUR552

##### A Report of a Rare Case of Isolated Racemose Haemangioma in the Retina

S HANDA<sup>1</sup>, R CHEW<sup>1</sup>, KG AU EONG<sup>1</sup>

<sup>1</sup>Ophthalmology, Alexandra Hospital, Singapore

**Aim:** Congenital arteriovenous malformation of the retina (or racemose haemangioma) is a rare unilateral developmental anomaly that may be associated with intracranial arteriovenous malformation in about 30% to 81% of cases. We report a rare case of isolated racemose haemangioma in the retina.

**Method:** This is an observational case report.

**Results:** A 39-year-old Chinese woman presented with a history of impaired vision in her right eye for more than 10 years. Her best-corrected visual acuity was 6/15 and 6/6 in the right and left eyes, respectively. Ophthalmic examination disclosed that her impaired vision was due to a moderate nuclear sclerotic cataract in the right eye. Ophthalmoscopy revealed multiple dilated

and tortuous vessels emerging from the right optic disc nasally and in the superotemporal quadrant. There was no retinal thickening, exudates or haemorrhages, or a relative afferent pupillary defect. The left eye was normal. Magnetic resonance imaging of the brain and orbits was also normal and disclosed no sign of Wyburn-Mason syndrome.

**Conclusion:** Isolated congenital arteriovenous communication of the retina is usually stable and does not require intervention. However, failure to do appropriate radiological and neurological assessments, in cases of central nervous system involvement, may be a significant medicolegal shortcoming.

#### SUR553

##### Efficacy of 1-drop versus 3-drop Regime using 1% Tropicamide for Mydriasis in Patients with Pigmented Irides — Results of a Randomised Controlled Trial

AM WAGLE<sup>1</sup>, CC YIP<sup>1</sup>, TP YAP<sup>1</sup>, BC TAP<sup>2</sup>, KG AU EONG<sup>1</sup>

<sup>1</sup>Ophthalmology, Alexandra Hospital, Singapore, <sup>2</sup>COFM, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** To evaluate the efficacy and rate of mydriasis with 1% tropicamide using a 1-drop versus a 3-drop regime in patients with pigmented irides.

**Methods:** Prospective randomised single masked clinical trial. Eighty patients with pigmented irides were consecutively enrolled from an ophthalmology outpatient clinic. One eye of each patient was randomly assigned to receive 1 drop of 1% tropicamide (regime A) while the other eye received 1 drop of 1% tropicamide thrice at 5-min intervals (regime B). A masked observer measured the pupil size and shape in both eyes at 5-min intervals for 45 min using a reference pupil chart.

**Results:** The median age was 50 years (range, 20-79 years) with a male predominance (61%). A quarter of the patients were diabetic (25%). Pupil size at 45 min was significantly larger with regime B compared to regime A after adjusting for age and ethnicity (mean difference = 0.23 mm; 95% CI, 0.07-0.40;  $P = 0.007$ ). Similarly, the rate of dilation was significantly faster with regime B compared to regime A after adjusting for age and ethnicity (mean difference = 0.02 mm/min; 95% CI, 0.01-0.03;  $P < 0.001$ ). However, there is no evidence that the effect of the regime differs with diabetes mellitus ( $P = 0.375$  for pupil size;  $P = 0.814$  for rate of dilation).

**Conclusion:** A 3-drop regime of 1% tropicamide gives a larger final pupil size and faster pupil dilation in pigmented irides. However, further studies are required to validate the clinical significance of this result.

#### SUR554

##### Visual Outcome in Patients with Central Retinal Artery Occlusion

CF CHIN<sup>1</sup>, C TAN<sup>1</sup>, KY GOH<sup>1</sup>

<sup>1</sup>Ophthalmology, Tan Tock Seng Hospital, Singapore

**Aim:** To analyse visual outcomes in patients with central retinal artery occlusion (CRAO).

**Methods:** We conducted a retrospective study of patients admitted to Tan Tock Seng Hospital between 2002 and 2005 with CRAO (n = 22). Parameters included presenting visual acuity (VA), age, sex, cause, management, outcome and complications.

**Results:** 50% of the patients were between ages of 50 and 69 years. The male-to-female ratio was 13:9. 90.9% had a presenting VA of counting fingers or worse. At the time of discharge, 27% showed improvement in VA, 50% were unchanged and 22.7% had poorer VA. There was no correlation between outcome and time of presentation and all the patients had similar management. Causes included carotid artery stenosis (27%) and atherosclerosis (50%). Three of the 22 patients developed neovascular glaucoma.

**Conclusion:** Visual outcome in CRAO is poor despite conventional management, regardless of early presentation. Newer modalities of treatment for CRAOs should be further looked into to improve visual outcome.

**SUR555**

**Clinical Results of Wavefront-guided Laser In Situ Keratomileusis (LASIK)**

**J CHUA<sup>1</sup>, WJ HENG<sup>1</sup>, HB FAM<sup>1</sup>, HM LEE<sup>1</sup>**

<sup>1</sup>Ophthalmology, Tan Tock Seng Hospital, Singapore

**Aim:** To evaluate the refractive outcome of myopic eyes post wavefront-guided LASIK.

**Methods:** A prospective study was conducted at the Department of Ophthalmology, Tan Tock Seng Hospital from May 2001 to January 2004. Four hundred and fifty-eight eyes of 238 patients received complete preoperative analysis including corneal topography with the Orbscan IIz, wavefront analysis with the Zywave<sup>®</sup> and scotopic pupil diameter measurement. Zylink<sup>®</sup> software (version 2.33) enabled individualised therapeutic strategy to be administered using the Zyoptix 217z system. Safety, efficacy, predictability and stability of wavefront-guided LASIK procedure were evaluated.

**Results:** 97% of 238 patients were Chinese, with almost twice as many females as males. The mean age was 33 ± 7 years. 63.8% eyes maintained their best corrected visual acuity (BCVA) while 35.9% eyes gained at least 1 snellen line of BCVA. Only 1 eye (0.3%) lost 1 snellen line of BCVA. The safety index was 1.16 at 6 months. 97.5% eyes attained an uncorrected visual acuity (UCVA) of 20/40 or better, with 70.5% eyes having 20/20 or better. Efficacy index of 0.98 was obtained at 6 months. Mean preoperative spherical equivalent (SE) was -6.79 D ± 2.46 (range, -14.13 to -2.00 D). At 6 months, the mean SE was -0.43 D ± 0.57 (range, 2.25 to 1.75 D). Results during the first 6 postoperative months showed good stability of ± 0.50 D change in SE. 93% of the eyes were within ± 1.0 D of the attempted SE correction, and 72% of the eyes were within ± 0.5 D of the attempted SE correction.

**Conclusion:** We have demonstrated excellent visual outcome with wavefront-guided LASIK.

**SUR556**

**Oculomotor Nerve Palsy: An Uncommon Complication of Herpes Zoster Ophthalmicus**

**FY FOQ<sup>1</sup>, KY GOH<sup>1</sup>**

<sup>1</sup>Ophthalmology, Tan Tock Seng Hospital, Singapore

**Aim:** We describe a patient with an uncommon complication of herpes zoster ophthalmicus: a right pupil-sparing oculomotor nerve palsy.

**Methods:** A 70-year-old Chinese gentleman presented to his primary physician with herpes zoster ophthalmicus. He was prescribed a 1-week course of oral acyclovir, but discontinued his medication due to intolerable nausea. He was seen in our department 5 days into his illness and assessed regularly for ocular complications. Our recommendation to the patient to take oral antiviral medication was met with stiff resistance. On day 7, he developed right keratoconjunctivitis and uveitis, which was treated with topical acyclovir ointment. He developed persistent diplopia on day 11. Clinical examination was consistent with a right pupil-sparing oculomotor nerve palsy, associated with partial ptosis. The right keratoconjunctivitis and uveitis had resolved. He was admitted for a 5-day course of intravenous acyclovir. Magnetic resonance imaging and magnetic resonance angiography were normal.

**Results:** The progression and recovery of the patient's oculomotor nerve palsy is pending follow-up. The pathophysiology of oculomotor nerve palsy in herpes zoster ophthalmicus and the role of early antiviral treatment are discussed.

**Conclusion:** This case illustrates an uncommon complication of herpes zoster ophthalmicus. The progression of the illness from keratoconjunctivitis and uveitis to oculomotor nerve palsy can be attributed partly to the failure of completion of oral antiviral medication. Oral acyclovir requires frequent daily dosing and can be associated with nausea, which can reduce compliance. The prognosis for recovery of oculomotor nerve palsy in herpes zoster ophthalmicus is otherwise good.

**SUR557**

**Amsler Grid versus Automated Perimetry in the Detection of Focal Central Visual Defects Produced by Diabetic Macular Laser**

**OK HEE<sup>1</sup>, C KHNG<sup>1</sup>**

<sup>1</sup>Ophthalmology, Tan Tock Seng Hospital, Singapore

**Aim:** The aim of the study was to compare the Amsler grid with automated perimetry (SAP) in the detection of focal central visual defects after diabetic macular laser.

**Methods:** The study was a prospective 12-week observational case series. One eye of consecutive patients with clinically significant focal diabetic maculopathy was included if it had a normal Amsler recording. Changes in Amsler recording and automated perimetry were compared before and after laser.

**Results:** Thirty-seven eyes were analysed. Laser caused Amsler defects in 12/37 (32.4%) of eyes, and SAP defects in 15/22 (68.2%,  $P = 0.014$ ). Laser shot count, power and burn intensity were higher in the group with Amsler defects ( $P = 0.003, 0.019$  and  $0.036$ , respectively) and SAP defects ( $P = 0.010, 0.005$  and  $0.052$ , respectively).

**Conclusion:** Amsler grid testing was poorer at detecting focal visual defects caused by laser photocoagulation compared with SAP. The laser shot count and power were significant factors in the production of defects detectable by Amsler and SAP.

**SUR558**

**A Case of Optic Neuropathy Secondary to Pansinusitis with Onodi Cell Involvement**

**EWT POH<sup>1</sup>, SA LIM<sup>1</sup>, J LEE<sup>2</sup>**

<sup>1</sup>Ophthalmology, <sup>2</sup>Otorhinolaryngology, Tan Tock Seng Hospital, Singapore

**Aim:** To report a case of optic neuropathy secondary to pansinusitis with Onodi cell involvement

**Methods:** A 61-year-old Chinese male was presented in May 2005 with sudden painless visual loss in the right eye. He received radiotherapy for nasopharyngeal carcinoma in 1997, for which he is now in remission. He also has a history of left primary angle closure glaucoma 2 years ago, resulting in left glaucomatous optic neuropathy (relative afferent pupillary defect (RAPD), pale disc, 6/18 visual acuity). Acuity was 6/9 in the right with a normal disc. Intraocular pressures (IOPs) normalised postbilateral peripheral iridotomies. However, he defaulted subsequent follow-up. During this episode, acuity was hand movement in the right and 6/12 in the left. There was an RAPD, abnormal colour vision and a temporal field defect on the right. IOPs were normal. The right optic disc was pink; the left was pale. Magnetic resonance imaging showed pansinusitis with rhinogenic optic neuritis from Onodi cell involvement. Intravenous Augmentin, nasal decongestants and oral prednisolone were administered while awaiting bilateral functional endoscopic sinus surgery (FESS).

**Results:** Acuity recovered to 6/9 and colour vision normalised in the right eye. He resumed a left RAPD. The right optic disc developed mild temporal pallor.

**Conclusion:** Patients with pansinusitis and Onodi cell involvement can develop optic neuropathy. Imaging studies are crucial in coming to the diagnosis. Management consists of initial medical, followed by surgical decompression.

**SUR559**

**Patients' Experience of Pain and Discomfort during Ophthalmic Laser Procedures**

**A LAU<sup>1</sup>, C TAN<sup>1</sup>, KG AU EONG<sup>2</sup>**

<sup>1</sup>Ophthalmology, Tan Tock Seng Hospital, Singapore, <sup>2</sup>Ophthalmology, Alexandra Hospital, Singapore

**Aim:** To investigate the severity of pain experienced by patients during argon laser photocoagulation.

**Methods:** One hundred and thirty-nine randomly selected patients undergoing argon laser photocoagulation (panretinal photocoagulation (PRP), focal lasers) were interviewed within 1 hour of their laser procedure using a standardised questionnaire. The pain experienced during the laser procedure was scored on a visual analogue scale of 0 to 10, where 0 represents no pain and 10 represents the most severe pain.

**Results:** The mean age of the 139 patients was 59.5 years (SD 9.5). There were 82 males (59.0%) and 57 females (41.0%). Eighty patients (57.6%) had PRP and 59 (42.4%) had focal laser. Ninety-one patients (65.5%) experienced pain during the laser procedure. A significantly higher proportion of patients undergoing PRP experienced pain (72 patients, 90%) compared to those undergoing focal laser (19 patients, 32.2%,  $P < 0.001$ ). Similarly, a higher proportion of patients undergoing PRP found the illuminating light uncomfortable (51 patients, 63.8%) compared to patients undergoing focal lasers (23 patients, 39.0%) although this difference was not statistically significant ( $P = 0.06$ ). The mean score of the various types of pain and light discomfort was higher for PRP compared to focal laser, although the difference was significant only for light discomfort (3.53 vs 1.88) and sharp pain (3.16 vs 0.53).

**Conclusion:** A majority of patients experience pain during ophthalmic laser procedures. The pain is significantly higher in those undergoing panretinal photocoagulation and those who have had previous laser treatment.

#### SUR560

##### Confocal Scanning Laser Ophthalmoscope Indocyanine-green Angiography Analysis of Exudative Age-related Macular Degeneration Vascular Subtypes in Singapore

**A LAUDE<sup>1</sup>, R RAJAGOPALAN<sup>1</sup>, NWH TAN<sup>1</sup>, DPL CHAN<sup>1</sup>, A DJATIKUSUMO<sup>1</sup>, JJ LEE<sup>1</sup>, TH LIM<sup>1</sup>**

<sup>1</sup>Ophthalmology, The Eye Institute, Singapore

**Aim:** With the advent of confocal scanning laser ophthalmoscope indocyanine-green angiography (SLO ICGA), exudative age-related macular degeneration (AMD) can now be further classified into different vascular subtypes, each with a different natural history and prognosis. The relative proportion of the different vascular subtypes has not been studied. This paper describes the relative proportion of the different angiographic subtypes of exudative AMD in Singapore.

**Methods:** A descriptive study of a case series of symptomatic eyes ( $n = 322$ ) of 318 patients that were examined using confocal SLO ICGA at a tertiary referral centre from July 2003 to December 2004 (18 months). The diagnosis of exudative AMD was based on history, fundus biomicroscopy and fundus fluorescein angiography.

**Results:** There were 137 eyes with an identifiable choroidal neovascularisation (CNV) membrane, 56 eyes with polypoidal choroidopathy (PCV) features and 7 eyes with retinal angiomatous proliferation features identified. Of these, 45 eyes had more than 1 feature identified. Eight patients had clinical signs of exudative AMD but no identifiable CNV on confocal SLO ICGA.

**Conclusion:** Amongst the patients who presented to our centre with exudative AMD, a vascular net was identified in majority (85%). PCV (with/without CNV) made up a significant proportion (35%) while RAP was uncommon (4%). A significant proportion had more than 1 subtype, suggesting that CNV, PCV and RAP may be different, co-existing manifestations of the same disease rather than completely different clinical entities.

#### SUR561

##### Comparison of the 4-mg Dose and the 20-mg Dose of Intravitreal Triamcinolone Acetonide Injection for Treatment of Refractory Diabetic Macular Oedema

**A LAUDE<sup>1</sup>, SCB TEOH<sup>1</sup>, A DJATIKUSUMO<sup>1</sup>, GKM NAH<sup>1</sup>, R JARIN<sup>1</sup>, TH LIM<sup>1</sup>**

<sup>1</sup>Ophthalmology, The Eye Institute, Singapore

**Aim:** To evaluate the clinical outcome of treatment of refractory diabetic

maculopathy using intravitreal triamcinolone acetonide (IVTA) in 2 different formulae.

**Methods:** An open-labelled, non-randomised, interventional case series using 4 mg/0.1 mL (without vehicle wash-out) and 20 mg/0.04 mL (with vehicle wash-out) IVTA in patients with clinically significant macular oedema who had had at least 1 session of focal or grid laser treatment in the affected eye. All patients were followed up at 1 day, 1 month and 3 months post-injection. The central macular thickness, as measured by optical coherence tomography, was used for comparison, as well as logMAR visual acuity (VA) and intraocular pressure (IOP) measurements.

**Results:** Six eyes of 6 patients received the 4-mg dose while 9 eyes of 9 patients received the 20-mg dose. The average change in macular thickness in the 4-mg dose group was  $-22.9\%$  while that of the 20-mg dose group was  $-25\%$  at the end of 3 months. The logMAR VA improved in both groups of patients but the average change was  $1.3 \pm 0.36$  to  $0.8 \pm 0.22$  in the 4-mg group and  $0.74 \pm 0.20$  to  $0.64 \pm 0.23$  in the 20-mg group. Two patients in the 4-mg group developed raised IOP while 1 patient in the 20-mg group developed raised IOP but all were controlled with topical anti-glaucoma medication. There was no incidence of endophthalmitis in this series.

**Conclusion:** The 4-mg dose seems to be comparable to the 20-mg dose and may be considered in treating patients with diabetic maculopathy in this small sample pilot study.

#### SUR562

##### Myopia Prevention in Singapore: A Health Beliefs and Protection Behaviour Approach

**L LEE<sup>1</sup>, M LWIN<sup>2</sup>, A CHENG<sup>3</sup>, SM SAW<sup>4</sup>**

<sup>1</sup>Ophthalmology, The Eye Institute, Singapore, <sup>2</sup>National University of Singapore Business School, National University of Singapore, Singapore, <sup>3</sup>Singapore Eye Research Institute, Singapore Eye Research Institute, Singapore, <sup>4</sup>COFM, National University of Singapore — Yong Loo Lin School of Medicine, Singapore

**Aim:** This pilot study aimed to examine parental knowledge of and attitudes towards myopia risk factors, perceived severity of myopia, as well as screening and treatment for myopia.

**Methods:** The sampling frame included all 152 co-education primary schools in Singapore and 3 schools were randomly selected, with parents of all children aged 10-11 years invited to join the study. Only Chinese children were selected in this analysis, with a participation rate of 493/782 (63%). Lensometry was performed for children who wore spectacles. Questionnaires (myopic) were given to parents of myopic children whose spherical equivalent was at least  $-0.5$  D in either eye. All other parents were given the questionnaire for non-myopic children.

**Results:** Myopia was perceived to be a serious condition (85.0% and 85.8% for parents of myopes and non-myopes respectively). Even though parents knew that myopia was a worsening public health problem, knowledge about myopia progression rates was not high (36.7% and 29.3% respectively). A greater proportion of parents of myopic children realised that myopia was a serious condition ( $P = 0.02$ ). A greater proportion of parents of myopic children were willing to cope with myopia prevention and screening, and were also more willing to bring their children for treatment and screening (all  $P < 0.001$ ).

**Conclusion:** This study shows that parents generally have good knowledge of myopia, and are quite receptive to myopia coping techniques. This study will help healthcare providers better understand health beliefs towards myopia, aid in the formulation of effective themes for communication and intervention efforts, as well as contribute to academic literature on myopia protection.



**SUR563**

**Comparisons of Trauma Cases in Oral and Maxillofacial Surgery in Two Major Hospitals in Singapore (National University Hospital and Tan Tock Seng Hospital)**

**JSP LOH<sup>1</sup>, V FAN<sup>1</sup>, R NAGADIA<sup>1</sup>**

<sup>1</sup>Oral and Maxillofacial Surgery, National University Hospital, Singapore

**Aim:** To audit the type of trauma cases serviced by the Department of Oral and Maxillofacial Surgery (OMFS) between the 2 teaching hospitals.

**Methods:** Retrospective study involving an audit of the cases treated by the OMFS Unit in the last 30 months through a review of the medical records. Particular attention was paid to the routine use of CT scans and its indications, the duration of hospital stay, the nature and variety of the trauma, timing and type of surgery, the surgeon doing the operation, type of cases managed conservatively; the postoperative care, any rehabilitation required, and the eventual recovery process and follow-up.

**Results:** It had been noted that there was a good distribution of the gender and the nature of the trauma. The type of cases referred and the duration of stay differed somewhat in the 2 different hospitals studied. Both simple and complex fractures of the face were managed to a satisfactory level. Also, the frequent use of CT scans had been observed in both hospitals.

**Conclusion:** Further studies are necessary to evaluate the usefulness and routine use of CT scans in OMFS trauma cases as it will have an economic impact on resources. There should also be quality of life studies on these patients. OMFS should become an integral part in the trauma management team in the major hospitals.

**SUR564**

**Infection as a Prognostic Factor for the Prevention of Proximal Amputations in Patients with Diabetic Foot Problems**

**Z AZIZ<sup>1</sup>, BC LIN<sup>1</sup>, BMC FENG<sup>1</sup>, CHJ ONG<sup>1</sup>**

<sup>1</sup>Orthopaedic Surgery, National University Hospital, Singapore

**Aim:** Our objective was to evaluate the type of pathogen as a prognostic factor in the prevention of proximal amputations in patients with diabetic foot problems (DFPs) as well as to evaluate the extent of infection (abscess, wet gangrene, osteomyelitis, septic arthritis) as a predictive factor determining the loss or salvage of limbs in patients with DFPs.

**Methods:** One hundred patients admitted to NUH from January 2002 to June 2005 were studied. The Majority of the patients were in the fifth and sixth decades of life. The ratio of males to females was 1:1. Parameters studied included antibiotics prescribed, results of culture/sensitivity test, antibiotics continued or changed, symptoms and signs of infection, markers of infection and outcome of treatment: 1) limb saved/lost (BKA, AKA), 2) life saved/lost, 3) complications encountered (e.g., readmission/repeat operations).

**Result:** We found that the extent of infection played an important role in predicting limb salvage. The type of pathogen present was also an important prognostic factor.

**Conclusion:** Infection is one of the major problems encountered in patients with diabetic foot problems in addition to neuropathy and vasculopathy.

**SUR565**

**Vasculopathy as a Prognostic Factor for the Prevention of Proximal Amputations in Patients with Diabetic Foot Problems**

**BMC FENG<sup>1</sup>, A ERASMUS<sup>2</sup>, A NATHER<sup>1</sup>, BC LIN<sup>1</sup>, CHJ ONG<sup>1</sup>, Z AZIZ<sup>1</sup>**

<sup>1</sup>Orthopaedic Surgery, <sup>2</sup>Rehabilitation, National University Hospital, Singapore

**Aim:** Our objectives were to evaluate the incidence of vasculopathy in patients with diabetic foot problems (DFPs) as well as to investigate vasculopathy as a predictive factor for prevention of proximal amputations (below knee and above knee amputations).

**Methods:** One hundred patients admitted to NUH from January 2002 to June

2005 were studied. The majority of the patients were in the fifth and sixth decades of life. The ratio of males to females is 1:1. One hundred patients with DFPs were assessed clinically for palpable dorsalis pedis, posterior tibial, popliteal and femoral pulse. Ankle brachial index (ABI) and toe brachial index (TBI) were measured for all the patients wherever possible. The waveforms of the pulses were also recorded. Comparisons were made between the status of clinically palpable pulses, ABI and TBI measurements, and pulse waveforms with respect to the incidence of limb salvage.

**Results:** The presence of clinically palpable pulses was an important predictive factor for prevention of proximal amputations. In particular, the type of waveform measured (monophasic, biphasic, triphasic) was also an important predictive factor. The level of ABI and TBI measured was a useful prognostic factor.

**Conclusion:** DFPs account for about 10% to 20% of emergency admissions in the Department of Orthopaedics, NUH. Of these, many patients suffer from vasculopathy. Our experience shows that vasculopathy plays an important factor in determining whether the limb is saved or lost.

**SUR566**

**Incidence of Neuropathy in Patients with Diabetes Mellitus — Comparison of Neuropathy Measured by Sensory Testing versus Monofilament Testing versus R-CPT**

**BMC FENG<sup>1</sup>, A NATHER<sup>1</sup>, SCF LIEW<sup>1</sup>, CHJ ONG<sup>1</sup>, CBT LIN<sup>1</sup>, Z AZIZ<sup>1</sup>**

<sup>1</sup>Orthopaedic Surgery, National University Hospital, Singapore

**Aim:** Little is known as to the incidence of neuropathy in patients with diabetes mellitus. The presence of neuropathy, if found to be present, is significant since early treatment can be instituted, footcare education and protective footwear can also be prescribed. The objectives of this study are to study the incidence of sensory neuropathy in patients with diabetes mellitus and to compare the incidence of neuropathy detected by 3 different modalities of testing — pin prick testing, monofilament test and rapid current perception threshold (neurometer measurement).

**Methods:** The method of sensory testing using pin prick, monofilament testing and neurometer assessments are described.

**Results:** Our experience indicated that many patients are unaware that neuropathy is present clinically whilst monofilament testing reveals that it is already present. Our results also show that both sensory testing using pin prick and neurometer measurements can detect sensory neuropathy even earlier than monofilament testing.

**Conclusion:** The majority of patients showed sensory disturbance up to the level of their ankles. Of those with sensory disturbance, all except 1 patient presented with hypoesthesia. There was no significant difference in the incidence of loss of protective sensation between the left leg and right leg. Monofilament testing showed a loss of protective sensation in about 25% of patients, significantly less than the sensory disturbance detected by pin prick (46.7%). Loss of protective sensation seen with monofilament testing was significantly less than sensory neuropathy detected by R-CPT values at all 3 frequencies.

**SUR567**

**Diabetic Foot Problems: Epidemiologic and Prognostic Factors**

**BCA LIN<sup>1</sup>, A NATHER<sup>1</sup>, BMC FENG<sup>1</sup>, CHJ ONG<sup>1</sup>, Z AZIZ<sup>1</sup>, SB CHIONH<sup>2</sup>**

<sup>1</sup>Orthopaedic Surgery, <sup>2</sup>Medicine, National University Hospital, Singapore

**Aims:** 1) To study the epidemiology of patients with diabetic foot problems (DFPs). 2) To evaluate prognostic factors determining the loss or salvage of limbs in patients with DFP. 3) To investigate the co-relation(s) of patient education with outcome (limb loss/salvage).

**Methods:** Two hundred patients with DFPs admitted to NUH from January 2002 to June 2005 were included in this study. The majority of patients were in the fifth and sixth decades of life. The ratio of males to females was 1:1.

**Results:** DFPs account for about 10% to 20% of emergency admissions in the

Department of Orthopaedic Surgery, NUH. Malays and Indians were more commonly affected. The majority of patients had poor control of diabetes (HbA1C). Common DFPs were gangrene, ulcer and abscess. Neuropathy and vasculopathy were present in more than 50% of the patients. The most common pathogens encountered were *pseudomonas aeruginosa*, *staphylococcus aureus* and *bacteriodes fragilis*.

**Conclusion:** Prognostic factors that determine proximal amputations included 1) type of diabetic foot problem, 2) comorbidities, 3) duration of diabetes, 4) control of diabetes, 5) risk factors, 6) complications of diabetes, and 7) type of pathogens encountered. Patient education on diabetic control, footcare and eye check showed that more of these are needed as they too play a vital role in determining limb loss/salvage.

#### SUR568

##### National University Hospital Multidisciplinary Team for Diabetic Foot Problems

A NATHER<sup>1</sup>, BY CUI<sup>1</sup>, SB CHIONH<sup>2</sup>, CCW LEE<sup>1</sup>, AH TORNG<sup>3</sup>

<sup>1</sup>Orthopaedic Surgery, <sup>2</sup>Medicine, <sup>3</sup>Administration, National University Hospital, Singapore

**Aim:** A multi-disciplinary team comprising an orthopaedic surgeon, an endocrinologist, an infection disease specialist, a podiatrist and specialist nurses was set up in NUH with the first author as leader.

**Methods:** A clinical pathway for diabetic foot problems (DFPs) was designed by the team and implemented. Weekly team rounds were conducted every Friday since May 2003. Monthly teaching sessions were conducted for healthcare professionals and doctors. The team conducted a symposium on DFPs on 25 October 2003 with good response (more than 90 participants). The first national and regional conference on DFPs was conducted on 19-20 November 2004 with 250 participants, including delegates from Malaysia, Indonesia, Hong Kong and India. Participants included nurses, general practitioners, physicians and surgeons.

**Results:** The formation of the NUH multidisciplinary team has changed the outcome of DRG 520: diabetic foot from a non-performing DRG in 2003 incurring losses of \$204,000 for that year to the third most profitable DRG in NUH for the period January to April 2004, bringing a profit of \$36,000 to NUH for that quarter.

**Conclusion:** The NUH multidisciplinary team has already set up the National Association for Diabetic Foot Problems with the first author as chairman, and the Asia-Pacific Association for Diabetic Foot Problems in November 2004, also with Nather as chairman. The secretariat of both associations is registered in NUH, Singapore. The objectives of both associations are to improve the management of patients with DFPs and reduce average length of stay, hospitalisation and below knee or above knee amputation rates.

#### SUR569

##### Strategies in Managing Diabetic Foot Problems — The NUH Experience

A NATHER<sup>1</sup>

<sup>1</sup>Orthopaedic Surgery, National University Hospital, Singapore

**Aim:** The objective of this paper is to outline our strategies in NUH to provide quality service for patients with diabetic foot problems (DFPs) – reduce major lower limb amputation rate, average length of stay, hospitalisation cost and readmission rate.

**Methods:** Strategies employed to address DFPs include: 1) formation of multi-disciplinary team (MDT), 2) launch of clinical pathway for DFPs, 3) running MDT ward round every Friday, 4) running specialised DFPs clinic every Wednesday, 5) providing comprehensive service for patients with DFPs e.g. primary treatment by orthopaedic surgeon, endocrine control by endocrinologist, infection control by infectious disease specialist, vascular assessment including ABI by podiatrists, neuropathy assessment including neurometer measurement, podiatric care, wound care by specialist nurses, footwear by orthotist (being developed), footcare education by podiatrist/nurses, diabetic care education by nurses, and improving primary healthcare for diabetics by providing education on diabetes and footcare.

**Results:** Improvements have been achieved since the MDT was formed and all these efforts were started. Major lower limb amputation rate were reduced from 31% to 20%. Average length of stay, hospitalisation costs and readmission rate were reduced.

**Conclusion:** More needs to be done to improve the care of patients with DFPs – a specialty of its own. It can be better served by the formation of a division for DFPs. Attention must also be focused towards improving primary healthcare for diabetics, especially education on diabetic care and footcare.

#### SUR570

##### Neuropathy as a Prognostic Factor for the Prevention of Proximal Amputations in Patients with Diabetic Foot Problems

CHJONG<sup>1</sup>, A NATHER<sup>1</sup>, SCF LIEW<sup>2</sup>, BMC FENG<sup>1</sup>, BC LIN<sup>1</sup>, Z AZIZ<sup>1</sup>

<sup>1</sup>Orthopaedic Surgery, <sup>2</sup>Medicine, National University Hospital, Singapore,

**Aim:** Little is known as to the effect of neuropathy on limb loss in patients with diabetic foot problems (DFPs). The presence of neuropathy, if found to be present, is significant since early treatment can be instituted, footcare education and protective footwear prescribed to prevent limb amputation. The objectives of this study were to compare the incidence of neuropathy detected by 3 modalities of testing — sensory testing using pin prick, monofilament testing and rapid current perception threshold (neurometer measurement) and to correlate neuropathy with limb loss in patients with DFPs.

**Methods:** Sixty patients with DFPs were seen in NUH between January and July 2005. The majority of patients were in the fifth and sixth decades of lives and had more than 10 to 20 years duration of diabetes. The methods of sensory testing, monofilament testing and neurometer assessments were described. Results were correlated with limb loss/ salvage in these patients.

**Results:** Monofilament, neurometer and sensory testing showed loss of protective sensation seen in majority of patients who presented with DFPs. Our results also showed that neurometer measurements could detect sensory neuropathy even earlier than monofilament testing and sensory testing using pin prick. Presence of neuropathy increased the chances of a patient developing foot ulcer, sepsis and other serious DFPs requiring an amputation.

**Conclusion:** Many patients are unaware that neuropathy is present clinically while monofilament testing reveals that it is already present. Our results show that neuropathy plays a significant factor in determining whether the limb is saved or lost.

#### SUR571

##### Pain Relief, Physical Function, and Safety Profile after Artificial Lumbar Disc Replacement (ADR) using Prodisc II for Lumbar Degenerative Disc Disease (DDD)

JN RUIZ<sup>1</sup>, HT HEE<sup>1</sup>, J THAMBIAH<sup>1</sup>, HK WONG<sup>1</sup>

<sup>1</sup>Orthopaedic Surgery, National University Hospital, Singapore

**Aim:** ADR is an emerging technology in the treatment of DDD. Reports focusing on clinical results and indications are few.

**Methods:** This is a single-centre prospective monitoring of outcomes (Visual Analogue Scale, Oswestry Score, SF-36), and complications in 34 patients after ADR. Twenty-six patients completed at least 12 months of follow-up (range, 12-30 months) and were used to analyse outcome measures over time (preoperative and at 3, 6, and 12 months postoperative). A blinded third party scored/analysed the SF-36 questionnaires. Repeated measures analysis (using mixed model technique, first order autoregressive) was used for statistical analysis. [Factors/predictors: occupation, previous spinal operation, asymptomatic “dark discs” not operated on, operated level(s).]

**Results:** As a group, there was significant improvement (VAS, Oswestry, and SF-36 — physical function, physical role limitations, pain, and social function domains) as early as 3 months post-operation and continued to improve before plateauing off. Analysis revealed differences when scores were compared between patients wherein asymptomatic discs were not operated on (diverging patterns of improvement as early as 6 months post operation). No implant had a range of motion of less than 5 degrees. There were no major complications noted. One patient underwent an adjacent-level

fusion 14 months post operation.

**Conclusion:** ADR is a safe procedure and benefits patients with DDD (maximum benefits noted in patients with single-level DDD). However, the operative indications are evolving. There may be a need to address all degenerate discs during the index operation because divergent patterns of improvement were noted between patients who had only a single "dark disc" and patients who had multiple "dark discs".

#### SUR572

##### Adolescents undergoing Surgery for Adolescent Idiopathic Scoliosis (AIS): Does the Surgical Procedure Affect Patient Satisfaction?

JN RUIZ<sup>1</sup>, HM HERNSTADT<sup>1</sup>, L LIM<sup>1</sup>, HK WONG<sup>1</sup>

<sup>1</sup>Orthopaedic Surgery, National University Hospital, Singapore

**Aim:** To compare patient outcomes after 2 types of surgical methods for AIS using the Scoliosis Research Society (SRS-24) questionnaire

**Methods:** The SRS-24 was used to evaluate patient-based outcomes in 2 groups of patients who underwent surgery as treatment for AIS. Patients underwent posterior fusion (group 1, n = 35) or thoracoscopic fusion (group 2, n = 35). Both groups had similar curve patterns (King-Moe Types 2 and 3) and the SRS-24 was administered at least 12 months post operation. They were then compared to another set of patients who had been scheduled for selective thoracic fusion (scoliosis control group, or Group 3) and to a group of patients who did not have AIS (normal control group, or Group 4). Statistical analysis using *t*-test was used to determine differences in the SRS-24 parameters.

**Results:** For the SRS-24 parameters, Group 1 scored significantly lower than Group 2 in the parameters of pain, postoperative self-image, postoperative function, and satisfaction (*P*)

**Conclusion:** Patients with AIS, who fulfil operative criteria and undergo scoliosis surgery, benefit by improving their self-image and seeing themselves similar to people who do not have scoliosis. Thoracoscopic surgery has the advantage of having better scores than posterior fusion using the SRS-24 as a gauge.

#### SUR573

##### Combined Modality Treatment for Lymphoepithelial Carcinoma of the Head and Neck — A Report of Four Cases

AEJ CHEAH<sup>1</sup>, DCS KOH<sup>2</sup>, CH LOW<sup>2</sup>, MLC KHOO<sup>3</sup>

<sup>1</sup>Orthopaedic Surgery, <sup>2</sup>Surgery, <sup>3</sup>Otorhinolaryngology, Tan Tock Seng Hospital, Singapore

**Aim:** Lymphoepithelial carcinomas (LECs) arising from non-nasopharyngeal sites of the head and neck are rare, and treatment strategies are not uniform. These tumours are histologically and behaviourally very similar to undifferentiated nasopharyngeal carcinoma, and likewise demonstrate a strong propensity for early nodal and distant metastasis, as well as a high sensitivity to radiotherapy. While radiotherapy is almost always indicated for treatment, the roles of surgery and chemotherapy are less well defined. We discuss the rationale behind each treatment combination, in particular, the choice of modalities and the sequence of delivery with the aim of producing a reasonable strategy for treating non-nasopharyngeal LECs of the head and neck.

**Methods:** We present 4 patients who were treated with a combination of modalities. One patient with a salivary LEC had surgery followed by adjunctive radiotherapy. Two patients with tonsillar LECs had radiotherapy upfront (1 with concurrent chemotherapy) followed by a planned neck dissection. The last patient with a locally recurrent salivary LEC following initial surgery alone had concurrent chemoradiotherapy followed by further salvage surgery.

**Results:** All 4 patients had complete response at the end of treatment and 3 remained disease-free (range, 11-94 months). Unfortunately, the patient with locally recurrent salivary LEC is awaiting surgery for solitary lung metastasis discovered after 23 disease-free months.

**Conclusion:** Surgery with adjuvant radiotherapy remains a good choice for salivary gland LECs, while radiotherapy with or without concurrent chemotherapy should be considered for LECs of the oropharynx. Salvage surgery is effective in treating local residual disease as well as the neck following radiotherapy.

#### SUR574

##### Effect of Anaesthesia Type on Limb Length Discrepancy Following Total Hip Arthroplasty

S SATHAPPAN<sup>1</sup>, D GINAT<sup>2</sup>, V PATEL<sup>2</sup>, W JAFFE<sup>2</sup>, P DICESARE<sup>2</sup>

<sup>1</sup>Orthopaedic Surgery, Tan Tock Seng Hospital, Singapore, <sup>2</sup>Orthopedics, Hospital for Joint Diseases, New York, USA

**Aim:** A frequent postoperative complication of total hip arthroplasty (THA) is limb length discrepancy (LLD). The potential consequences of LLD include patient dissatisfaction, postoperative limp, lower back pain, a need for shoe lifts, hip instability, neurological effects, medico-legal complaints, and/or revision arthroplasty. Because of the increasing preference for regional over general anaesthesia, there is now a greater possibility for overlengthening the limb, especially when soft tissue tension is used as a measure of intraoperative stability. The purpose of this study is to determine whether lengthening of the operated limb and medial offset following THA are more likely using spinal or general anaesthesia.

**Methods:** We performed a retrospective study on 132 patients (63 spinal anaesthesia and 69 general anaesthesia) undergoing THA by 4 fellowship-trained adult reconstructive surgeons to determine the influence of anaesthesia type on postoperative limb length and medial offset. Data analysis was done using Fisher exact test.

**Results:** LLD occurred in 87.0% of the patients who received regional anaesthesia as opposed to 47.6% of the patients who had general anaesthesia (*P* < 0.001). Differences in postoperative medial offset measurements between the 2 groups were not statistically significant.

**Conclusion:** The causes of limb lengthening following THA include functional lengthening (e.g., pelvic obliquity), component malpositioning (e.g., inferior placement of acetabular cup) and choice of anaesthesia. We conclude that the use of spinal anaesthesia for THA is associated with soft tissue laxity, which can increase the likelihood of excessive limb lengthening. Thus, preoperative templating should supersede intraoperative soft tissue tension tests to ensure limb length equalisation.

#### SUR575

##### Early Experience of Laser Stapedotomy in Otosclerosis

CM LIM<sup>1</sup>, GH CHEE<sup>1</sup>

<sup>1</sup>Otolaryngology – Head and Neck Surgery, National University Hospital, Singapore

**Aim:** The aim of this study was to evaluate the results of laser stapedotomy in patients with otosclerosis.

**Methods:** Retrospective chart review of all patients who underwent laser stapedotomy for otosclerosis in the Department of Otolaryngology — Head and Neck Surgery from July 2002 to November 2004 was performed. Three frequency, pure tone average air and bone conduction thresholds were computed before and after surgery. Success was defined as closure of the air-bone gap (AB gap) to within 10 dB and improvement was considered as closure of the AB gap to within 20 dB. Paired *t*-test was used for paired comparison analysis for the preoperative and postoperative audiogram findings. Criterion for statistical significance was set at *P* < 0.05, 2-tailed.

**Results:** A total of 25 laser stapedotomies were performed. The mean duration of the postoperative audiogram and follow-up period was 3.9 months (SD 3.1) and 5.1 months (SD 4.4) respectively. Successful closure of the AB gap was achieved in 17 (68%) patients and 7 (28%) patients had improvement of the AB gap. Hence, a total of 24 (96%) patients had their AB gaps improved to less than 20 dB. One patient developed a dead ear postoperatively which was attributed to an inner ear abnormality which was not identified preoperatively. Using paired *t*-test comparison analysis, the *P* value for the mean difference between the preoperative and postoperative AB

gap is statistically significant.

**Conclusion:** Laser stapedotomy is an effective treatment option in otosclerosis with a success rate of 96% from our early experience.

#### SUR576

##### Dural Sinus Thrombosis after Minor Head Injury in a Child

**HW YUEN<sup>1</sup>, BK GAN<sup>2</sup>, WT SEOW<sup>2</sup>, HKK TAN<sup>3</sup>**

<sup>1</sup>Otolaryngology – Head and Neck Surgery, National University Hospital, Singapore, <sup>2</sup>Neurosurgery, <sup>3</sup>Otolaryngology, KK Women's and Children's Hospital, Singapore

**Aim:** Dural sinus thrombosis following minor head injury is rare. We report such a case in a child after mild head injury.

**Methods:** A 4-year-old child presented with giddiness and vomiting after a fall. Clinical examination was unremarkable. Magnetic resonance venogram revealed thrombosis of the right sigmoid and transverse sinuses. The patient was managed conservatively.

**Results:** Repeat scans 10 weeks after injury showed recanalisation of the thrombosis.

**Conclusion:** Dural sinus thrombosis should be excluded in children presenting with persistent giddiness and vomiting after minor head injury.

#### SUR577

##### Synchronous Airway Lesions and Associated Anomalies in Laryngomalacia

**HW YUEN<sup>1</sup>, KK TAN<sup>2</sup>, A BALAKRISHNAN<sup>2</sup>**

<sup>1</sup>Otolaryngology – Head and Neck Surgery, National University Hospital, Singapore, <sup>2</sup>Otolaryngology, KK Women's and Children's Hospital, Singapore

**Aim:** To evaluate the safety and outcome of selective rigid endoscopy, and the significance of synchronous airway lesions (SALs) and associated anomalies in children with laryngomalacia.

**Methods:** Retrospective analysis of records of all children diagnosed with laryngomalacia who underwent rigid endoscopy over a 4-year period (group 1) was performed. Over the same period, the same number of children diagnosed with laryngomalacia but did not undergo rigid endoscopy evaluation were randomly selected from the outpatient database (group 2).

**Results:** There were 26 children in each group. The mean age of presentation was similar in both groups. In Group 1, 1 child (3.8%) required surgical intervention for severe isolated laryngomalacia. Seven children (26.9%) had at least 1 SAL identified. Of these, 6 (85.7%) were previously diagnosed on flexible fiberoptic laryngoscopy (FFL). Two of these children (7.7%) required surgical management of the SAL. Prematurity and anti-neutrophil cytoplasmic antibodies (ANCA) prolonged hospital stays of these children. However, the presence of SALs did not affect the length of hospital stay or the time to resolution of symptoms. Symptoms resolution occurred in all children by the first 3 years of life, whether SALs or ANCA were present. There was no adverse outcome in both groups.

**Conclusion:** Despite having indications for rigid endoscopy, many children with laryngomalacia do not have SALs, which even when present, are rarely clinically significant. SALs and ANCA do not impact the time to symptom resolution. The current indications for rigid endoscopy in the evaluation of laryngomalacia are safe and appropriate.

#### SUR578

##### Nasolabial Cyst — Diagnosis and Management

**HW YUEN<sup>1</sup>, JCY LEE<sup>2</sup>, SCL YEAK<sup>2</sup>**

<sup>1</sup>Otolaryngology – Head and Neck Surgery, National University Hospital, Singapore, <sup>2</sup>Otorhinolaryngology, Tan Tock Seng Hospital, Singapore

**Aim:** Nasolabial cysts are rare but easily diagnosed when they occur. The published literature on these cysts is limited to isolated case reports and the occasional series in the literature. No local data is available. This study

reviews our recent experience, examines the clinical and pathologic features of nasolabial cysts and provides a basis for diagnosis and treatment.

**Methods:** Retrospective review of patients with nasolabial cysts treated at the Department of Otorhinolaryngology, Tan Tock Seng Hospital between January 1999 and January 2004 was performed. Biodata, presenting symptoms, clinical features, pathological findings, preoperative investigations, treatment and outcome were analysed retrospectively in each case.

**Results:** Fourteen patients with nasolabial cysts were analysed. The features of adult onset, higher incidence in females and left-sided preponderance concurred with current literature. The diagnosis of nasolabial cyst was made clinically and was accurate in all cases. Preoperative computer tomography (CT) scan performed in 1 patient did not alter the management. All the patients underwent complete surgical excision of the lesions via the sublabial approach. Histopathologic examination revealed epithelial lining with pseudostratified, stratified, squamous, and simple cuboidal. None of the patients suffered any complication or recurrence.

**Conclusion:** Nasolabial cysts may be more common in the local population than reported in the literature. A high index of suspicion and awareness is vital for early diagnosis and management. Diagnosis based on clinical features is highly accurate. These lesions respond well to complete surgical excision.

#### SUR579

##### Emergency Tracheostomy for Acute Upper Airway Obstruction

**HW YUEN<sup>1</sup>, S JOHARI<sup>2</sup>, AHC LOY<sup>2</sup>**

<sup>1</sup>Otolaryngology – Head and Neck Surgery, National University Hospital, Singapore, <sup>2</sup>Otorhinolaryngology, Tan Tock Seng Hospital, Singapore

**Aim:** Treatment of a patient with acute airway obstruction is one of the most challenging problems in clinical medicine. The most common definitive surgical treatment is tracheostomy. However, tracheostomy under these circumstances is usually performed in haste and with considerable difficulty. This study aims to evaluate the indications, complications and outcome of emergency tracheostomy for acute airway control in a tertiary hospital.

**Methods:** A retrospective review was performed on data obtained from inpatient records, treatment and operative charts of patients who underwent emergency tracheostomy over a 4-year period from 2001 to 2004 at an urban tertiary medical centre.

**Results:** Seventy-four patients underwent emergency tracheostomy during this period. Orotracheal intubation was not feasible in many of these patients. All procedures were performed within 24 hours of ENT review. The majority (19 of 74 cases, 25%) were performed for obstructing head and neck cancers. Other indications include bilateral abductor paralysis (22.9%), deep neck infections (22.9%), epiglottic/supraglottic oedema (10.8%), and trauma (10.8%). One case was performed for unexpected failure of intubation by anaesthetists. All tracheostomies were performed using the standard open technique. Most cases were performed in the operating theatre except 2 cases which had to be done in the emergency department and 1 case by the bedside. Complications included 1 case of pneumothorax and 1 case of failed decannulation. No long-term complications were observed.

**Conclusion:** Acute airway obstruction from various causes is a common otolaryngologic emergency. Tracheostomy performed in this setting is fraught with danger. With experience, it is safe and life-saving.

#### SUR580

##### Surgical Treatment of Obstructive Sleep Apnoea: The Singapore Experience

**KP PANG<sup>1</sup>, P MOK<sup>1</sup>, J ABISHEGANANDEN<sup>2</sup>, YH LEE<sup>3</sup>, A SAURAJEN<sup>4</sup>, WS YAP<sup>2</sup>**

<sup>1</sup>Otorhinolaryngology, <sup>2</sup>Respiratory Medicine, Tan Tock Seng Hospital, Singapore, <sup>3</sup>Medicine, Alexandra Hospital, Singapore, <sup>4</sup>Ear, Nose and Throat, Mount Elizabeth Hospital, Singapore

**Aim:** To describe the stringent selection of patients for sleep apnoea surgery, from the patient's history, physical examination, radiological examination, polysomnographic (PSG) tests, surgical selection, to success criteria.

**Methods:** Eighty-five patients attended the combined sub-specialty sleep clinic from January 1998 to December 2003. All patients were strongly advised nasal continuous positive airway pressure (CPAP) therapy and many patients had dietician, bariatric, and orthodontic consults.

**Results:** Seventy-one patients with postoperative PSG had a total of 117 procedures performed. From strict patient selection, a 71.2% success rate after uvulopalatopharyngoplasty was attained. Sixty-seven per cent success rates were achieved with the combined uvulopalatopharyngoplasty and genioglossus advancement procedure. Three patients also underwent a transpalatal advancement pharyngoplasty with good results. Despite a higher proportion of severe OSA patients (62%) in this series, the overall success rate was 71.8% at phase I surgery, with AHI improving from a mean of 48.3 (preoperative) to 9.9 (postoperative,  $P < 0.0001$ ), and lowest oxygen desaturation improving from 79.6% to 88.1% ( $P < 0.0001$ ), with all patients maintaining a fairly stable body mass index.

**Conclusion:** This strict surgical philosophy helps in patient selection and yields better surgical results.

#### SUR581

##### Vasculopathy as a Prognostic Factor for the Prevention of Proximal Amputations in Patients with Diabetic Foot Problems

**A ERASMUS<sup>1</sup>, A NATHER<sup>2</sup>, MCB FENG<sup>2</sup>, BC LIN<sup>2</sup>, HJC ONG<sup>2</sup>, Z AZIZ<sup>2</sup>**

<sup>1</sup>Rehabilitation, <sup>2</sup>Orthopaedic Surgery, National University Hospital, Singapore

**Aim:** Diabetic foot problems (DFPs) account for about 10% to 20% of emergency admissions in the Department of Orthopaedic Surgery, NUH. Vasculopathy is associated with DFPs and is a common cause of amputations and poor healing of wounds. The aims of our study were 1) to evaluate the incidence of vasculopathy in patients with DFPs, 2) to investigate vasculopathy as a predictive factor for prevention of proximal amputations (below knee and above knee amputations), and 3) to evaluate the correlation between palpable pulses, ABI/TBI and waveforms with limb loss.

**Methods:** One hundred diabetic patients were admitted to NUH from January 2002 to June 2005. The average age was 58 years with a male to female ratio of 1:1. These patients with DFPs were assessed clinically for palpable dorsalis pedis, posterior tibial, popliteal and femoral pulse. Ankle brachial index (ABI) and toe brachial index (TBI) were measured for all patients wherever possible. The waveforms of the pulses were also recorded. Comparisons were made between the status of clinically palpable pulses, ABI and TBI measurements, and pulse waveforms with respect to the incidence of limb salvage.

**Results:** Presence of clinically palpable pulses was an important factor in the prevention of proximal amputations. Comparison of ABI and TBI results indicated that the ABI readings may not be reliable in diabetic patients. TBI was shown to be more reliable than ABI. Waveforms were shown to be useful in assessing blood flow quality.

**Conclusion:** Palpable pulse and ABI values alone are not enough to predict the healing potential of the diabetic foot. Cutaneous perfusion is important for wounds to heal and this can be assessed with TBI.

#### SUR582

##### Laparoscopic Gastric Banding for Severe Obesity — The First 200 Patients from the Alexandra Hospital Bariatric Surgical Program

**T LEESE<sup>1</sup>, G RAMALINGAM<sup>1</sup>, A RAO<sup>1</sup>, H BALADAS<sup>2</sup>**

<sup>1</sup>Surgery, Alexandra Hospital, Singapore, <sup>2</sup>Surgery, Raffles Hospital, Singapore

**Aim:** Severe obesity is on the increase in Singapore. In May 2005, our 200th patient underwent laparoscopic gastric banding. To assess the effectiveness of the programme, we analysed the outcome of the first 100 patients with 7.5-mL gastric pouches. All had completed at least 1 year of postoperative follow-up.

**Methods:** A prospective database of our patients, which included detailed follow-up, was used for this study.

**Results:** The mean age of the patients was 37.2 years (range, 18-55 years). There were 64 females and 36 males. The mean patient weight was 114.6 kg and the mean BMI was 42 (range, 32.5 to 72). Operating time was a mean of 1.84 hours. 85% of patients were allowed to go home the day after surgery. One patient was converted to open surgery and 4 patients required revision surgery. There was 1 late death due to acute myocardial infarction 53 weeks after surgery. Mean weight loss over the first year was 0.52 kg/week (27.3 kg at 1 year). A mean of 56.4% of excess weight was lost in the first year taking a BMI of 23 as the baseline. Only 5% of the patients failed to lose at least 25% of their excess weight. Comorbidities such as diabetes and hypertension improved or resolved in 85% of the patients.

**Conclusion:** There is a clear and growing demand for bariatric surgery in Singapore. It is the only method of effective, lasting weight loss with improvement/resolution of comorbidity. Laparoscopic gastric banding achieves the weight loss seen with more complex bariatric surgical procedures with lower morbidity and mortality.

#### SUR583

##### Laparoscopic Adjustable Gastric Banding — 100 Consecutive Cases in Singapore

**SK MANTOO<sup>1</sup>, HG BALADAS<sup>2</sup>**

<sup>1</sup>Surgery, Alexandra Hospital, Singapore, <sup>2</sup>Surgery, Raffles Hospital, Singapore

**Aim:** In Singapore, overweight, obesity and clinically severe obesity are reported to be about 25%, 6% and 1.6% respectively. Asians have a higher percentage of body fat for any given BMI by 3 kgm<sup>-2</sup>. Thus in Asian patients, clinically severe obesity is defined as a BMI from 32.0 to 36.9 kgm<sup>-2</sup> with comorbidities and morbid obesity as a BMI >37.0 kgm<sup>-2</sup>. Our centre first performed laparoscopic adjustable gastric banding in January 2001.

**Methods:** Our senior surgeon (HGB) has performed just over 200 gastric bands since 2001. One hundred consecutive cases of 10-cm and Vanguard Lapband (Inamed Health, Santa Barbara, CA) with a 7.5-mL pouch, pars flaccida technique are reviewed retrospectively.

**Results:** M:F = 36:64%; average age (years): 37.2 ± 9.42; average weight (kg): 114.6 ± 20.3; average height (m): 1.65 ± 0.09; average BMI (kgm<sup>-2</sup>): 42.0 ± 5.9; average operation duration (h): 1.84 ± 0.48; average follow-up (weeks): 40.8 ± 29.5; weight loss and comorbidities weight loss at 52 weeks (kg): 27.3 ± 12.1; BMI loss at 52 weeks (kgm<sup>-2</sup>): 9.6 ± 4.0; %EWL\* at 52 weeks: 54.6 ± 22.1; diabetes (NIDDM): 80% cured or improved post-operation; hypertension: 86% cured or improved post-operation.

**Conclusion:** There is good weight loss, BMI loss, and percentage excess weight loss at 52 weeks. Good resolution or improvement of NIDDM (80%) and hypertension (86%). Lapband is effective in the Asian context.

#### SUR584

##### Laparoscopic Adjustable Gastric Banding after the VLCD: Is it Easier?

**AD RAO<sup>1</sup>, G RAMALINGAM<sup>1</sup>**

<sup>1</sup>Surgery, Alexandra Hospital, Singapore

**Aim:** Laparoscopic adjustable gastric banding (LAGB) is a worldwide accepted bariatric surgical procedure, and is used in an increasing number of patients. However, it can be very difficult in superobese patients with body mass index (BMI) greater than 50. Much interest has been generated recently in performing the LAGB operation after an initial programmed weight loss with the use of the very low calorie diet (VLCD). We sought to analyse the impact of the VLCD on the technical difficulties during the LAGB.

**Methods:** We evaluated prospectively, the technical difficulties for a single dedicated bariatric surgeon during the LAGB in 2 groups of patients. Patients operated on after 6 weeks on a VLCD diet (group A, n = 5) and patients on no diet (group B, n = 5). The 2 groups had similar BMI at operation. The technical difficulties for 5 key steps during the LAGB were graded by 3

individuals who were blinded with regard to the patient group (1 = 1st surgeon, 2 = 2nd surgeon, 3 = observer). Cumulative values for each step and BMI level in the two groups were analysed by the Wilcoxon signed rank test.

**Results:** All 3 independent observers' gradings of technical difficulties were lower in group A ( $P < 0.05$ ) overall as well as for each BMI value.

**Conclusion:** Our results are consistent with those of other bariatric centers. VLCD is a very useful tool to make the LAGB procedure easier in the superobese patients.

#### SUR585

##### Exsanguinating Haemorrhage Following Gastric Erosion after the Adjustable Gastric Banding: Report of a Case

**AD RAO<sup>1</sup>, G RAMALINGAM<sup>1</sup>**

<sup>1</sup>*Surgery, Alexandra Hospital, Singapore*

**Aim:** Laparoscopic gastric banding has of late become the number one procedure in bariatric surgical practice. Gastric erosion is one of the most dreaded complications.

**Methods:** We present a case of patient who complained of persistent pain after gastric banding. Endoscopy revealed a normally placed band which was also confirmed on upper GI imaging. In spite of this, the patient subsequently presented with exsanguinating GI haemorrhage and circulatory collapse, which necessitated emergent laparotomy with the retrieval of the band from within the gastric lumen.

**Results:** This case highlights the possible urgent presentation of erosion after gastric banding which was hitherto understood to be essentially insidious and a high index of clinical suspicion remains the mainstay of diagnosis.

**Conclusion:** As international experience with this procedure is increasing and initial reports of long-term follow-up are expected in literature, it becomes mandatory to evaluate this complication in detail with possible methods of prevention and early salvage. The authors are of the opinion that an international consensus must be available on the actual incidence of early and late migration with very good guidelines in its diagnosis and management.

#### SUR586

##### Endoscopic "Lasso" Technique to Extract a Large Rectosigmoid Foreign Body

**RM SINGAPOREWALLA<sup>1</sup>, D TAN<sup>1</sup>, TK TAN<sup>1</sup>**

<sup>1</sup>*Surgery, Alexandra Hospital, Singapore*

**Aim:** Rectal foreign bodies are common and various shapes and sizes have been described in literature. Large objects impacted high in the rectosigmoid junction pose a challenge for endoscopic extraction. We describe a method that successfully removed a 15 cm x 6 cm x 3.5 cm shampoo bottle impacted in the rectosigmoid junction.

**Methods:** A 50-year-old bachelor had passed a shampoo bottle through his anus into the rectum. Rectal examination revealed a lax sphincter but the bottle could not be felt. Contrast X-rays showed a well-delineated bottle in the rectosigmoid junction with no evidence of bowel perforation. A flexible sigmoidoscope was used under sedation to extract the foreign body transanally. Once the bottom end of the shampoo bottle was visible, a snare was passed around the circumference and tightened. Gentle downward traction brought bottle down. The snare was reapplied proximally to prevent slippage. As the bottle was maneuvered into the lower rectum, a grasping forceps was passed transanally to hold the bottle and deliver it out.

**Results:** A check sigmoidoscopy after extraction showed no bleeding or perforation. The patient was discharged the next day after counselling.

**Conclusion:** This technique is a safe, feasible, and less morbid method for extracting large recto-sigmoid foreign bodies in the absence of perforation. It should be the first step in management of such patients before attempting open surgery.

#### SUR587

##### Small Bowel Obstruction due to Obturator Hernia: Computed Tomography Diagnosis

**RM SINGAPOREWALLA<sup>1</sup>, N DUBEY<sup>2</sup>, D TAN<sup>1</sup>**

<sup>1</sup>*Surgery, <sup>2</sup>Diagnostic Radiology, Alexandra Hospital, Singapore*

**Aim:** Obturator hernia is a rare type of abdominal hernia which remains a significant cause of intestinal obstruction in the elderly emaciated individual. Clinically the problem lies in establishing an early preoperative diagnosis and mortality is high with delayed treatment. Computerised tomography (CT) of the abdomen may improve the outcome by providing a definitive diagnosis for early treatment.

**Methods:** A 76-year old lady presented with a 4-day history of abdominal distension. On examination, she was frail and emaciated. The abdomen had features of ileus. The hernial orifices were clinically normal. Abdominal X-rays showed multiple air fluid levels in the small bowel. Initial treatment with intravenous fluids and nasogastric decompression failed and a contrast-enhanced CT scan of the abdomen was performed.

**Results:** CT revealed dilated fluid filled small bowel loops down to the left pelvis. A transition zone with a knuckle of small bowel caught between the left pectineus and obturator externus muscle was clearly seen. This finding was pathognomonic of small bowel obstruction secondary to an obturator hernia. Laparotomy revealed a classical Richter's hernia within the left obturator foramen. The knuckle of bowel was strangulated, requiring a limited small bowel resection. The dilated foramen was closed with interrupted sutures. The patient made an uneventful recovery.

**Conclusion:** CT findings help in the definitive diagnosis of obturator hernia. In the elderly emaciated individual, an early CT diagnosis of obturator hernia will prevent delays in initiating surgical treatment and improve the overall outcome.

#### SUR588

##### Radiological Appearances in Peliosis Hepatis

**RM SINGAPOREWALLA<sup>1</sup>, MJ CLARKE<sup>2</sup>, K MAK<sup>1</sup>**

<sup>1</sup>*Surgery, <sup>2</sup>Diagnostic Radiology, Alexandra Hospital, Singapore*

**Aim:** Peliosis hepatis is a rare benign condition characterised by multiple cystic, blood-filled spaces in the liver. Although the cause is unknown, it is associated with several diseases and medications. Its importance is that it can be mistaken for liver metastases, cirrhosis or liver abscesses. We report a case of peliosis hepatis initially misdiagnosed as liver metastases.

**Methods:** A 67-year-old Chinese male was presented with right hypochondriac pain and mildly deranged liver function. Initial ultrasound showed a diffuse heterogeneous coarse echotexture and irregular contour suggestive of possible liver secondaries. The gallbladder and bile ducts were normal. A triphasic contrast enhanced CT liver demonstrated a heterogeneous reticulated appearance of the liver during the portal venous phase. The parenchyma appeared nearly uniform on the arterial and delayed scans. MRI liver showed a heterogeneous signal diffusely within the liver. During the arterial phase, numerous poorly defined small enhancing nodules were identified. During the portal venous phase, a heterogeneous, reticulated nodular pattern of the liver was noted. The delayed phase showed the liver parenchyma has a more uniform iso-intense appearance. A diagnostic ultrasound guided core needle biopsy of the right lobe was performed.

**Results:** The CT and MRI findings are consistent with other published reports of peliosis hepatis. Histology showed irregular sinusoidal dilatation and endothelial proliferation. There is no evidence of malignant hepatocytes or extramedullary haemopoietic elements. Portal tracts were present and showed mild ductular reaction.

**Conclusion:** Peliosis hepatis must be differentiated from other more life-threatening liver disorders. A combined assessment of ultrasound, CT and MRI findings coupled with final histology helps in the definitive diagnosis.



**SUR589**

**Carcinoma within Fibroadenoma in Young Females**

**SA BUHARI<sup>1</sup>, JSH LAM<sup>2</sup>, TC PUTTI<sup>3</sup>**

<sup>1</sup>*Surgery, National University Hospital, Singapore, <sup>2</sup>National University Medical Institute, National University of Singapore — Yong Loo Lin School of Medicine, Singapore, <sup>3</sup>Pathology, National University Hospital, Singapore*

**Aim:** Fibroadenoma is a benign tumour of the breast. Rarely, it may harbour a carcinoma and is indistinguishable from a common benign fibroadenoma. Reported cases arise mainly in middle-aged patients.

**Methods:** We present a small series of ductal carcinoma in situ (DCIS) in young patients below 40 years old. All patients presented with clinically benign lumps. Both breast imaging and core biopsy had features suggesting that these lumps may not be completely benign. Hence, excision biopsy was carried out.

**Results:** The histology was not clear-cut. Immunohistochemistry (IHC) using cytokeratin markers were employed to establish the diagnosis of DCIS with fibroadenoma. As there is insufficient data on the behaviour of these tumours, all were treated like the usual DCIS, with wide excision.

**Conclusion:** Although fibroadenoma is benign and can be left alone if proven on imaging and histology, excision should be recommended if there is any unusual feature, regardless of age. Diagnosis is not easy and may require IHC. Treatment is in line with the usual DCIS.

**SUR590**

**Management of Fibromatosis of the Breast**

**SA BUHARI<sup>1</sup>, APH TANG<sup>1</sup>**

<sup>1</sup>*Surgery, National University Hospital, Singapore*

**Aim:** Fibromatosis of the breast is a locally invasive tumour of the breast. Although uncommon, there have been several case reports on presentation pathology and treatment, but data on long-term follow-up and local recurrence are lacking. Treatment strategies and long-term surveillance are extrapolated from desmoid tumours found at other sites or on other soft tissue tumours.

**Methods:** We present the clinical findings, investigation, treatment and long-term follow-up (median 13 years) on 8 patients with fibromatosis. Five patients with local recurrence had their histology and surgical margins reassessed. Surveillance and treatment of local recurrence are discussed.

**Results:** Wide excision alone is an adequate treatment. However, surgical margin involvement is invariably associated with recurrence. Complete excision of local recurrence does not appear to further increase recurrence or affect survival.

**Conclusion:** These findings confirm the aggressive nature of the tumour, and hence necessitating excision with wide margin. Once a good margin is achieved, this disease is curable. We also propose a treatment and follow-up plan based on the pattern of local recurrence.

**SUR591**

**Comparison Between Polyester (Parietex) and Polypropylene Mesh with Fixation in Total Extraperitoneal Hernia Repair**

**E CU<sup>1</sup>, WK CHEAH<sup>1</sup>, J SO<sup>1</sup>, D LOMANTO<sup>1</sup>**

<sup>1</sup>*Surgery, National University Hospital, Singapore*

**Aim:** Polypropylene mesh is widely used in total extraperitoneal (TEP) hernia repair. To avert mesh migration some form of fixation is used. The aim of this study was to compare the result of polyester (Parietex<sup>®</sup>) mesh alone with polypropylene (Prolene<sup>®</sup>) mesh with fixation.

**Methods:** Between 2002 and 2005, 127 consecutive patients underwent TEP repair. 60 used Parietex while 67 used Prolene with fixation (Protack<sup>®</sup> or Endoanchor<sup>®</sup>). Their respective outcomes, operative time, hospital stay, pain score, immediate and late complications were compared.

**Results:** The mean age was 50 years (19 to 85 years) and M:F ratio was 122:5. The Prolene and Parietex groups were compared for mean operative time (74 vs 86 min), mean hospital stay (31 vs 33 hours), both statistically insignificant.

The highest pain score during admission and at discharge were comparable for both groups. The mean follow-up for both groups was 6 months. The Prolene and Parietex groups were compared for immediate (16% vs 13%) and late (14% vs 9%) complication rate. The difference was statistically insignificant. Our early complications included haematoma (19.64% vs 13.46%) and bleeding port site (0% vs. 1.92%). Late complications included seroma/haematoma (9.23% vs 6.90%), ischaemic orchitis (1.54% vs 0%), numbness/paresthesia (1.54% vs. 0%) and port site infection (1.54% vs 0%). No recurrence or mesh infection was observed in either group.

**Conclusion:** For TEP hernia repair, Parietex mesh is equally effective as the Prolene mesh with fixation with regard to operating time, hospital stay, pain score and complications.

**SUR592**

**Right and Left Laparoscopic Adrenalectomy: The Learning Curve for Conn's Syndrome**

**J DOMINO<sup>1</sup>, WK CHEAH<sup>1</sup>, D LOMANTO<sup>1</sup>, A RAUFF<sup>1</sup>**

<sup>1</sup>*Surgery, National University Hospital, Singapore*

**Aim:** Laparoscopic adrenalectomy (LA) has become the procedure of choice for Conn's tumours. Several studies stated different learning curves for LA. Due to the anatomical difference and surgical approach, there may be a difference in the learning curve between the right and left LA. The aim of this study was to compare the learning curve between the 2 sides and to determine if the size, weight of the gland and tumour size can influence operative time (OT).

**Methods:** Forty-two patients underwent LA in our institution from the year 2001 to 2005. Of these, only 32 cases with Conn's syndrome were included. The operative time, size of the tumour, size and weight of the gland were recorded separately for the right and left sides.

**Result:** The study group of 32 patients had a mean OT of 101 min. However, results of the 2 sides showed the right LA had a mean of 110 min and left was 95 min. There was no significant difference ( $P = 0.622$ ) between the 2 sides with regard to their learning curves. The mean size of the gland and tumour was 5.8 cm and 1.95 cm, respectively, while the mean weight of the gland was 11.55 g. Only the weight of the gland showed a significant predictor (multiple linear regression analysis).

**Conclusion:** The right LA showed a higher OT than the left in this study. However, the right has a shorter learning curve (8-9 cases) than the left LA (12-13 cases). This study also showed that only the weight of the gland has influenced the OT of both sides of LA.

**SUR593**

**Acute Acalculous Cholecystitis (AAC): Challenging the Myths**

**SG IYER<sup>1</sup>, EHUANG<sup>1</sup>, MK MOHAMMED<sup>1</sup>, RDIDDAPUR<sup>1</sup>, JRISAAC<sup>1</sup>**

<sup>1</sup>*Surgery, National University Hospital, Singapore*

**Aim:** Traditionally, AAC is a disease commonly seen in critically ill patients with high rates of morbidity. We observed several patients presenting from the community with acute cholecystitis without stones with no severe comorbid conditions.

**Methods:** A retrospective review of all patients with acute cholecystitis who underwent surgery from January 2001 to May 2005 (133 patients), revealed 11 patients (7.5%) with AAC. All patients were below 70 years of age, 7 patients were below 60 years and there were 9 males and 2 females in this study. The most common comorbid condition was hypertension (n = 2) and overall, 4 patients had no comorbidities. No patient was critically ill or from the ICU. Most patients presented with right upper outer quadrant abdominal pain and only 3 had associated fever at presentation. Five patients underwent laparoscopic and 6 had open cholecystectomy. Six patients had gangrenous gall bladder at surgery. Most patients underwent surgery within 72 hours of presentation to the hospital and were discharged within 6 days of surgery. No major morbidity or mortality was seen.

**Results:** Acalculous cholecystitis accounts for approximately 10% of all cases of acute cholecystitis and is associated with high morbidity and

mortality and is seen in critically ill patients in ICU setting. Our series demonstrated that the traditional myths about AAC are unfounded and we may see these cases in community setting.

**Conclusion:** AAC may be seen in patients from the community. It is possible that the presentation, morbidity and mortality may be no different from acute calculous cholecystitis.

#### SUR594

##### Laparoscopic Cholecystectomy in Severe Cardiac Disease: Extending the Boundaries

SG IYER<sup>1</sup>, MK MOHAMMED<sup>1</sup>, R DIDDAPUR<sup>1</sup>

<sup>1</sup>Surgery, National University Hospital, Singapore

**Aim:** Laparoscopy in patients with poor cardiac function has been the subject of controversy and is considered by many surgeons a relative contraindication.

**Methods:** We report the case of a 70-year-old man with severe irreversible ischaemic heart disease and atrial fibrillation presented with acute cholecystitis. The patient had poor cardiac ejection fraction (25%) and was on anticoagulation. Conservative treatment with antibiotics failed, following which he underwent laparoscopic cholecystectomy with low-pressure pneumoperitoneum and close perioperative haemodynamic monitoring with transesophageal echocardiography.

**Results:** Poor cardiac function is a relative contraindication to laparoscopic surgery due to added adverse haemodynamic effects of pneumoperitoneum. The perioperative management issues including anticoagulation are discussed.

**Conclusion:** Patients with severe cardiac diseases can be offered the benefits of minimally invasive surgery with careful management of perioperative hemodynamic status.

#### SUR595

##### Laparoscopic Repair of Large Ventral Hernias: Feasibility and Risk Reduction Strategies

SG IYER<sup>1</sup>, JBY SO<sup>1</sup>, WK CHEAH<sup>1</sup>, D LOMANTO<sup>1</sup>

<sup>1</sup>Surgery, National University Hospital, Singapore

**Aim:** Since its introduction in 1992, laparoscopic incisional hernia repair has revolutionised the management of ventral hernia. To date, the laparoscopic approach has achieved better outcomes than the open approach. We present a series of large ventral hernias treated with laparoscopic approach.

**Methods:** This was a prospective study of large ventral hernias (>100 cm<sup>2</sup>) treated with laparoscopic repair. Twenty-five patients (21 F/4 M) with a mean age of 58 years (range, 30-83 years) underwent laparoscopic repair of large ventral hernias (5 primary and 20 incisional). Laparoscopic repair was performed using 3 trocars placed laterally to the abdominal wall. Intraperitoneal onlay mesh (IPOM) technique was utilised with both transfascial suture and spiral staplers for fixation of composite mesh.

**Results:** Risk reduction strategies to prevent complications were utilised accordingly (adequate preoperative evaluation and preparation; open entry; careful adhesiolysis using ultrasound shears; use of composite mesh; double methods fixations; postoperative pressure dressing and abdominal binder). The mean duration of operation was 95 min (range, 35-180 min); postoperative stay was 2.56 days (range, 1-5 days). The mean follow-up was 24 months (95% CI 17.7 to 28.8 months) and 1 recurrence (4%) was observed during the follow-up period. There were no deaths but there was 1 major complication of bowel injury. There were 3 seromas (12%) and 1 wound infection (4%). One patient required the removal of the mesh.

**Conclusion:** In conclusion, laparoscopic seems to be feasible, safe and effective method for treatment of large ventral hernias in our experience

#### SUR596

##### T2 versus T2, T3 Ablation in Thoracoscopic Sympathectomy for Hyperhidrosis

A KATARA<sup>1</sup>, WK CHEAH<sup>1</sup>, D LOMANTO<sup>1</sup>

<sup>1</sup>Surgery, National University Hospital, Singapore

**Aim:** Thoracoscopic sympathectomy is popularly performed for patients with palmar hyperhidrosis. Surgeons vary worldwide in the level of the sympathetic nerves ablated. Our aim was to prove that ablation of the second thoracic sympathetic nerve (T2) is as effective as of ablation of levels T2 and T3.

**Methods:** In our series of 80 patients undergoing bilateral thoracoscopic sympathectomy for palmar hyperhidrosis, 15 patients had unilateral T2 and T3 ablation followed by contralateral ablation of T2 level only. Patients were followed up for a mean period of 22.6 months (range, 2-65 months). The patients were analysed for comparison of symptoms bilaterally, compensatory hyperhidrosis and levels of satisfaction postoperatively.

**Results:** Our study group consisted of 15 patients with a male: female ratio of 3:2 and a mean age of 31.93 years (range, 19 to 50 years). All 15 patients confirmed that their palmar sweating resolved postoperatively, both palms being equally dry. Thirteen out of 15 (86.66%) patients complained of compensatory hyperhidrosis (54% mild, 46% moderate) in other parts of the body, which was also bilaterally symmetrical. The areas involved were the trunk (80%), lower limbs (33.33%) and armpits (13.33%). Overall, 80% were very satisfied with the procedure, 20% were satisfied with mild to moderate compensatory hyperhidrosis not affecting their lifestyle. None were dissatisfied with the procedure.

**Conclusion:** T2 ablation in thoracoscopic sympathectomy for palmar hyperhidrosis is equally effective as ablation of T2 and T3 levels in terms of outcome, recurrence and compensatory hyperhidrosis.

#### SUR597

##### Initial Experience of Laparoscopic Fundoplication for Gastroesophageal Reflux Disease in Singapore

CCL LAU<sup>1</sup>, WK CHEAH<sup>1</sup>, D LOMANTO<sup>1</sup>, JBY SO<sup>1</sup>

<sup>1</sup>Surgery, National University Hospital, Singapore

**Aim:** In Asia, laparoscopic fundoplication is an uncommon procedure and only a few series have been reported. We review our experience and results of laparoscopic anti-reflux surgery over a 5-year period.

**Methods:** Between 2000 and 2005, 12 patients underwent laparoscopic funduplications at our institution. Medical records were reviewed and phone interviews were conducted to assess functional outcome and patient satisfaction. Follow-up time averaged 15 months (1 to 54 months).

**Results:** The mean age was 41 years (27 to 56 years). Five patients underwent nissen funduplications, and 7 underwent partial funduplications (3 Toupet and 4 anterior hemifundoplication). No intraoperative complications were experienced. Median operation time was 164 min (range, 125 to 215 min). One patient required conversion to open fundoplication due to intra-abdominal adhesions. One had para-oesophageal hernia requiring re-laparoscopy on the first postoperative day and 1 developed transient gastroparesis necessitating temporary tube feeding. 60% (3 out of 5) who underwent nissen fundoplication developed dysphagia in the immediate postoperative period, compared to 14% (1 out of 7) who underwent partial fundoplication. 44% of patients did not require anti-reflux medication use following fundoplication. 77% of patients assessed their outcome as good to excellent. 89% of them would undergo fundoplication in retrospect.

**Conclusion:** Early experience with laparoscopic funduplications in Singapore demonstrated favourable results. Notably, results suggest that a higher percentage of patients who underwent nissen funduplications developed dysphagia compared to patients who underwent partial funduplications.

**SUR598**

**Reoperation in Adult with Choledochal Cyst: A Case for Complete Excision of Intrapancreatic Portion**

**J OH<sup>1</sup>, SG IYER<sup>1</sup>, J ISAAC<sup>1</sup>**

<sup>1</sup>*Surgery, National University Hospital, Singapore*

**Aim:** Complications often follow if a choledochal cyst is treated by incomplete resection in childhood. We describe a rare case of remnant choledochal cyst in intrapancreatic portion of bile duct following previous surgical excision. The clinical presentation, the diagnostic work-up and strategies of surgical resection are described.

**Methods:** A 30-year-old Chinese lady who had 2 previous operations for choledochal cyst was presented to the emergency department with septic shock. Investigations revealed a large cystic structure noted at the region of the distal common bile duct and pancreatic head likely to represent remnant of choledochal cyst that has re-expanded. She underwent an endoscopic drainage of cyst followed by complete surgical excision.

**Results:** Residual cyst in the intrapancreatic portion may give rise to complications in later life. Complications may be in the form of cancers, stones, cholangitis and pancreatitis.

**Conclusion:** A complete excision of intrapancreatic portion should be performed in patients undergoing choledochectomy for choledochal cysts.

**SUR599**

**A Case of Using Non-surgical Treatment of Superior Mesenteric Artery (SMA) Aneurysms**

**J OH<sup>1</sup>, JY SEE<sup>1</sup>, SA BUHARI<sup>1</sup>**

<sup>1</sup>*Surgery, National University Hospital, Singapore*

**Aim:** SMA aneurysms are rare and have the potential to cause significant mortality and morbidity if not treated promptly. To date, clinicians have used surgical intervention as the primary means of treatment. We report a case of SMA aneurysm that responded well to radiological coiling of the aneurysm.

**Methods:** A 25-year-old Malay male, a known IV drug user, presented with symptoms of a cerebral infarct. Subsequent investigations revealed that he had bacterial endocarditis for which valvular surgery was performed. Three weeks post-operation, he complained of abdominal pain where a CT showed 2.4 cm x 3cm SMA aneurysm with some splenic infarcts. Given the risk of another laparotomy, a decision was made to attempt to treat the aneurysm with interventional radiology rather than surgical repair.

**Results:** Under the angiographic guidance, coiling of the SMA aneurysm was performed successfully, which stopped further blood flow to the aneurysm. The patient responded to this treatment and abdominal symptoms were resolved.

**Conclusion:** To the best of our knowledge, there have only been a few cases of non-surgical treatment for SMA aneurysms. We strongly believe that conservative management may be the future trend in dealing with this.

**SUR600**

**Adult Choledochal Cyst: Our Experience from 1995-2004**

**JY SEE<sup>1</sup>, JEH KUA<sup>1</sup>, RK DIDDAPUR<sup>1</sup>, JR ISAAC<sup>1</sup>, K MAK<sup>1</sup>, HR SIDHU<sup>1</sup>**

<sup>1</sup>*Surgery, National University Hospital, Singapore*

**Aim:** Choledochal cysts are infrequent anomalies of the biliary tree that occur more commonly in Asian, female, infant patients. However, they are recently recognised with increasing frequency in adults. There are 5 types of choledochal cysts. We report our experience with adult choledochal cysts during the last 10 years.

**Methods:** Twenty-three patients with choledochal cysts were managed in our centre from the years 1995 to 2004. There were 9 adult patients aged 19 years and above (36.4%). There were 4 males and 5 females. Seven had type I and 2 had type IV-A cysts. Presenting complaints include non-specific abdominal pain, cholangitis and jaundice. US, CT scan, ERCP, MRCP and intraoperative

cholangiography were used to make the diagnosis. Choledochal cystectomy, cholecystectomy and Roux-Y hepaticojejunostomy were performed on all 9 patients. One of these patients was previously treated unsuccessfully by internal drainage procedures.

**Results:** There was no operative mortality. One patient had wound infection and 1 developed adhesion colic. The 2 patients with type IV-A cysts subsequently developed recurrent episodes of cholangitis. No cholangiocarcinoma has been encountered in our patients after a mean follow-up of 3.7 years from the time of diagnosis.

**Conclusion:** Abdominal pain is the most common presentation in the adult. MRCP is noninvasive and displays ductal anatomy well without risk of pancreatitis. Partial cyst resection and internal drainage is less satisfactory because of risk of cholangitis, pancreatitis and cholangiocarcinoma. Complete excision of the choledochal cyst where possible with Roux-en-Y hepaticojejunostomy is the treatment of choice and it can be performed with low operative morbidity.

**SUR601**

**Sentinel Node Biopsy for Breast Cancer: Experience at National University Hospital, Singapore**

**JY SEE<sup>1</sup>, PW HO<sup>1</sup>, A SHAIK<sup>1</sup>, P IAU<sup>1</sup>**

<sup>1</sup>*Surgery, National University Hospital, Singapore*

**Aim:** Sentinel lymph node biopsy (SLNB) is known to have a sampling error of about 3% to 6%. From January 2002 until January 2005, we performed 90 SLNB for breast cancer to validate the SLN concept (identification rate 98%; false negative rate: 4%).

**Methods:** Between January 2002 and January 2005, 90 patients underwent SLNB under general anaesthesia. Preoperative 5 mL of patent blue (5 min before incision) were injected intra-dermally periareolarly. The SN was identified intraoperatively by visual inspection of a blue duct leading to a blue node. After excision histopathological examination including immunohistochemistry was performed. All positive SLNB were followed by an axillary dissection up to level 2.

**Results:** In 87/90 patients (96.7%), at least 1 sentinel node was found. In 65/90 patients (72.2%), the sentinel node was negative on both FS and IHC. Of these 65 patients who were SLNB-negative, they were randomised to 39 without ALND and 26 with ALND. Only 1/26 of the patients with SLNB negative who underwent ALND was found to have axillary involvement (false negative rate of 4%). Of the remaining 25/90 patients whose SLNB was positive on FS or IHC, ALND was performed; 9/25 were positive (36.0%)

**Conclusion:** Our experience with identification rate of 96.7% and false negative rate of 4% is in concordance with the identification rate of 98% and false negative rate of 4% published in the literature.

**SUR602**

**Role of Axillary Lymph Node Dissection in Breast Cancer Patients with Micrometastatic Sentinel Lymph Nodes**

**JY SEE<sup>1</sup>, PW HO<sup>1</sup>, A SHAIK<sup>1</sup>, P IAU<sup>1</sup>**

<sup>1</sup>*Surgery, National University Hospital, Singapore*

**Aim:** As the sentinel lymph node (SLN) biopsy has become the standard procedure for the axillary treatment of breast cancer patients and allows focused pathologic analysis, the chance of detecting micrometastases is increasing. The need for complete axillary lymph node dissection (ALND) for the patients whose SLNs prove micrometastases has not been determined yet. In this study, we retrospectively reviewed the patients with micrometastatic SLNs and evaluated the role of ALND in this population.

**Methods:** Between January 2002 and January 2005, 90 clinically node-negative breast cancer patients underwent SLNB under general anaesthesia at our institution. Preoperative 0.5 cc of patent blue (5 min before incision) was injected intra-dermally periareolarly. The SLN was identified intraoperatively using the blue colour. Intraoperative frozen examination was performed with haematoxylin and eosin staining. All SLNs were additionally studied by immunohistochemical staining for cytokeratins. All positive SLNB were followed by an axillary dissection up to level 2. SNLB-negative

patients were followed up without axillary clearance.

**Results:** In 87/90 patients (96.7%), at least 1 sentinel node was found. In 65/90 patients (72.2%), the sentinel node was negative on both FS and IHC. Of the remaining 25/90 patients who were positive, 21 were positive on intraoperative frozen examination (9/21 with SLNB-positive only on FS had axillary involvement), while only 4 were positive on IHC. These 4 patients had ALND and no metastases were found in the remaining axillary lymph nodes.

**Conclusion:** These results suggest that ALND may not be appropriate in breast cancer patients with micrometastatic SLNs detected by immunohistochemistry.

### SUR603

#### Noninvasive Detection of Acute Lower Gastrointestinal Bleeding Using Multiphase Multidetector CT after Inconclusive Endoscopy

**A SHABBIR<sup>1</sup>, PS GOH<sup>2</sup>, SC WANG<sup>2</sup>, A LEONG<sup>1</sup>, Z AMIN<sup>3</sup>, KM WONG<sup>2</sup>, L TAN<sup>2</sup>**

<sup>1</sup>Surgery, <sup>2</sup>Diagnostic Imaging, <sup>3</sup>Radiation Oncology, National University Hospital, Singapore

**Aim:** Catheter angiography is the accepted radiological investigation and final step in the investigative pathway for patients with acute lower gastrointestinal bleeding who have negative or inconclusive endoscopy. We evaluated the diagnostic efficacy of contrast enhanced multiphase multidetector CT (MP-MDCT) in these patients.

**Methods:** This was a prospective, non-randomised study of 13 consecutive patients with acute lower gastrointestinal bleeding with incomplete, failed or non-diagnostic endoscopy in a university teaching hospital. The study was performed over a 12-month period (2003/2004). Fourteen CT scans were performed. One patient required a second CT scan, 3 days apart, as the first scan was negative. MP-MDCT was performed on a 4-slice multi-detector row CT in the arterial and venous phases of vascular contrast enhancement. Maximum intensity projection and multiplanar reformatted images were processed on a CT computer console to visualise the vascular and bowel anatomy effectively.

**Result:** MP-MDCT demonstrated the site of bleeding in all 13 patients. The site of bleeding was localised to the colon in 9 patients and the small bowel in 4 patients. The bleeding site was determined in 12 out of 13 cases after the first scan. In the remaining patient, the site of bleeding was demonstrated on a second scan. No patients suffered from any significant adverse event from the procedure.

**Conclusion:** MP-MDCT is safe and technically feasible in investigating massive acute lower GI haemorrhage. It accurately localised the bleeding site in all our patients enabling targeted management.

### SUR604

#### Liver Transplantation for Hepatocellular Carcinoma: The National University Hospital, Singapore Experience

**A SHABBIR<sup>1</sup>, K MAK<sup>2</sup>, P KRISHNAN<sup>3</sup>, R SHANKAR<sup>1</sup>, J ISAAC<sup>1</sup>**

<sup>1</sup>Surgery, National University Hospital, Singapore, <sup>2</sup>Surgery, Alexandra Hospital, Singapore, <sup>3</sup>Paediatric Surgery, National University Hospital, Singapore

**Aim:** To review the outcome of liver transplantation (LTx) for hepatocellular carcinoma (HCC) at the National University Hospital, Singapore.

**Methods:** A retrospective clinical review of all patients with HCC treated by LTx between August 1995 and March 2005 was performed and outcome of these patients were subsequently analysed.

**Results:** There were 25 patients with HCC treated by LTx. The selection criteria included a single tumour lesion with size <5 cm, <3 lesions with total tumour diameter <9 cm, absence of vascular invasion or extrahepatic disease, and an assessment that the tumours were not amenable to curative partial hepatectomy. The mean age was 51 years, with a male:female ratio of 24:1. The underlying disease processes in these patients were hepatitis B (14 cases), hepatitis C (6 cases), alcoholic cirrhosis (2 cases), biliary atresia (1 case), Byler's disease (1 case) and citrulinaemia (1 case). The mean waiting time

for transplantation was 185 days (3-600 days). Mean follow-up post-LTx was 49 months (range, 3-112 months). Seventeen of the 25 patients remained alive with a 1-year survival of 78% and 5 years 64%. Eight of the 25 patients had died. There were 2 perioperative deaths, 1 from hepatic artery thrombosis, acute myocardial ischaemia and the other from primary graft failure. Two died from HCC recurrence, 2 due to sepsis with multi-organ failure, and the last died of hepatitis B flare secondary to noncompliance with medication.

**Conclusion:** LTx is an established treatment of HCC, allowing long-term survival in selected patients. Liver transplant data for HCC in NUH shows survival results comparable to established centres.

### SUR605

#### Sentinel Node Biopsy in Early Breast Cancer: Results with Patent Blue Dye

**APH TANG<sup>1</sup>, SA BUHARI<sup>1</sup>, PTC IAU<sup>1</sup>, JY SEE<sup>1</sup>, PW HO<sup>1</sup>**

<sup>1</sup>Surgery, National University Hospital, Singapore

**Aim:** Sentinel lymph node biopsy (SLNB) is known to have a sampling error of about 3% to 6%. From January 2002 until January 2005, we performed 90 SLNB for breast cancer to validate the SLN concept (identification rate 98%; false negative rate: 4%).

**Methods:** Between January 2002 and January 2005, 90 patients underwent SLNB under general anaesthesia. Preoperative 5 mL of patent blue (5 min before incision) were injected intra-dermally periareolarly. The SN was identified intraoperatively by visual inspection of a blue duct leading to a blue node. After excision, histopathological examination including immunohistochemistry was performed. All positive SLNB were followed by an axillary dissection up to level 2.

**Results:** In 87/90 patients (96.7%), at least 1 sentinel node was found. In 65/90 patients (72.2%), the sentinel node was negative on both FS and IHC. Of these 65 patients who were SLNB-negative, they were randomised to 39 without ALND and 26 with ALND. Only 1/26 of the patients with SLNB negative who underwent ALND was found to have axillary involvement (false negative rate of 4%).

**Conclusion:** Our experience with identification rate of 96.7% and false negative rate of 4% is in concordance with the identification rate of 98% and false negative rate of 4% published in the literature.

### SUR606

#### Artificial Intelligence in Trauma Training — A Prototypical Artificial Intelligence Driven Computer Based Trauma Tutoring System

**V APPASAMY<sup>1</sup>, LS ONG<sup>2</sup>**

<sup>1</sup>Surgery, Tan Tock Seng Hospital, Singapore, <sup>2</sup>National University of Singapore, Institute of System Sciences, Singapore

**Aim:** Training surgical trainees in managing multi-system trauma is clinically challenging. Errors in trauma resuscitation can lead to adverse outcome. Commercially available computer-aided training packages have helped but have limitations due to a lack of realism and sophistication. An artificial intelligence (AI)-based computer-aided training system was conceptualised to overcome these limitations.

**Methods:** Torso trauma patients with solid and hollow viscus injuries in our database were selected for AI modeling. Pre-hospital and emergency department parameters including GCS, HR, BP, RR, SaO<sub>2</sub>, their responses to specific interventions including intravenous infusion/transfusion, intubation and chest tube insertion, results of blood investigations, X-rays, FAST and CT scans were collected and incorporated in Case Based Reasoning, Rule Based Reasoning and Fuzzy Logic AI Neural Network tools to develop the prototype programme. A graphic user interface (GUI) was developed for the trainee-programme interactions. This system operated on a laptop computer.

**Results:** The prototype was tried by surgical trainees. Through the GUI, they could log on at any time, select trauma patients and view the clinical findings, study trends in the vital signs, make provisional diagnoses of potential injuries, input diagnostic and therapeutic interventions, study outcomes of interventions and continue management to stabilise the patient in a user-

friendly and intuitive manner. The system provides feedback and reasons behind favourable and unfavourable outcomes, simultaneously scoring the trainees' performance.

**Conclusion:** This AI training prototype adds value to current trauma training in a safe, clinically challenging and cost-effective manner, avoiding adverse events from decision errors and infections from actual patients.

## SUR607

### Management of Breast Leiomyosarcoma

**PW HO<sup>1</sup>, JY SEE<sup>2</sup>, GT TAY<sup>2</sup>, SA BUHARI<sup>2</sup>**

<sup>1</sup>*Surgery, Tan Tock Seng Hospital, Singapore, <sup>2</sup>Surgery, National University Hospital, Singapore*

**Aim:** Leiomyosarcoma (LMSC) is not an uncommon soft tissue tumour. However, it is particularly rare in the breast. The origin of a true LMSC in the breast is thought to arise from pluripotent mesenchymal cell of the mammary stroma, rather than smooth muscle cells of the vascular wall. Treatment of breast LMSCs is uncertain.

**Methods:** We report a 47-year-old Malay woman who presented with a mobile 40-mm lump in the upper inner quadrant of her right breast. There was no palpable axillary lymph node. Her left breast was normal. Mammography showed a bi-lobed opacity in the right breast and targeted ultrasound scan showed that this lesion was predominantly hypochoic with minimal posterior acoustic enhancement and distortion of the adjacent stroma. Imaging features were suggestive of a suspicious lesion.

**Results:** Core biopsy histology of the lump revealed minute area of highly atypical epithelioid and spindle cells. Excision was advised for adequate characterisation. Wide local excision under general anaesthesia was performed in view of suspicion of malignancy on both imaging and core biopsy. Intra-operative finding was a firm, white fibrotic mass with ill defined margins. Excision histology showed high-grade leiomyosarcoma.

**Conclusion:** Breast LMSC is rare. Post-excision treatment is not certain. Axillary clearance is not necessary as none of the reported cases showed lymph node metastasis.

## SUR608

### A Retrospective Review of Ileostomy Closure

**PW HO<sup>1</sup>, D NG<sup>1</sup>, R SIM<sup>1</sup>**

<sup>1</sup>*Surgery, Tan Tock Seng Hospital, Singapore*

**Aim:** A defunctioning loop ileostomy is often constructed after a low colorectal anastomosis. The purpose is to minimise the impact of peritoneal sepsis in case of an anastomotic dehiscence. However, the creation and the subsequent closure of ileostomy are associated with complications. This is a retrospective review of our patients who had ileostomy closure done in the past 4 years. The primary aim of the study was to evaluate the complication rates related to closure of ileostomy.

**Methods:** All patients who had ileostomy closure done in Tan Tock Seng Hospital from January 2000 to December 2004 were included in this study. Case records including operative notes and admission records were traced manually.

**Results:** A total of 47 patients underwent ileostomy closure during the 4-year period, of which 28 were males and 19 were females. The median age was 61 years old (range, 29-82 years). The mean length of hospital stay was 5.42 days (range, 3-18 days) and the mean operative time was 83.93 min (range, 35-230 min). Handsewn closure was performed on 37 patients (78.7%) and stapled closure in 10 patients (21.3%). Most ileostomy closure was performed by consultant (66%). The overall complication rate was 17%. Complications included wound infection (6.3%), small bowel obstruction (4.2%), enterocutaneous fistula (2.2%), intra-abdominal abscess (2.2%) and incisional hernia (2.2%). There were 5 readmissions (10.6%) within 30 days due to ileus and subacute intestinal obstruction. Two patients required reoperation because of small bowel obstruction in 1 patient and enterocutaneous fistula in the other.

**Conclusion:** Review of our experience showed that ileostomy closure was associated with low complication rates and short hospital stay.

## SUR609

### Microsatellite Instability (MSI) and MLH1 Hypermethylation-incidence and Significance in Colorectal Polyps in Young Patients

**D KOH<sup>1</sup>, M LUCHTEFELD<sup>2</sup>, D KIM<sup>2</sup>, H ATTAL<sup>3</sup>, T MONROE<sup>4</sup>, K INGERSOLL<sup>4</sup>**

<sup>1</sup>*Surgery, Tan Tock Seng Hospital, Singapore, <sup>2</sup>Colon and Rectal Surgery, The Ferguson Clinic, Grand Rapids, Michigan, USA, <sup>3</sup>Pathology, <sup>4</sup>Molecular Research, Spectrum Health Digestive Disease Institute, USA*

**Aim:** MSI is observed in most HNPCC-related colorectal cancers (CRC). The Bethesda criteria recommend MSI testing in patients 40 years or below diagnosed with adenomas. We aimed to primarily determine the incidence of MSI and the presence of hypermethylation (HM) of the promoter MLH1 protein in these polyps; secondarily to detect patterns correlating genomic and demographic variables to the clinico-molecular characteristics.

**Methods:** Patients aged 40 years or below diagnosed with colonic polyps removed endoscopically from 1998 to 2003 were identified and their charts reviewed. DNA extractions were performed and tested for MSI at the Bethesda Consensus recommended loci. Samples were characterised by immunohistochemical staining of the 4 MMR proteins. MLH1 HM was assessed using a real-time methylation-specific PCR. The appropriate statistical analyses were applied.

**Results:** Twenty-three patients with 38 polyps were analysed. Eight patients had a positive family history of colorectal polyps (FHCP), 11 a family history of CRC (FHCC). No significant correlation between FHCC/FHCP and polyp location was found. 53% were tubulo-adenomas and 27% tubulovillous adenomas. IHC staining revealed appropriate expression of the MMR proteins in all samples. None of the polyps exhibited MSI. MLH1 "A" HM was present in 30% of the polyps. No HM was observed at region C. FHCP and FHCC were associated with a higher incidence of MLH1 "A" HM. There was no determinable correlation between the clinico-pathological features of the polyp with MLH1 HM.

**Conclusion:** MLH1 HM was found in ~30% of polyps found in young patients. The yield of MSI testing in these patients is low and is not recommended.

## SUR610

### Penetrating Injuries in Trauma Patients — The Tan Tock Seng Experience

**EKW LIM<sup>1</sup>, A VIJAYAN<sup>1</sup>, MT CHIU<sup>1</sup>**

<sup>1</sup>*Surgery, Tan Tock Seng Hospital, Singapore*

**Aim:** Penetrating injuries are uncommon in Singapore with blunt injuries forming the majority of trauma cases. Hence a review of penetrating injuries looking at the demographics, their presentation and subsequent management was done.

**Methods:** Patients who were treated for penetrating injuries over a 4-year period from May 2001 to May 2005 in Tan Tock Seng Hospital were included in this study. Data from the trauma database were analysed. The demographics, presentation and outcome are presented.

**Results:** There were 67 patients with penetrating injuries treated over the past 4 years. The median age was 32 years old. There were 61 males and 6 females. Distribution of races was 38 Chinese (56.7%), 11 Malays (16.4%), 11 Indians (16.4%) and 7 of other races. The mechanism of injury was assault in 54 patients (80.6%), 7 self-harm, 3 gunshot wounds and 3 from a fall. The median injury severity score (ISS) was 10. There were 4 deaths that correlated with high ISS of 29 to 75. There were 24 injuries to the abdomen, 10 in the chest, 12 in the head, 5 in the neck, and 18 in the extremities. Three patients were successfully treated non-operatively for lacerations involving kidney, liver and spinal cord. All 5 injuries to the neck were explored surgically.

**Conclusion:** Penetrating injuries are relatively uncommon in Singapore, with assault being the most common mechanism of injury, followed by self-harm. Gunshot wounds are uncommon. Mortality correlated well with ISS. The experience gained has helped in the protocol of managing penetrating injuries in trauma victims.

**SUR611****Combination Therapy using Alpha-blockers and Antimuscarinic Drugs in Men with Lower Urinary Tract Symptoms Suggestive of Bladder Outlet Obstruction and an Overactive Bladder: Is it Safe and Efficacious?****EKW LIM<sup>1</sup>, SJ CHIA<sup>1</sup>**<sup>1</sup>*Surgery, Tan Tock Seng Hospital, Singapore*

**Aim:** Combination therapy with alpha-blockers plus antimuscarinics has been shown to improve symptoms in men with bladder outlet obstruction (BOO) and overactive bladder (OAB). We assessed the efficacy and safety of treating men with LUTS suggestive of BOO and OAB with combination therapy.

**Methods:** The study included 89 men diagnosed with lower urinary tract symptoms (LUTS) suggestive of BOO and concomitant OAB. They were started on terazosin 2 mg ON titrated to 5 mg ON and on follow-up continued to have predominantly storage symptoms and were then started on a trial of tolterodine 2 mg BD or oxybutynin 5 mg BD. Their urinary symptoms, uroflow and post-void residual urine, international prostate symptom score (IPSS) and side effects were recorded subsequently. Wilcoxon signed rank test was used for statistical analysis.

**Result:** The median age of patients was 64.3. The median length of follow-up was 7.8 months (range, 6-36 months). Twenty-one men (23.6%) stopped antimuscarinic therapy because they defaulted or were excluded due to diagnosis of other pathology. Sixty-eight men continued with the combination therapy and subsequent clinic visits showed that 60 men (88.2%) showed improvement in their storage symptoms, uroflow and IPSS. The other 8 men (11.8%) showed improvement in their uroflow but not storage symptoms. There was no acute urinary retention or increase in post-void residual urine observed and therapy was well tolerated.

**Conclusion:** Combination therapy using alpha-blockers and antimuscarinics in men diagnosed with LUTS suggestive of BOO and OAB is effective, safe and well tolerated in clinical practice, with a low risk of acute urinary retention or impairment of obstructive symptoms.

**SUR612****The Role of Antibiotic Therapy in the Management of Elevated Serum PSA****CK NG<sup>1</sup>, GY TAN<sup>1</sup>, KL TOH<sup>1</sup>, SJ CHIA<sup>1</sup>, JK TAN<sup>1</sup>**<sup>1</sup>*Surgery, Tan Tock Seng Hospital, Singapore*

**Aim:** In Asian countries, the incidence of prostate cancer detected by transrectal ultrasound-guided (TRUS) biopsy of the prostate is low. This may be due to a high prevalence of asymptomatic prostatitis causing elevated serum prostate-specific antigen (PSA). We assess whether empirical antibiotic therapy is useful in the management of patients with elevated serum PSA. Our hypothesis is that patients with significant PSA decrease after antibiotics have prostatitis rather than prostate cancer.

**Methods:** Within a prospective trial, 104 patients with serum PSA above 4 ng/mL were given empirical antibiotic treatment for 1 month. Serum PSA was repeated 1 month before TRUS biopsy was performed. Analysis was performed with receiver operating characteristic curves.

**Results:** In the group of patients with initial serum PSA between 4 and 10 ng/mL ( $n = 80$ ), percentage change in PSA accurately differentiated between prostate cancer and benign histology. Using percentage PSA change of  $-10\%$  as the cutoff, sensitivity and specificity for detection of prostate cancer was 100% and 49% respectively. None of the 34 patients with PSA decrease exceeding 10% had prostate cancer detected. Out of the remaining 46 patients, 11 had prostate cancer detected.

**Conclusion:** Empirical antibiotic therapy is useful in the management of patients with elevated serum PSA between 4 and 10 ng/mL. After a course of antibiotics, patients who have a PSA decrease exceeding 10% have a low likelihood of having prostate cancer, and may elect not to undergo biopsy. With this strategy, up to 43% of patients may be saved from unnecessary biopsy.

**SUR613****Distribution Patterns of Colonic Diverticular Disease on Barium Enema Studies in Tan Tock Seng Hospital****J RAO<sup>1</sup>, PL POON<sup>2</sup>, R SIM<sup>1</sup>, D CHEONG<sup>1</sup>**<sup>1</sup>*Surgery, Tan Tock Seng Hospital, Singapore, <sup>2</sup>Surgery, Alexandra Hospital, Singapore*

**Aim:** The aim of study was to investigate the pattern of diverticular disease found in our population.

**Methods:** Between January 2001 and August 2002, we reviewed all barium enemas performed in our hospital. The prevalence and location of colonic diverticuli were recorded and correlation made with age group, sex, and race.

**Result:** Of 1698 barium enema studies performed, 23 were incomplete, leaving 1675 available for evaluation. The overall prevalence of diverticular disease was 45% ( $n = 758$ ). Gender distribution was equal. 84% of the patients were Chinese, 6% Malays and 7% Indians. There was a higher proportion of Chinese patients and lower proportion of Malay patients as compared to the national racial distribution. The prevalence of diverticular disease increases with age and was highest in the 60-80 years age group (55%) compared to 43% in the 40-60 years age group and 21% in the 20-40 years age group. Right-sided diverticular disease was more common than left in our study population (59% versus 30%). The prevalence of both right and left sided diverticular diseases increased with age. This would suggest that the development of diverticular disease in urban Asian populations is a product of genetic and environmental factors.

**Conclusion:** Diverticular disease in Singapore appears at a young age and increases in incidence to peak around the 7th decade. The predominance of right-sided disease in our study is consistent with other Asian/oriental populations and suggests a genetic predisposition. The rising occurrence with age of both left and right-sided diseases is consistent with the changing dietary trends in the population of Singapore.

**SUR614****Fibrin Glue in the Treatment of Fistula in Ano: A Prospective Randomised Comparison****J RAO<sup>1</sup>, D CHEONG<sup>1</sup>, R SIM<sup>1</sup>**<sup>1</sup>*Surgery, Tan Tock Seng Hospital, Singapore*

**Aim:** To compare the outcome of patients with low and high fistulas treated with either fibrin glue or conventional surgery

**Methods:** Between January 2003 and July 2004, 30 patients with low and high fistulas were randomised to receive treatment in either the fibrin glue arm or conventional surgery arm. The primary end point was fistula healing defined as closure of fistula without discharge. Mann-Whitney U test was used to compare pain scores, duration to no pain, duration to cessation of dressing, duration to fistula closure and duration to return to normal activity.

**Results:** Patients in the fibrin glue arm and conventional arm were well matched for gender, median age, and type of fistulae. Fibrin glue healed 12 (80%) out of 15 patients whereas 13 (87%) were cured with conventional treatment (95% confidence interval: 58%-93%;  $P = 1$ , Fisher's exact test). The duration to no pain was lower in the fibrin glue arm but this was not statistically significant ( $P = 0.4$ ). The pain scores and duration of analgesics were comparable in both arms. The duration to cessation of dressing was lower in the fibrin glue arm (median 3 vs 12 days). The duration to fistula closure was shorter in the fibrin glue arm (median 7 vs 14 days). The duration to return to work or normal activity was also shorter in the fibrin glue arm (median 7 vs 14 days).

**Conclusion:** The outcome of treatment with fibrin glue and the conventional surgery were comparable. Fibrin glue healed fistulas faster with less pain and required less dressing. The patients could also return to work or normal activity earlier. We conclude that fibrin glue is a viable option in the treatment of anal fistulas.



## SUR615

### Undertreatment of Elderly Asian Breast Cancer Patients

**M SEAH<sup>1</sup>, PMY CHAN<sup>1</sup>**

<sup>1</sup>*Surgery, Tan Tock Seng Hospital, Singapore*

**Aim:** Breast cancer in the elderly population is more indolent in nature and there have been proponents for less aggressive treatment in this group of patients. We aimed to look at the treatment trends for elderly Asian breast cancer patients and determine if our patients are undertreated.

**Methods:** Data was obtained from a prospectively maintained database. The demographics, risk factors, disease stage as well as management were reviewed.

**Results:** From January 2001 to May 2005, there were 165 patients above 70 years. The mean age was 77.4 years. The tumour was invasive in 148 patients. Surgery was performed on 132 patients (80%). A mastectomy was performed on 87 patients (53%) while 45 patients (27%) had a wide excision of the tumour. Axillary clearance was performed on 105 patients (64%). Post-surgery, 32 patients (19%) had chemotherapy, 56 patients (34%) had radiotherapy and 80 patients (49%) were started on tamoxifen. Eleven patients (7%) had metastatic disease at the time of diagnosis. In the group that underwent surgery, 63 patients (48%) were undertreated. Locoregional recurrence occurred in 3 patients while another 4 had metastatic recurrence. Eleven patients (7%) passed away during the study period. Eight died from metastatic breast cancer and 1 each from acute renal failure, multiorgan failure and pneumonia. The mean follow-up period was 24 months.

**Conclusion:** Decision making in elderly breast cancer patients is complex. A high proportion of our patients are undertreated for specific reasons.

## SUR616

### Demographics of Trauma in Singapore

**TS GO<sup>1</sup>, MP KOH<sup>1</sup>, MT CHIU<sup>2</sup>, A YEO<sup>3</sup>**

<sup>1</sup>*Trauma Centre, <sup>2</sup>Surgery, Tan Tock Seng Hospital, Singapore, <sup>3</sup>General Surgery, Singapore General Hospital, Singapore*

**Aim:** To demonstrate the demographics of trauma cases admitted to 2 major trauma hospitals in Singapore from 2001 to 2004.

**Methods:** Retrospective review of trauma patients admitted to TTSH and SGH using data captured in the trauma registries of the 2 hospitals

**Results:** A total of 2817 cases were analysed. Of these 2817 cases, 394 (14%) died with 35% (139) of the mortalities in the Emergency Resuscitation room. Distributions of trauma patients to various disciplines are as follows: orthopaedic (1057; 39%), neurosurgery 30% (791), general surgery 27% (718) and 4% (112) to other disciplines like ENT and Ophthalmology. The majority of the trauma patients are male (73%; 2069). 95% (2673) of the trauma seen in Singapore were blunt traumas. 45% (1257) were motor vehicle accidents, 39% (1099) from falls, 7% (198) results from assaults, 4% (100) from falling object, 2% (61) were sports-related and 3% (98) from other mechanisms. The majority of these patients were below 55 years old (71%; 2003) and 29% (814) were 55 years or older. Severity of injury sustained by the patients was distributed as follows: 57% (1595) of the trauma cases admitted were classified as serious injury with ISS ranging from 9-15. 20% (577) had severe injuries (ISS 16-24), 17% (465) sustained critical injuries (ISS 25-49) and 3% (85) sustained severely critical injuries (ISS  $\geq$ 50).

**Conclusion:** The majority of trauma cases seen in Singapore are blunt trauma with male patients being the dominating gender. Falls and vehicular accidents are the 2 most common mechanism of injury and most admitted sustained serious to critical injuries.

## SUR617

### Local Experiences with Laparoscopic-assisted Placement of Intra-peritoneal Dialysis Catheter

**EW YANG<sup>1</sup>, L LIEW<sup>1</sup>**

<sup>1</sup>*Urology, National University Hospital, Singapore*

**Aim:** A review of local experiences using an alternative method of inserting

and revising peritoneal dialysis catheter via laparoscopic approach.

**Methods:** A total of 10 patients underwent either a laparoscopic revision of blocked catheters or a laparoscopic insertion of catheter for the first time. All cases were done under general anaesthesia. An alternative method of laparoscopic placement is described.

**Results:** Six out of 10 patients had laparoscopic revision of blocked Tenckhoff catheters. The remaining 4 patients had laparoscopic assisted insertion for the first time using either swan-neck or Tenckhoff catheters. Early complication includes 1 patient with wound site infection. Two patients were presented with the late complication of dialysis-related peritonitis.

**Conclusion:** This laparoscopic method offers a safe and alternative approach as compared to the blind open technique used commonly for catheter insertion.

## SUR618

### Repair of Nasal Septal Perforations Using Auricular Conchal Cartilage Graft in Children

**D CHUA<sup>1</sup>, H TAN<sup>2</sup>**

<sup>1</sup>*ENT, Changi General Hospital, Singapore, <sup>2</sup>Otolaryngology, KK Women's and Children's Hospital, Singapore*

**Aim:** To review 3 paediatric patients who underwent repair of nasal septal perforations after button battery injury.

**Methods:** Retrospective review of case notes and close regular follow-up of the patients since their first presentations with button batteries as foreign bodies in the nose.

**Results:** Two out of the 3 children who underwent repair of the nasal septum achieved successful closure of the nasal septum within 2 months. One failure occurred in a child with a large septal perforation.

**Conclusion:** Repair of nasal septal perforations is a challenging procedure, especially for children. Good results can be achieved with auricular conchal cartilage graft.

## SUR619

### Oesophageal Impacted Denture — Failed Endoscopic Extraction Requiring Cervical Esophagostomy

**D CHUA<sup>1</sup> SA BUHARI<sup>2</sup>**

<sup>1</sup>*ENT, Changi General Hospital, Singapore, <sup>2</sup>Surgery, National University Hospital, Singapore*

**Aim:** We report a case of successful removal of denture ingested by a patient that was impacted in the oesophagus.

**Methods:** The 36-year-old Malay gentleman first presented to us after complaints of ingestion of his denture. He complained of odynophagia, blood stained sputum and pain localised in the lower part of his neck. Rigid oesophagoscopy was done and revealed a large denture 24 cm from the incisor. Treatment progress and complications due to disease or treatment were noted.

**Results:** Successful removal of denture was achieved with cervical oesophagostomy. He was kept nil-by-mouth for the first postoperative day and was given intravenous antibiotics for 1 week. Nasogastric feeding was subsequently started and he tolerated feeds well. On postoperative day 7, a gastrograffin study was done. It showed satisfactory flow of gastrograffin along the proximal and mid-third of the oesophagus with no evidence of leakage. The patient recovered well postoperatively with no complications.

**Conclusion:** Oesophageal foreign bodies are usually removed via an oesophagoscopy in most cases. However, in situations where this is impossible, such as an impacted foreign body, a cervical oesophagostomy is a safer alternative. Dentures are considered challenging foreign bodies to be removed because of the difficulties in localisation and retrieval of ingested dentures. They are frequently radiolucent and their awkward shape makes their removal via endoscopy difficult.

**SUR620****Giant Cutaneous Horn of the Breast: Unsightly or Dangerous?****CHJ WONG<sup>1</sup>, SA BUHARI<sup>2</sup>**<sup>1</sup>General Medicine, Changi General Hospital, Singapore, <sup>2</sup>Surgery, National University Hospital, Singapore

**Aim:** Cutaneous horn is an uncommon skin condition but frequently featured in surgical textbooks. Giant cutaneous horn of the breast is rare. Besides the shocking appearance, this condition may be associated with a tumour or infection. Worse still, it may mask a cancer and pose a trap to the unwary.

**Methods:** We describe a giant cutaneous horn of the breast in a 31-year-old female who have had it for 15 years. The cutaneous horn was excised at the base with an adequate margin.

**Results:** There was no underlying cancer but histology showed features suggesting an infection of viral origin. No further treatment was needed.

**Conclusion:** Giant cutaneous horn of the breast is rare. Excision is recommended due to the associated pathology. It can easily mask an underlying tumour such as Paget's disease.

**SUR621****Early Results of Radiofrequency Ablation (RFA) for Unresectable Hepatocellular Carcinoma (HCC) in Changi General Hospital****SS TAN<sup>1</sup>, ACC FOONG<sup>1</sup>, HS TEH<sup>2</sup>, EH TAN<sup>2</sup>, KH TAY<sup>1</sup>**<sup>1</sup>General Surgery, <sup>2</sup>Radiology, Changi General Hospital, Singapore

**Aims:** 1) To determine our technical success with RFA of unresectable HCCs in terms of complete ablation and recurrence rates, and pre-/post-operation alpha-fetoprotein (AFP) levels, and 2) to determine RFA safety and patient tolerability, especially between open and percutaneous routes.

**Methods:** We conducted a retrospective review of 14 patients who received RFA for unresectable HCC between October 2003 and April 2005 via either open or percutaneous approach (under general anaesthesia with ultrasound guidance). These patients were closely surveyed with triphasic CT scans or MRI liver 3 weeks post-operation and 3-monthly thereafter. All scans were reviewed by radiologist for evidence of recurrences.

**Results:** A total of 27 lesions were treated, of which 25 were successfully ablated giving a technical success rate of 92.6%, which is comparable to international figures. There was also a significant decrease in AFP levels post-RFA indicating response to treatment. Overall survival was 9.6 months and mean disease-free survival was 6.9 months. Comparing open and percutaneous RFA, the latter offers a shorter hospital stay and low post operation pain score.

**Conclusion:** RFA for unresectable HCCs is feasible with good success rates and offers a potentially curative option. RFA is both safe and well tolerated.

**SUR622****Which Octogenarians do Poorly after Laparotomy and Major Abdominal Surgery in Our Asian Population?****KY TAN<sup>1</sup>, CM CHEN<sup>1</sup>, C NG<sup>1</sup>, SM TAN<sup>1</sup>, HC CHNG<sup>1</sup>, KH TAY<sup>1</sup>**<sup>1</sup>General Surgery, Changi General Hospital, Singapore

**Aims:** 1) To assess how our octogenarians fair after major surgery, and 2) to identify which are the ones that do poorly.

**Methods:** A retrospective review of 125 octogenarians who underwent major abdominal surgery between January 1997 and September 2003 was performed. Preoperative condition was assessed using a weighted index of comorbidity used in Charlson Comorbidity Index and classification of patients according to the American Society of Anesthesiologists (ASA). The outcome was measured as whether complications developed, 30-day mortality and whether there was return to pre-morbid function.

**Results:** The patients had a mean age of 84.6 years (range, 80-106 years). Nearly half (48.8%, n = 61) the cases were emergency cases. The median index of comorbidity was 3 and 29.6% of patients were classified as either ASA III or IV. The operations were mostly stomach, small bowel or large bowel resection. Multivariate analysis revealed that emergency operations

were associated with significantly increased odds of morbidity. The overall 30-day mortality was 5.6%, with 4.7% for elective cases despite the high morbidity rates. ASA classification, comorbidity index greater than 5, development of acute coronary syndrome and anastomotic leakage were found on multivariate analysis to significantly increase the odds of mortality. For elective cases, 82.8% of patients were able to return to their pre-morbid functional status. Development of complications and comorbidity index greater than 5 were found to predict failure of its occurrence.

**Conclusion:** There should be a shift of attitude towards elective surgery rather than doing emergency operations when complications occur. Octogenarians should not be denied elective surgery.

**SUR623****Breast Conservation Cancer Surgery: Predicting Histologically Tumour-free Margin using Ultrasonography and Mammography — A Pilot Study****KY TAN<sup>1</sup>, SM TAN<sup>1</sup>, SH CHIANG<sup>2</sup>, A TAN<sup>2</sup>, CK CHONG<sup>1</sup>, KH TAY<sup>1</sup>**<sup>1</sup>General Surgery, <sup>2</sup>Radiology, Changi General Hospital, Singapore

**Aim:** This study aimed to compare the accuracy of intraoperative specimen ultrasonography (IOUS) and specimen mammography in the prediction of achieving histologically tumour-free margins during breast-conserving surgery (BCS).

**Methods:** Between March 2003 and September 2004, a prospective study was performed on 25 patients who underwent BCS. After wide excision, IOUS and specimen mammography was used to assess adequacy of margins. Further margins were taken when either modality revealed an inadequate margin. The margins were assessed histologically and correlated with IOUS and mammographic findings.

**Results:** The majority (92%) of the tumours were infiltrative ductal carcinomas with 76% associated with ductal carcinoma-in-situ (DCIS). Using IOUS alone, higher rates of histologically tumour-free margins were achieved compared to mammography alone. Combined IOUS and mammography achieved similar or slightly higher rates of histologically tumour-free margins compared to IOUS alone. A margin measured on IOUS twice that of the desired histological margin will result in achieving a histologically tumour-free rate exceeding 90%. Associated DCIS was the only significant factor found to decrease the rate of achieving adequate margins.

**Conclusion:** IOUS is a useful tool in achieving adequate margins during BCS. A specimen margin on IOUS twice that of the desired histological margin is able to achieve tumour-free rates exceeding 90%.

**SUR624****Real-time Ultrasound Elastography of Breast Lumps — A Non-invasive Diagnosis****SM TAN<sup>1</sup>**<sup>1</sup>General Surgery, Changi General Hospital, Singapore

**Aim:** Elastography is the technique of imaging tissue hardness. Breast carcinomas are usually harder than benign nodules on palpation. However, palpation is limited to large superficial lesions. A new technique of ultrasound elastography using combined autocorrelation method of tissue elasticity allows for real-time strain image visualisation using free-hand probe with concurrent conventional B-mode image. A prospective study was undertaken to evaluate the strain images of breast nodules and accuracy of diagnosis using elastography.

**Methods:** Between February and June 2005, consecutive women with breast lumps confirmed on B-mode ultrasound were assessed with elastography using EUB-8500 digital ultrasound scanner (Hitachi) with elastography software and 6.5-13.0 mHz probe. The images were scored according to the elasticity score. Histology of the lump(s) was established with fine needle aspiration cytology, and core or excision biopsy. The strain image scores were correlated to histology and the accuracy of diagnosis with elastography calculated.

**Results:** There were 169 women with 257 breast lumps. About one-third

(31.5%) of the lumps were not palpable. Of the 44 (17.1%) malignant lumps, the majority (81.8%) was infiltrative ductal carcinoma. Of the 213 benign lumps, the majority was fibroadenoma (40%). The average elastography score for malignancy was 4.02 (SD 1.19) and 1.82 (SD 0.86) for benign lesions. The sensitivity of elastography in detecting carcinoma was 93.9% and specificity was 95.3%. The overall positive predictive value of elastography was 95.3%.

**Conclusion:** Real-time ultrasound elastography of breast lumps using free-hand probe is a useful non-invasive diagnostic tool that is user-friendly with a high accuracy rate.

#### SUR625

##### Concurrent Non-contiguous Necrotising Fasciitis of the Upper and Lower Limbs

**YJ LIM<sup>1</sup>, FC YONG<sup>2</sup>, CH WONG<sup>3</sup>, ABH TAN<sup>2</sup>**

<sup>1</sup>Orthopaedic Surgery, Changi General Hospital, Singapore, <sup>2</sup>Hand Surgery, <sup>3</sup>Plastic, Reconstructive and Aesthetic Surgery, Singapore General Hospital, Singapore

**Aim:** Necrotising fasciitis is an uncommon soft tissue, caused by virulent bacteria, often in an immuno-compromised host, causing widespread systemic toxicity, leading to high morbidity and mortality. Most patients present with a single focus of disease. We present 3 unusual cases of concurrent non-contiguous necrotising fasciitis of one upper and one contra-lateral lower limb.

**Methods:** We retrospectively reviewed 2 female and 1 male patients who were recently treated in the Department of Hand Surgery, Singapore General Hospital.

**Results:** The first patient underwent initial aggressive debridement of left upper and right lower limb, followed by amputation of the left forearm and right lower limb due to continued sepsis and progressive loss of viability of the operated limbs. The patient survived. The second patient underwent debridement of the right upper and left lower limb, followed by a right forearm amputation and repeat debridement of the left leg wound. He refused amputation of the left leg, and died 11 days after admission. The third patient underwent urgent debridement of the right hand and left foot on the third day of admission. Unfortunately, she succumbed to overwhelming sepsis soon after surgery.

**Conclusion:** These patients presented late with unusual, advanced, bi-focal necrotising fasciitis. Patients seeking traditional therapy as a first-line therapy or a failure to recognise the disease early can lead to treatment delay and disease progression. This emphasises the need for radical surgery and possible primary amputation, with aggressive supportive care in the treatment of this dreadful condition.

#### SUR626

##### Outlook for Breast Cancer Patients with 10 or More Positive Axillary Lymph Nodes

**S NG<sup>1</sup>, WS YONG<sup>2</sup>, PH TAN<sup>3</sup>, GH HO<sup>2</sup>, A YEO<sup>2</sup>, CY WONG<sup>2</sup>**

<sup>1</sup>Orthopaedic Surgery, Changi General Hospital, Singapore, <sup>2</sup>General Surgery, <sup>3</sup>Pathology, Singapore General Hospital, Singapore

**Aims:** We studied our local CA breast patients who have been operated on, and have 10 or more positive LN on histopathology, and reviewed the prognosis, survival and pattern of local, regional and systemic recurrence.

**Methods:** We conducted a retrospective study of CA breast patients, operated on by the Department of Surgery, SGH and Department of Surgical Oncology, NCC, from 1994 to 1999, who have 10 or more positive LN on histopathology. Case-sheets of the patients were retrieved and the data were analysed. Sixty cases were studied.

**Results:** The median age of the patients seen was 52.2 years. The median follow-up to date of the patients seen was 61.2 months. The median size of the tumour found was 4.25 cm, and the most common type was an invasive ductal carcinoma. The main form of treatment was a simple mastectomy with axillary clearance (SMAC), with adjuvant therapy comprising chemotherapy

and radiotherapy and/or hormonal therapy. The recurrence rate was 56% while on follow-up, with the majority involving systemic disease. 23% of the patients were lost to follow-up, and 45.6% of the patients were dead after the mean follow-up period.

**Conclusion:** The prognosis for patients with a Stage III CA breast is poor, with increased mortality rates from systemic recurrence.

#### SUR627

##### Combined Spinal Epidural Causes Higher Block than Equivalent Single-shot Spinal Anaesthesia in Elective Caesarean Patients

**CT CHONG<sup>1</sup>, F ITHNIN<sup>1</sup>, Y LIM<sup>1</sup>, A SIA<sup>1</sup>, C OCAMPO<sup>1</sup>**

<sup>1</sup>Anaesthesia, KK Women's and Children's Hospital, Singapore

**Aim:** Combined spinal epidural (CSE) and single-shot spinal (SSS) anaesthesia are established techniques for lower segment caesarean section (LSCS). In SSS anaesthesia, the negative pressure of the epidural space is preserved whereas in CSE, the negative pressure in the epidural space is counterbalanced by the open connection to atmospheric pressure through the epidural needle, possibly resulting in reduction of dural sac volume and consequently a higher level of sensory block after a spinal dose of local anaesthetic. We test the hypothesis that the spinal block from a CSE technique results in a more extensive spread of local anaesthetic and a higher sensory block level than the SSS technique.

**Methods:** All 30 ASA I parturients for elective LSCS recruited into our randomised controlled double-blinded study received IT 2 mL of 0.5% hyperbaric bupivacaine. Group S (n = 15) received a SSS technique. Group C (n = 15) received a CSE technique using loss of resistance to 2 mL of air. A power analysis assuming a 2-segment difference with a power of 0.8 and alpha <0.05 indicated a sample size of 15 patients. We used the Student *t* test to analyse parametric data and Mann-Whitney U test to compare the non-parametric data.

**Results:** The maximal sensory block achieved in Group C was statistically higher than that in Group S (median C6 interquartile range (IQR) C5 to C8 vs median T3 (IQR) T2 to T4, *P* <0.001).

**Conclusion:** The administration of intrathecal local anaesthetic via the CSE technique results in higher level of sensory block than a SSS technique. Dose reduction to prevent excessively high block may be necessary when CSE is used.

#### SUR628

##### Epidural Top-up in Combined Spinal Epidural (CSE) Analgesia has Time-limited Direct Spinal Effect

**T ISLAM<sup>1</sup>, E LEW<sup>1</sup>**

<sup>1</sup>Anaesthesia, KK Women's and Children's Hospital, Singapore

**Aim:** This prospective randomised controlled study investigated if the epidural top-up in CSE could pass through the spinal puncture into the CSF.

**Methods:** After IRB approval and informed consent, 50 parturients were randomised into 2 groups: the saline group (NS) received 10 mL saline and the bupivacaine group (B) received 10 mL 0.1% bupivacaine top-up, 5 min after the intrathecal injection of 1 mg bupivacaine with 5 µg fentanyl. Pain was assessed using verbal pain scale (VPS) on a scale of 0-100. VPS, sensory and motor block were recorded every 5 min. If VPS score >20 after 10 min, rescue top-up with 10 mL 0.1% bupivacaine was given at 15 min. If pain was not relieved, another 5 mL top-up was given at 20 min. To detect a difference of 34% (NS = 35% vs B = 1%) in the incidence of VPS > 20 at 10 min, 25 women were required in each group with a power of 90% and a 2-sided test of 5%. Data were analysed using Fisher's exact, chi-square and Mann-Whitney U tests.

**Results:** B had higher pain relief compared to NS (Relative risk = 2.08, 95% CI 1.38 to 3.38, *P* <0.001), though NS received similar bupivacaine dose at 15 min.

**Conclusion:** Immediate epidural top-up of 10 mL of anaesthetic in CSE does have direct spinal effect as epidural content may pass into the CSF through the spinal puncture. The movement of the content is time-limited, as the effect is less significant after 15 min.

## SUR629

**Comparison of the Modified Airway Management Device with the Proseal Laryngeal Mask Airway in Patients Undergoing Major Gynaecological Procedures****BL SNG<sup>1</sup>, LL PAY<sup>1</sup>, Y LIM<sup>1</sup>**<sup>1</sup>Anaesthesia, KK Women's and Children's Hospital, Singapore

**Aim:** The modified airway management device (AMD) and proseal laryngeal mask airway (PLMA) are supraglottic airway devices designed to maintain airway patency and allow ventilation during anaesthesia. This study compares the use of the 2 devices on patients undergoing major gynaecological procedures.

**Methods:** In this prospective, randomised trial, 82 patients undergoing elective major gynaecological surgery were randomised into 2 groups. Group A (n = 41) had the AMD and Group P (n = 41) had PLMA, inserted after induction of anaesthesia. We compared the success of airway placement, time to achieve an airway, oropharyngeal leak pressure and complications associated during anaesthesia.

**Results:** First-time insertion success rates were significantly higher in Group P than Group A (100% vs 83%,  $P < 0.012$ ). Time taken to achieve airway was also significantly shorter in Group P than Group A (mean,  $21.9 \pm 7.8$  s vs  $40.2 \pm 48.0$  s,  $P < 0.001$ ). The oropharyngeal leak pressure was significantly higher for Group P than Group A (mean,  $31.2 \pm 5.7$  cm H<sub>2</sub>O vs  $24.2 \pm 8.3$  cm H<sub>2</sub>O,  $P < 0.001$ ). Ten patients in Group A had transient loss of airway during anaesthesia and needed manipulation of AMD; 4 patients needed to have airway switched to PLMA for the rest of the procedure.

**Conclusion:** The modified AMD has significant lower first-time successful placement rate, required longer insertion time and has lower oropharyngeal leak pressure than the PLMA. It also demonstrated an increased loss of airway during anaesthesia. The modified AMD needs further evaluation on its efficacy and safety before further use can be recommended.

## SUR630

**Lichen Sclerosus — Is It Really Rare in Singapore?****M LAU<sup>1</sup>, A WONG<sup>1</sup>, SC QUEK<sup>1</sup>, KL YAM<sup>1</sup>, J LOW<sup>1</sup>, EH TAY<sup>1</sup>**<sup>1</sup>Gynaecological Oncology, KK Women's and Children's Hospital, Singapore

**Aim:** To determine the characteristics of our local patients with vulva lichen sclerosis (LS).

**Methods:** We retrospectively reviewed all histologically proven LS attending the Vulva Clinic, KK Women's and Children's Hospital from March 2002 to January 2005.

**Results:** There were 24 histological proven LS diagnosed during the period. Median age of presentation was 55 years old and majority were Chinese (75%, n = 18). 13% (3) were nulliparous. 63% (15) were post-menopausal. No clear association was observed with smoking, blood group or immunological status. Itch was the commonest presenting symptom — 91% (22). Most had disease that was confined to vulva with only 1 (4.2%) case of perianal involvement. At presentation, most had evidence of chronic scarring, mainly symmetrical hypopigmentation 91.7% (22) and loss of labia minora 54.2% (13). Active disease with signs of ecchymosis, excoriation or fissuring was seen in 41.7% (10). All were treated with superpotent topical corticosteroids and 83.3% (20) showed good response. No progression of cancer was noted.

**Conclusion:** Our prevalence of LS is lower compared to overseas. This could be underestimated, as many women may be asymptomatic or embarrassed to seek help. We did not observe any association with blood group nor immunological status. Perianal involvement was reported in 30% of cases overseas but only 1 (4.2%) case in our study. The possibility of some genetic factor that protects our women from LS needs further investigation. No new cancers were seen due to the small number of cases and short duration of follow up. A previous review on SCC vulva locally found 16.2% association with LS. Long-term follow-up is therefore necessary.

## SUR631

**Second Trimester Maternal Serum Screening (MSS) Performance: A 5-year Review of 16,653 Singleton Pregnancies****FM LAI<sup>1</sup>, PC KHONG<sup>1</sup>, TYT TAN<sup>1</sup>, GS YEO<sup>1</sup>**<sup>1</sup>Maternal Fetal Medicine, KK Women's and Children's Hospital, Singapore

**Aim:** To determine the screening performance of the maternal serum screening (MSS) programme in KKH from March 1999 to February 2004.

**Methods:** Maternal serum was analysed for both maternal serum alpha-fetoprotein (AFP) and free-beta human chorionic gonadotrophin ( $\beta$ -hCG) (adjusted for maternal weight) and converted to multiples of the unaffected median (MoM) based on local data. The gestational age was based on ultrasound measurements. The risk was computed based on the algorithm by Wald 1998. All mothers with a term risk of 1:250 or higher for Trisomy 21 (T21) or AFP MoM > 2.0 were referred for a detailed ultrasound scan. Follow-up on pregnancy outcome was complete for 92.3% of the cases.

**Results:** The cohort of 16,653 singleton pregnancies comprised 72.9% Chinese, 11.6% Malays, 10.0% Indians and 5.5% other races, with a median maternal age of 30.1 years. The prevalence of T21 was 1 in 833 pregnancies. The screen positive rate for T21 was 6.1%, negative predictive value was 99.96%, and the detection rate was 65.0%. The positive predictive value was 1 in 78. There were 7 T21 pregnancies giving a false negative rate of 1 in 2234. Four of the 7 T21 pregnancies had karyotyping done as fetal abnormalities/markers were found on subsequent routine ultrasound scan.

**Conclusion:** With maternal serum screening alone, we had a detection rate of 65% of Down syndrome pregnancies in a fairly younger subset of mothers seen at KKH at a screen positive rate of 6.1%. In combination with a routine 20-week screening obstetric ultrasound scan, the detection rate was 85%.

## SUR632

**Spontaneous Fetal Loss in a Second Trimester Maternal Serum Screening Population****FM LAI<sup>1</sup>, PC KHONG<sup>1</sup>, TYT TAN<sup>1</sup>, GS YEO<sup>1</sup>**<sup>1</sup>Maternal Fetal Medicine, KK Women's and Children's Hospital, Singapore

**Aim:** To determine the spontaneous fetal loss rates in a low-risk pregnant population from 15 weeks' gestation onwards.

**Methods:** A retrospective study of 15,921 singleton pregnancies with serum screening done between March 1999 and February 2004, which had outcome data, were analysed. We excluded pregnancies with any structural or chromosomal anomalies, medical history of insulin dependent diabetes mellitus and with amniocentesis performed. Maternal age and ethnicity were analysed using multiple logistic regression to determine if they were independent predictors of miscarriages.

**Results:** 72.8% were Chinese, 11.8% Malays, 10.0% Indians and 5.4% other races. The spontaneous pregnancy loss was 0.62% (98/15,921 or 1 in 162 pregnancies). The median gestational loss was at 21.4 weeks with three-quarters of the loss occurring before 24 weeks of gestation. The different fetal loss rates among the different ethnic group were statistically significant ( $P = 0.002$ ), with Indians having a significantly higher loss rate of 1.25% (1 in 80) while the Chinese had the lowest loss rate of 0.49% (1 in 203). Fetal loss rates increased with maternal age for all groups ( $P = 0.001$  and  $R^2 = 0.9363$ ). Using multiple logistic regression, maternal age and ethnicity were independent predictors of spontaneous fetal loss.

**Conclusion:** The background spontaneous fetal loss rate for "normal" (low-risk MSS with "normal" ultrasound screening scan) pregnancies was 1 in 162 pregnancies. Both maternal age and ethnic groups were independent predictors of fetal losses beyond 15 weeks. The differing fetal losses among the ethnic groups were not explained by the differing age structure and needs further study.

### SUR633

#### Should Race-specific Medians be Used in Second Trimester Maternal Serum Screening for Down Syndrome?

**FMLAI<sup>1</sup>, PC KHONG<sup>1</sup>, GSH YEO<sup>1</sup>**

<sup>1</sup>Maternal Fetal Medicine, KK Women's and Children's Hospital, Singapore

**Aim:** To test the effect of using race-specific regression medians on the detection rate and screen positive rates in an antenatal Down syndrome screening programme.

**Methods:** Maternal serum alpha-fetoprotein (AFP) and free-hCG values (adjusted for weight) were converted to multiples of the unaffected median of the general population (MoM) as well as race-specific MOMs. Risk assessment for Trisomy 21 (T21) was then computed based on the algorithm by Wald 1998. The 4 race-specific MoMs were then combined to form 1 race-specific MoM distribution (MoMr) which was compared to general population distribution using the paired *t*-test.

**Results:** This study of 16,653 singleton pregnancies with complete follow-up outcome comprised 72.9% Chinese, 11.6% Malays, 10.0% Indians and 5.5% other races. AFP and free-hCG values were found to be significantly different among the races ( $P < 0.001$ ) at each gestation week. There were significant differences when comparing the general population and the race-specific MOM distributions ( $P < 0.001$ ) for both AFP and free-hCG MoMs. Although the detection rate was the same and there was only a slight improvement in the positive predictive value from 1:78 to 1:70, there was a relative reduction of 10% of the screen positive rate (SPR) from 6.1% to 5.5%.

**Conclusion:** The distribution parameters for AFP MoMs and free-hCG MoMs were statistically significant different for the 4 ethnic groups. With race-specific medians, this has improved the efficiency of maternal serum screening testing by lowering the SPR without decreasing the detection rate of Down syndrome.

### SUR634

#### Reasons for Low Uptake of Amniocentesis in a Multi-ethnic Population

**FMLAI<sup>1</sup>, Y CHUA<sup>1</sup>, GSH YEO<sup>1</sup>**

<sup>1</sup>Maternal Fetal Medicine, KK Women's and Children's Hospital, Singapore

**Aim:** Before 1999, antenatal Down syndrome screening in KKH involved offering amniocentesis to all mothers 35 years or older at delivery. The uptake of amniocentesis from this policy was 43%. The objective of this study was to determine the reasons for this seemingly low uptake.

**Methods:** Our study was done in 2 parts over 9 months in 1999 and 2000. Mothers 35 years or older at delivery were interviewed after their delivery and before discharge from hospital. The first part of the study found that the patients thought that the trained nurse counsellor was the best person in counselling. However, despite increasing the counselling by these nurses from 14% to 50%, the uptake rate of amniocentesis did not change significantly.

**Results:** In our hospital over the 2 study periods, there were 11,904 deliveries. Of these, 15% were 35 years or older. The main reasons cited for declining amniocentesis were refusal to consider abortion, perceived low risks for having a Down syndrome baby and inability to accept the increased risks of miscarriage. We also found from multivariate analysis that race, religion, socio-economic status and education were significant factors.

**Conclusion:** The low uptake rate of amniocentesis was not due to lack of patient awareness nor the effectiveness of the person counselling. Rather, it was due to patient's beliefs. It would be interesting to see if the current method of a combination of age, ultrasound scan and serum biochemistry will result in a higher uptake rate of screening as well as uptake rate of amniocentesis for mothers at "high-risk".

### SUR635

#### The Prevalence of Obesity among Pregnant Women in Singapore

**W LEE<sup>1</sup>, HY WEE<sup>1</sup>, CS TEE<sup>1</sup>**

<sup>1</sup>Maternal Fetal Medicine, KK Women's and Children's Hospital, Singapore

**Aim:** To determine the prevalence of overweight (BMI  $\geq 25$ ) women at the booking antenatal visit (<14 weeks of gestation) in a tertiary obstetric unit in Singapore.

**Methods:** A survey was conducted in the antenatal wards over six weeks at KK Women's and Children's Hospital, Singapore (KKH). Patient's cases records were reviewed 3 times per week in both subsidised and private antenatal wards sequentially. Cases records were systematically reviewed for booking gestational age, age of patient, race, weight and height.

**Results:** Of the 1500 case records reviewed, 1050 patients (531 private patients; 519 subsidised patients) had booking visit with either the general practitioner or the obstetricians at 25 is most prevalent in Malay population (49%). Women between 20-24 years old and 30-34 years old were most likely to be overweight (32.0% and 27.7% respectively). The prevalence of obesity in Malays increases with age from 15-29 years (36.4%-49%-51.4%). More women in subsidised class were overweight (36.3%). Increasing parity was associated with increased proportion of overweight women. A high prevalence of obesity was noted in Indian primigravidas (40.8%).

**Conclusion:** Over a quarter of pregnant women who book at the largest maternity unit in Singapore are overweight. The antenatal setting is ideally suited to identify and educate on lifestyle modifications in order to reduce the morbidity in these young women.

### SUR636

#### Technique of Hydrostatic Reduction of Acute Uterine Inversion: A Case Report

**NSY LUDDIN<sup>1</sup>, KH TAN<sup>1</sup>**

<sup>1</sup>Maternal Fetal Medicine, KK Women's and Children's Hospital, Singapore

**Aim:** Acute uterine inversion is an obstetric emergency which may be complicated by life-threatening postpartum haemorrhage and shock. Therefore, timeliness and an effective reduction technique are crucial in its management. We described a simple but effective technique of reducing an acutely inverted uterus using the ventouse cup.

**Methods:** This is a case report of a 32-year-old para 2 who delivered her third child at KKH recently. Her third stage of labour was complicated by an acute uterine inversion. We reduced the inversion by modifying the hydrostatic reduction techniques described by O'Sullivan and Ogueh. The ventouse cup, once inserted into the vagina, was gently withdrawn until its outer convex aspect sat snugly at the inner aspect of the introitus.

**Results:** This method provided a very good saline seal. No additional efforts or palm of the hands were required to keep the seal as there was no significant leakage. The accumulating water in turn exerted backward pressure to maintain the seal and subsequently, the generated hydrostatic pressure reduced the inverted uterus. The total blood loss was only 300 mL and the patient was well.

**Conclusion:** It is important to resist the tendency to push the ventouse cup deeper inside the vagina. The cup should sit snugly at the introitus. This simple manipulation of the ventouse cup ensures good saline seal which subsequently resulted in successful hydrostatic reduction of an acute uterine inversion.

### SUR637

#### The KKH Stillbirth Classification System

**NSY LUDDIN<sup>1</sup>, KH TAN<sup>1</sup>**

<sup>1</sup>Maternal Fetal Medicine, KK Women's and Children's Hospital, Singapore

**Aim:** Since 1999, KK Hospital has classified its stillbirth cases according to the KKH Stillbirth Classification, which is based on obstetric events. This study compared the KKH Stillbirth Classification with the Aberdeen (Obstetrics), Fetal/Neonatal Factors, Extended Wigglesworth and the Australia

& New Zealand Perinatal Death Classifications, in order to evaluate which system would be more informative to the clinicians.

**Methods:** Two hundred and eleven stillbirths occurring from January 2000 to December 2003 were retrospectively analysed. A stillbirth was defined as the delivery of a fetus at or beyond 28 weeks' gestation with no sign of life. The apparent cause for each stillbirth was identified after evaluation of genetic, chromosomal or anatomical abnormalities, maternal medical illnesses, laboratory tests, autopsy findings and placental pathologic conditions.

**Results:** The KKH Stillbirth Classification System could categorise distinctly the cause of stillbirth in at least 70% of the cases. It allowed obstetricians to identify factors leading to the death and whether the causal factors were recurrent. In contrast, other perinatal death classifications tended to group various fetal conditions in broad categories such as 'asphyxia' or 'specific fetal condition'. This broad categorisation was not useful to the clinicians.

**Conclusion:** The KKH Stillbirth Classification System serves as a guideline for the obstetricians to optimally investigate the causes of stillbirths. It takes into consideration various factors (including cultural), whilst avoiding unnecessary tests to derive a more conclusive cause of a stillbirth. This information will subsequently allow the caregivers to provide adequate counseling and treatment for the mothers before and during their next pregnancy.

### SUR638

#### Intestinal Atresia of Co-Twin after Spontaneous Cessation of Blood Flow through an Acardiac Twin — A Case Report

**HF WONG<sup>1</sup>, T TAN<sup>2</sup>, K KWEK<sup>2</sup>, Y LOW<sup>2</sup>, SH YEO<sup>2</sup>**

<sup>1</sup>Maternal Fetal Medicine, <sup>2</sup>Clinical Laboratory, KK Women's and Children's Hospital, Singapore

**Introduction:** The acardiac twin pregnancy is caused by reversed arterial perfusion through vascular anastomoses between 2 cord insertions in a mono chorionic placenta, characterised by a partial or complete lack of cardiac development in 1 of the twins.

**Case Report:** We report a case of acardiac twin pregnancy (managed expectantly with close fetal surveillance) with spontaneous cessation of blood flow through the acardiac twin, but which was complicated by the postnatal detection of intestinal atresia in the other surviving twin.

**Discussion:** This case report is interesting in 3 aspects. Firstly, it agrees with the observations by others that spontaneous cessation of blood flow in the acardiac twin may occur during expectant management. Secondly, the initial fear of the risk of cord entanglement in this case of mono chorionic monoamniotic twin pregnancy with a thrombosed cord was unfounded by our experience in this case. Thirdly, the finding of intestinal atresia/stenosis postnatally in the pump twin of brings fresh worries to the approach of expectant management.

### SUR639

#### Neurosurgical Problems in Complex Fronto-ethmoidal Meningoencephaloceles

**BK GAN<sup>1</sup>, WT SEOW<sup>1</sup>, CL FOO<sup>2</sup>**

<sup>1</sup>Neurosurgery, <sup>2</sup>Plastic and Reconstructive Surgery, KK Women's and Children's Hospital, Singapore

**Aim:** To highlight the neurosurgical problems associated with complex fronto-ethmoidal meningoencephaloceles (FEMs), their treatment requirements and outcomes.

**Methods:** The case and imaging records of patients with FEMs treated at the KK Women's and Children's Hospital from 2000 to 2005 were studied and abnormalities related to the brain were identified.

**Results:** Seven out of 9 children with FEMs were identified to have complex lesions. Their ages ranged from 1 month to 19 years and the sex ratio was 5:2. All underwent surgical repair in our institution. Four of the children had hydrocephalus which required shunting. Three children had arachnoid cysts, and 2 had large pore-encephalic cysts. One child with arachnoid cyst required a cysto-peritoneal shunt. One child had multiple cystic loculations of the

brain; another had a large brain hamatoma. Four children had endocrinopathies and 4 children had epilepsy. Five of these 7 children were developmentally delayed.

**Conclusion:** FEMs can be associated with multiple brain anomalies. Children with these complex FEMs require more care apart from simple closure of their encephaloceles. There is a high incidence of developmental delay and it is likely that the associated brain abnormalities and endocrinopathies are responsible for the poorer outcome in this particular group of children.

### SUR640

#### Treatment of Intracranial Arteriovenous Malformations in Children with Gamma Knife Radiosurgery

**BK GAN<sup>1</sup>, WT SEOW<sup>1</sup>**

<sup>1</sup>Neurosurgery, KK Women's and Children's Hospital, Singapore

**Aim:** We reviewed the outcome of children with arteriovenous malformations (AVMs) treated with GKR in our institution.

**Methods:** The case records of children with AVM who underwent gamma knife radiosurgery (GKR) in our institution were reviewed for this study.

**Results:** Nine patients with AVM underwent GKR from 1999 to 2005, 6 as a single therapy and 3 as a second treatment modality (1 following embolisation and 2 following surgery) for their AVMs. The ages ranged from 5 to 16.6 years. All AVMs were deep-seated and AVM target volumes were less than 5 cm<sup>3</sup>. Radiation dosage given was between 18 and 25 Grays at the 50% isodose line. Three children (<11 years old) underwent general anaesthesia for the procedure. There were no complications or further deterioration of existing neurological deficits in all children. Follow-up ranged from 0.75 to 5.5 years. Four children had documented angiographic obliteration after three years. One had partial obliteration at 3 years. Three children had not reached the 3-year mark for angiographic assessment and 1 was lost to follow-up overseas. No child had any recurrent haemorrhage. Only 1 patient required anti-epileptic treatment.

**Conclusion:** The AVM obliteration rate at 3 years was 66.6% in our evaluable patients. No re-bleeding was noted. GKR is a safe, feasible and effective option for the treatment of small deep seated intracranial AVMs in children and appears to confer some protection from re-bleeding.

### SUR641

#### A Case of Massive Pre-placental and Subchorionic Haematoma

**KSY LOI<sup>1</sup>, KT TAN<sup>1</sup>**

<sup>1</sup>Obstetrics and Gynaecology, KK Women's and Children's Hospital, Singapore

**Aim:** Massive placental haematomas have potential catastrophic consequences. We present an unusual case with both a massive pre-placental and a subchorionic haematoma.

**Case Report:** A 26-year-old Chinese woman presented with recurrent episodes of antepartum haemorrhage (APH) at 24 and 25 weeks associated with contraction pains. She was treated with intravenous tocolysis, dexamethasone and antibiotics. Ultrasound scan at 25 weeks showed a subchorionic haematoma in the lower posterior uterine wall measuring 5.0 x 4.6 x 2.7 cm and a separate pre-placental haematoma on the surface of the placenta measuring 4.3 x 2.0 cm. Colour Doppler showed no blood flow within both lesions. She was then managed with oral adalat for tocolysis and twice-weekly intramuscular progesterone. The pre-placental haematoma continued to grow to 9.3 x 6.6 cm at 32 weeks. At 32+4 weeks, a crash caesarean section was performed when the patient had another episode of severe APH.

**Results:** The patient had an uneventful postoperative course. The infant was also discharged well after an uneventful 21-day hospital stay.

**Conclusion:** "Subchorionic haematomas" are maternal clots, which separate the chorionic plate from the villous chorion. Much more rare are clots termed "pre-placental haematomas" which dissect between the layers of the chorionic plate. The use of colour Doppler helps to distinguish placental haematomas from chorioangiomas. The cause and pathogenesis of such haematomas



remains unclear. However, they are associated with high fetal loss rates and premature delivery particularly if there is antepartum bleeding. Careful surveillance, bed rest, use of corticosteroids, tocolysis, progesterone may have contributed to a good outcome in this case.

#### SUR642

### Blastocyst Culture: A Novel Way to Manage High Responders to Assisted Reproductive Techniques

**MS HENDRICKS<sup>1</sup>**

<sup>1</sup>Obstetrics and Gynaecology, KK Women's and Children's Hospital, Singapore

**Aim:** Severe ovarian hyperstimulation syndrome (OHSS) is a serious and potentially life-threatening condition following ovarian stimulation in assisted reproductive techniques (ART). Despite careful monitoring, a small number of women will respond with large numbers of oocytes. These high responders may develop prolonged and severe OHSS should they conceive with routine day 2 embryo transfer. To avoid exacerbation of OHSS, the standard measure is the cryopreservation of embryos. However, frozen thawed embryos carry a significantly lower pregnancy rate. In KKIVF, we explored a novel strategy of managing this group of patients. By culturing the embryos to blastocysts, the 3- to 4-day interval allows time to monitoring the development of clinically significant OHSS. The aim of this study was to evaluate the effectiveness of this strategy in the management of high responders in terms of severe OHSS rates and pregnancy rates.

**Method:** All high responders to ART treatment in KKIVF managed with this strategy from 8 July 2001 to 8 July 2004 were reviewed. Main outcome measures were implantation rates, pregnancy rates and severe OHSS rates.

**Results:** There were 33 high responders who underwent blastocyst culture with the aim of avoiding OHSS. Six patients subsequently did not have blastocyst transfer because of clinically significant OHSS. Ten women became pregnant. Clinical pregnancy rate was 33.3% and implantation rate was 23.5%. None had higher order multiple pregnancies or developed severe OHSS.

**Conclusion:** Blastocyst culture may be an effective strategy to manage high responders in ART. It allows the clinician to monitor high responders for clinically significant OHSS, transferring blastocysts without compromising clinical pregnancy rates and avoiding higher order multiple pregnancies.

#### SUR643

### Successful Management of Interstitial Heterotopic Pregnancy with Ultrasound-guided Selective Fetocide of the Ectopic Gestation – A Case Report

**MS HENDRICKS<sup>1</sup>, CL ONG<sup>2</sup>, SF LOH<sup>3</sup>**

<sup>1</sup>Obstetrics and Gynaecology, <sup>2</sup>Diagnostic Imaging, <sup>3</sup>Reproductive Medicine, KK Women's and Children's Hospital, Singapore

**Introduction:** Heterotopic pregnancy is a rare condition occurring between 1 in 4000 and 1 in 30,000 of natural conceptions. The rate is higher in patients conceiving by modern reproductive methods. It is reported to accompany 1% of assisted reproductive techniques (ART) and ovulation induction regime-related pregnancies. The ectopic gestation of a heterotopic pregnancy usually implants within the ampulla of the fallopian tube. When it implants in the interstitial portion of the fallopian tube, the resulting heterotopic pregnancy is especially dangerous since it may escape detection and suddenly rupture, causing massive haemorrhage and maternal mortality. Interstitial heterotopic pregnancy is not only a potentially life-threatening condition, it is also difficult to diagnose and therefore a high index of suspicion is crucial. One must never dismiss the possibility of a heterotopic pregnancy in such patients despite the presence of an intrauterine pregnancy.

**Case Report:** We report a case of an interstitial heterotopic pregnancy in a 38-year-old woman with a 5-year history of primary infertility, who conceived via superovulation and intrauterine insemination (SO-IUI). Interstitial heterotopic pregnancy is difficult to manage surgically as surgery on the interstitial portion of the fallopian tube is fraught with the risk of severe

haemorrhage and compromising the viability of the intrauterine pregnancy. Ultrasound-guided selective fetocide of the viable ectopic interstitial pregnancy was performed successfully after laparoscopy confirmed the diagnosis. The intrauterine pregnancy progressed uneventfully to term and delivered by normal vaginal delivery.

**Conclusion:** With early detection and appropriate management of heterotopic interstitial pregnancies, complications may be avoided and favourable outcomes achieved.

#### SUR644

### Markedly Elevated Serum CA125 in a Woman with Pulmonary Tuberculosis

**S SULAIMAN<sup>1</sup>, KH TAN<sup>2</sup>,**

<sup>1</sup>Obstetrics and Gynaecology, <sup>2</sup>Maternal Fetal Medicine, KK Women's and Children's Hospital, Singapore

**Aim:** To illustrate that a non-gynaecological condition like pulmonary tuberculosis should always be considered as one of our differential diagnoses in a woman presenting with markedly elevated serum CA125.

**Method:** A case report.

**Results:** A 26-year-old woman first presented to the Singapore Anti-Tuberculosis Association with cough and fever and was diagnosed to have pulmonary tuberculosis. She was also referred to Kangar Kerbau Hospital for exclusion of gynaecological pathology when she was found to have abnormally high serum levels of CA125 in the health screening programme done concomitantly. Pelvic examination and pelvic ultrasound were normal. The level of serum CA125 was monitored and returned to normal values with anti-tuberculosis treatment.

**Conclusion:** A non-gynaecological condition like pulmonary tuberculosis should always be considered as one of our differential diagnoses in a woman presenting with markedly elevated serum CA125. A chest X-ray can be an additional investigative tool in exclusion of pelvic malignancy in cases with raised serum CA125.

#### SUR645

### The Significance of Hydrosalpinges in In Vitro Fertilisation

**HH TAN<sup>1</sup>, T SINGH<sup>1</sup>, SF LOH<sup>2</sup>, KE LOH<sup>2</sup>**

<sup>1</sup>Obstetrics and Gynaecology, <sup>2</sup>Reproductive Medicine, KK Women's and Children's Hospital, Singapore

**Aim:** To review the effects of hydrosalpinx in tubal infertility and the possible benefits from tubal surgery on IVF-ET.

**Methods:** A retrospective review of clinical pregnancy rates of all IVF-ET cycles in patients with both tubal factor infertility and day 3 FSH of <11 mIU/mL over a 6-year period from 1997 to 2002. Appropriate tests of statistical significance were used when indicated.

**Results:** A total of 215 IVF-ET cycles (171 patients) were recorded. A trend towards lower pregnancy rates was observed in those cycles with hydrosalpinx although this did not approach statistical significance ( $P > 0.05$ ). The clinical pregnancy rates per ET in those without hydrosalpinx (group I: 188 cycles) versus those with hydrosalpinx (group II: 27 cycles) were 28.7% and 15.8% respectively. Baseline clinical data of age, total dose of gonadotrophin, days of stimulation and day 3 FSH were similar in the patients between the 2 groups. Due to the small numbers, various forms of prophylactic tubal surgery performed (salpingostomy, salpingectomy and neosalpingostomy) in 9 of the 27 cycles with hydrosalpinges did not yield any apparent benefits.

**Conclusion:** Owing to the embryotoxic properties, the presence of hydrosalpinges appears to have a deleterious impact on our local IVF-ET outcomes. This is of importance in counselling and prognostication of our patients with tubal infertility undergoing IVF cycles. As such, in line with current evidence, we believe that it is still prudent to offer prophylactic surgical intervention in these patients to improve pregnancy rates.

## SUR646

**The Randomised Controlled Trial of Misoprostol and Dinoprostone Vaginal Pessaries for Cervical Priming (TROMAD Study)**TC TAN<sup>1</sup>, GSH YEO<sup>2</sup>, SY YAN<sup>3</sup>, TM CHUA<sup>4</sup>, YS CHONG<sup>4</sup><sup>1</sup>Obstetrics and Gynaecology, <sup>2</sup>Maternal Fetal Medicine, KK Women's and Children's Hospital, Singapore, <sup>3</sup>Biostatistics Section, Clinical Trials and Epidemiology Research Unit, Singapore, <sup>4</sup>Obstetrics and Gynaecology, National University Hospital, Singapore

**Aim:** Most studies of labour induction with misoprostol used doses higher than 25 µg and intervals of 3 to 4 hours. We studied a low-dose regime of 25 µg misoprostol and compared its efficacy as single dose or double dose with dosing interval of 6 hours to our current regime of 3 mg dinoprostone pessary.

**Methods:** One hundred and seventy-one women with singleton term pregnancies and modified Bishop score (mBS)  $\geq 5$  were recruited and randomised into 3 arms: current dinoprostone regime, double dose misoprostol or single dose misoprostol. The primary outcome was the number of women who achieved favourable mBS  $>6$  or active labour by day 2. Secondary outcomes were time interval from insert to active labour or delivery, abnormal uterine activity, delivery method and adverse neonatal outcome.

**Results:** There were significantly more women in dinoprostone group who achieved primary outcome compared to misoprostol single dose group (93% versus 77.8%,  $P = 0.03$ ); more women in misoprostol double dose group achieved primary outcome compared to misoprostol single dose group (96.6% versus 77.8%,  $P = 0.003$ ). There was no difference in the primary outcome between misoprostol double dose and dinoprostone group ( $P = 0.438$ ). There was no difference in secondary outcome measures between the 3 groups. Multiparous women were more likely to achieve primary outcome compared to the nulliparous women ( $P = 0.018$ , OR 0.21, 95% CI 0.06- 0.77).

**Conclusion:** Double dose misoprostol 25 µg is as effective as dinoprostone 3-mg inserts for cervical priming; both are more efficacious compared to single dose misoprostol. Parity is a significant independent prognostic factor in the success of induction.

## SUR647

**Prognostic Factors of Stage IV Ovarian Cancer: A Retrospective Study**TC TAN<sup>1</sup>, J MOHD<sup>1</sup>, G SEE<sup>1</sup>, XY YAN<sup>2</sup>, J LOW<sup>3</sup><sup>1</sup>Obstetrics and Gynaecology, KK Women's and Children's Hospital, Singapore, <sup>2</sup>Biostatistics Section, Clinical Trials and Epidemiology Research Unit, Singapore, <sup>3</sup>Gynaecological Oncology, KK Women's and Children's Hospital, Singapore

**Aim:** We conducted a retrospective analysis to elucidate the prognostic factors of stage IV ovarian cancer.

**Methods:** Eligibility criteria included all patients with stage IV ovarian cancer who were surgically confirmed in our centre between January 1993 and June 2001. Data were collected regarding age, tumour histologic subtype, site of metastasis, preoperative CA125, cytoreductive surgery, residual disease after cytoreductive surgery, and response to primary chemotherapy. They were followed up till January 2005. Survival analyses were computed using the method of Kaplan-Meier based on the interval from the date of initial surgical procedures to the date of last follow-up or until death. The Cox proportional hazards regression model was used to identify independent variables associated with an improved survival rate.

**Results:** Seventeen patients with stage IV ovarian cancer were identified. The median age of the patients was 64 years. The most common site of extraperitoneal disease was malignant pleural effusion (41.2%). Thirteen patients (76.5%) were optimally cytoreduced. Most patients received platinum-based combination chemotherapy for primary chemotherapy. In multivariate analysis, residual disease after cytoreductive surgery was independent prognostic predictor of outcome. The overall median survival for optimally debulked patients was 52 months compared to 9 months for suboptimally

debulked patients ( $P = 0.027$ , 95% CI 0.044-0.827, hazard ratio 0.19).

**Conclusion:** Optimal surgical debulking is an important prognostic factor of survival in patients with stage IV ovarian cancer.

## SUR648

**The Accuracy of Midtrimester Ultrasound Diagnosis of Placenta Praevia Major in the Prediction of Placenta Praevia at Delivery**HY WEE<sup>1</sup>, KH TAN<sup>2</sup>, G YEO<sup>2</sup><sup>1</sup>Obstetrics and Gynaecology – Menopause, <sup>2</sup>Maternal Fetal Medicine, KK Women's and Children's Hospital, Singapore

**Aim:** To determine the correlation between placenta praevia major at 18 to 22 weeks diagnosed during transabdominal sonography and the incidence of obstetric complications caused by placenta location.

**Methods:** In an ongoing prospective audit of routine screening sonography in non-selected pregnant women, the placenta position was determined transabdominally. The case notes of women noted to have placenta that covered the internal cervical os at 18 to 22 weeks over a 12-month period were reviewed for persistence of placenta praevia and related obstetric complications.

**Results:** Transabdominal sonography was performed for 10,961 women. The placenta covered the internal os in 136 (1.2%) cases. Information regarding delivery was unavailable for 7 cases because the patients delivered outside our centre. Vaginal delivery was possible in 43 (33.3%) cases. Eighty-six (66.7%) women had caesarean section and 65 (50.4%) women had placenta praevia confirmed at surgery. Antenatal vaginal bleeding necessitating hospitalisation occurred in 34 (26.4%) women; all had placenta praevia at delivery. All cases of migrated placenta had no vaginal bleeding requiring hospitalisation. Placenta praevia was more likely to persist in cases with uterine scar 13/22 (59.1%) than without 52/105 (48.6%) but this did not reach statistical significance ( $P = 0.484$ ). There were 3 (2.3%) cases of caesarean hysterectomy; 1 case had a previous uterine scar. There were no maternal deaths.

**Conclusion:** Placenta praevia major at 18 to 22 weeks determined by the abdominal route is associated with a high incidence of placenta praevia at delivery and antepartum haemorrhage. This high risk must be emphasised during counselling.

## SUR649

**Paediatric Adenoidectomy in KK Women's and Children's Hospital and Adenoidectomy Using Microdebrider**KK TAN<sup>1</sup>, LS NG<sup>2</sup><sup>1</sup>Otolaryngology, KK Women's and Children's Hospital, Singapore, <sup>2</sup>Otolaryngology – Head and Neck Surgery, National University Hospital, Singapore

**Aim:** To study the epidemiology and outcome of paediatric adenoidectomy in KKH, and to determine the safety and efficacy of microdebrider adenoidectomy.

**Methods:** We studied 132 patients who underwent adenoidectomy from 1997-2005. Patient characteristics noted were age, gender, and indication for surgery. Preoperative investigations, size of adenoids, method of adenoidectomy and concomitant procedures were recorded. Outcome measures were operating time, complications, need for repeat adenoidectomy and parent's satisfaction. Safety of microdebrider adenoidectomy was determined from its complications and efficacy was extrapolated from the time taken for surgery, need for repeat adenoidectomy and parent's satisfaction with respect to obstruction. The results of various techniques of adenoidectomy were compared.

**Results:** The patients' age ranged from 6 months to 18 years and the male-to-female ratio was 2.2:1. Indications included 59 cases of sleep related breathing disorder (SRBD), 18 otitis media with effusion (OME), 3 rhinosinusitis/adenoidectomy, 18 SRBD with OME, 22 SRBD with rhinosinusitis/adenoidectomy, 3 OME with rhinosinusitis/adenoidectomy and 9 cases with all 3 indications. Most of the adenoids filled up more than 50% on lateral neck X-ray/endscope. Methods of adenoidectomy were microdebrider, conventional

curette and suction diathermy. Two patients experienced excessive intra-operative bleeding, 6 were admitted for postoperative vomiting and another 2 for poor feeding postoperatively. 94.3% of the patients had improved symptoms. Of those who underwent microdebrider adenoidectomy, there were no complications, a greater proportion had symptom improvement and there were no repeat adenoidectomy.

**Conclusion:** The mean age at which adenoidectomy was carried out corresponded to the age of greatest adenoid hypertrophy and gender ratio were found to be similar to that of our Western counterparts. Complication rate was comparable to other studies. Microdebrider adenoidectomy is a safe and effective technique.

#### SUR650

##### **Campylobacter jejuni: A Rare Cause of Colonic Perforation**

**JHY CHUA<sup>1</sup>, CH CHUI<sup>1</sup>, AS JACOBSEN<sup>1</sup>**

<sup>1</sup>Paediatric Surgery, KK Women's and Children's Hospital, Singapore

**Aim:** *Campylobacter* infections are the most common cause of bacterial enterocolitis in humans. Although most of those affected will report mild gastroenteritis symptoms, *Campylobacter jejuni* can occasionally cause severe life-threatening diarrhoeal disease, systemic sepsis, toxic megacolon and even colonic perforations. To date, there have only been 10 reported cases of *C. jejuni*-related colonic perforations; only 2 of these occurred in children.

**Methods:** We report a healthy 9-year-old boy who presented with caecal perforations secondary to *C. jejuni* enterocolitis.

**Results:** He underwent an emergency limited right hemicolectomy and had an uneventful recovery.

**Conclusion:** Although caecal perforations from infective aetiologies are exceedingly rare in children, this case illustrates the need to consider this diagnosis when a patient presents with localised right-sided peritonitis with a history not consistent with acute appendicitis.

#### SUR651

##### **Not Just a Pain in the Neck: A Case Series of Cervical Abscesses with Atypical Causation**

**MA DE SILVA<sup>1</sup>, C ONG<sup>1</sup>, CH CHUI<sup>1</sup>**

<sup>1</sup>Paediatric Surgery, KK Women's and Children's Hospital, Singapore

**Aim:** Cervical abscess is a common condition in children that results from suppurative bacterial cervical lymphadenitis. It is routinely treated with simple incision and drainage and no further investigations apart from a single intra-operative wound swab for bacterial culture. We have encountered in our practice, seemingly typical cervical abscesses with unusual causative agents, which require different therapy. The aim of this review was to identify the key clinical indicators that would prompt the clinician to send specimens for specific cultures and histology.

**Methods:** Chart and pathology review of consecutive cases of cervical abscesses from Jan 2003 to May 2005 were carried out.

**Results:** There were 57 patients whose median age was 3 years and 10 months (range, 19 days to 14 years). Wound cultures grew common bacterial organisms in 63% of cases, majority of which were *Staphylococcus aureus*. Cultures were aseptic in 28% of cases. Atypical microbiology and histopathology were found in 9% of cases (1 *Mycobacterium tuberculosis*, 1 BCG lymphadenopathy, 1 *Mycobacterium haemophilum*, 1 actinomycosis, and 1 malignant lymphoma). These 5 cases are discussed in detail to highlight the "red flags" in each that raised suspicion.

**Conclusion:** In the management of childhood cervical abscesses, a thorough history-taking should identify most atypical cases that require specific investigations and early alternative therapy.

#### SUR652

##### **Laparoscopic Fundoplication: The Pars Flaccida Approach**

**Y LOW<sup>1</sup>, CH CHUI<sup>1</sup>, A JACOBSEN<sup>1</sup>**

<sup>1</sup>Paediatric Surgery, KK Women's and Children's Hospital, Singapore

**Aim:** Fundoplication for gastroesophageal reflux disease in children is now increasingly done endoscopically. Benefits cited include decreased operative stress and shorter recovery times. However, safe and effective laparoscopic fundoplication requires advanced laparoscopic skills, with a steep learning curve. Significant morbidity, such as oesophageal perforations, have been reported. The objective of this paper was to assess a modified surgical technique in retro-oesophageal dissection.

**Methods:** The pars flaccida approach to the dissection of the space behind the oesophagus is used by adult bariatric surgeons working in the same anatomical area as in fundoplication. The surgeon starts by specifically identifying the pars flaccida as a surgical landmark and incising it. Then peritoneal windows on the right crus and at the angle of His to the left of the cardia are opened. Once this is done, the plane behind the oesophagus opens up effortlessly.

**Results:** Even in the hands of our trainee surgeons, the dissection was achieved neatly and in a much shorter time than before.

**Conclusion:** This minor technical modification, when taught specifically, was easily reproducible and consistently and considerably eased dissection and shortened operative times.

#### SUR653

##### **Laparoscopic-assisted Trans-umbilical Meckel's Diverticulectomy for Diverse Meckel's Diverticular Complications in Children**

**S PRASAD TR<sup>1</sup>, CH CHUI<sup>1</sup>, CEL TAN<sup>2</sup>, AS JACOBSEN<sup>2</sup>**

<sup>1</sup>Paediatric Surgery, <sup>2</sup>General Paediatric Surgery, KK Women's and Children's Hospital, Singapore

**Aim:** To analyse the safety and efficacy of laparoscopic-assisted trans-umbilical Meckel's diverticulectomy (LATUM) for diverse Meckel's diverticular complications in children.

**Methods:** Retrospective analysis of all the consecutive cases of LATUM done by a trainee in paediatric laparoscopic surgery from January 2004 to May 2005 was done.

**Results:** Eight patients (5 males and 3 females) aged 3 to 13 years (median, 12 years) underwent LATUM by the same surgeon. Three patients had painless per-rectal bleeding and 1 patient presented with intestinal obstruction due to a mesodiverticular band and intestinal ischaemia. Two presented with features masquerading as appendicitis; one had perforated Meckel's diverticulum (MD) with secondary inflammation of the appendix and the other had a torted and gangrenous MD. In 2 patients, incidental MD with a narrow base was noted at appendectomy for appendicitis. All patients underwent successful LATUM along with appendectomy in 4 patients. The operative duration was 72-165 minutes (mean 112.1 ± 30.6). There were no operative complications and none required conversion to open surgery. The hospital stay was 4-7 days (mean 4.7 ± 1.2). The patient with Meckel's band intestinal obstruction presented with adhesive intestinal obstruction 2 weeks after the surgery. Laparoscopic-assisted mini-laparotomy was done to release the pelvic adhesions. There were no other complications during the follow-up (0.5-12 months, mean 4.8 ± 4).

**Conclusion:** LATUM is a safe and effective procedure with a better cosmetic outcome that can be performed for diverse manifestations of MD. The technique also allows palpation of the MD and avoids usage of expensive staplers.

**SUR654****Laparoscopic Resection of Torted Meckel's Diverticulum****S PRASAD TR<sup>1</sup>, CH CHUI<sup>2</sup>, AS JACOBSEN<sup>2</sup>**<sup>1</sup>Paediatric Surgery, <sup>2</sup>General Paediatric Surgery, KK Women's and Children's Hospital, Singapore

**Aim:** To report an unusual case of acute abdomen due to a torted Meckel's diverticulum (MD) in a 13-year-old boy and illustrate the efficacy of laparoscopy in the diagnosis and management of acute surgical abdomen in children.

**Methods:** The clinical features, investigations, laparoscopic management and follow-up were noted.

**Results:** A 13-year-old boy presented with acute lower abdominal pain, one episode of blood streaked stools and low-grade fever for one day's duration. On examination, the right iliac fossa was tender with rebound tenderness. The haemogram was normal except for a marginally raised total white count ( $11.6 \times 10^9/L$ ). At laparoscopy, a torted and gangrenous MD that was retort-shaped, with a narrow pedicle and multiple twists, was found covered with omentum and adherent to the parieties at the right iliac fossa. The MD was resected successfully after ligating the narrow base with a pre-tied loop suture (vicryl endoloop, Ethicon) and delivered through the umbilicus. The entire procedure was performed through one 10-mm umbilical camera port and 2 5-mm working ports at the left iliac fossa and suprapubic region. The histopathological examination revealed a completely infarcted lesion. The postoperative recovery was uneventful and the patient was discharged on the 4th postoperative day.

**Conclusion:** Torsion of the MD is a rare form of complicated MD. To our knowledge this is only the third case described in children and the first to be managed entirely by laparoscopy. This case also illustrates the versatility of laparoscopy in the diagnosis and management of acute abdominal conditions in children.

**SUR655****Swallowed Foreign Bodies in Children: Report of Four Unusual Cases****S PRASAD TR<sup>1</sup>, Y LOW<sup>2</sup>, CEL TAN<sup>2</sup>, CH CHUI<sup>2</sup>, AS JACOBSEN<sup>2</sup>**<sup>1</sup>Paediatric Surgery, <sup>2</sup>General Paediatric Surgery, KK Women's and Children's Hospital, Singapore

**Aim:** To report 4 unusual cases of foreign body (FB) ingestion in children and discuss the management issues.

**Methods:** The history, clinical findings, investigations, and management were noted.

**Results:** Four children had accidentally swallowed an iron nail, metallic dumbbell, safety pin and a cushion pin respectively. The abdominal plain radiographs in all the patients revealed the FB in the stomach. Oesophago-gastro-duodenoscopy (OGD) was done in all the patients and the nail, metallic dumbbell and open safety pin were successfully retrieved using a dormia basket, polypectomy snare and rat tooth forceps respectively. The cushion pin had migrated to the duodeno-jejunal junction within 4 hours of ingestion and necessitated open duodenotomy and retrieval. All patients did well after the procedure with no complications.

**Conclusion:** Swallowed foreign bodies with pointed or sharp ends or large enough to cross the pylorus and duodenal sweep require removal, in the majority of the cases, they can be retrieved by OGD. Sharp FBs that have crossed the 2nd part of duodenum necessitate emergent laparotomy for retrieval to prevent complications.

**SUR656****Childhood Appendicitis: Is Laparoscopy the Order of the Day?****S PRASAD TR<sup>1</sup>, CH CHUI<sup>1</sup>, AS JACOBSEN<sup>1</sup>**<sup>1</sup>Paediatric Surgery, KK Women's and Children's Hospital, Singapore

**Aim:** To analyse the safety and efficacy of laparoscopic appendicectomy (LA) as a training procedure and feasibility in the management of complicated appendicitis and concurrent lesions.

**Methods:** Retrospective analysis of all the consecutive cases of LA done by a trainee in paediatric laparoscopic surgery from September 2003 to May 2005 was done.

**Results:** Ninety consecutive patients aged 3-15 years (mean,  $10.4 \pm 2.6$ ) with suspected appendicitis underwent LA by the same surgeon. Seventeen patients had acute appendicitis (AA), 32 had acute suppurative appendicitis (ASA) adherent to the caecum with localised and/or pelvic pus pocketing, 35 had perforated appendicitis (APA) with peritonitis and 6 had normal appendix [mesenteric adenitis (1), omental infarct (1), torted Meckel's diverticulum (MD) (1), torted ovary (1), ruptured luteal cyst and haemoperitoneum (1) and primary peritonitis (1)]. Four patients underwent simultaneous laparoscopic Meckel's diverticulectomy. Partial omentectomy for omental infarct, oophorectomy for torted ovary and ovarian cystectomy for ruptured haemorrhagic luteal cyst was done in 1 patient each. There were no operative complications and none required open conversion. The operative duration ranged from 23-110 minutes (mean,  $55.6 \pm 23.4$ ). The hospital stay was 1-4 days (mean,  $2.6 \pm 1.2$ ) for AA, 2-7 days (mean,  $3.6 \pm 1$ ) for ASA and 3-14 days (mean,  $5.4 \pm 2.2$ ) for APA. There were 3 complications; 2 had adhesive intestinal obstruction and underwent successful laparoscopic adhesiolysis and 1 had umbilical wound infection.

**Conclusion:** Laparoscopy is a safe and an effective procedure for complicated appendicitis as well as concurrent lesions encountered in children with suspected appendicitis in addition to being an effective laparoscopic training procedure.

**SUR657****Empyema Thoracis in Children: Is Thoracoscopic Decortication Safe and Effective?****R RAI<sup>1</sup>, S PRASAD TR<sup>1</sup>, CH CHUI<sup>1</sup>, Y LOW<sup>1</sup>, AS JACOBSEN<sup>1</sup>**<sup>1</sup>Paediatric Surgery, KK Women's and Children's Hospital, Singapore

**Aim:** We report our experience with thoracoscopic decortication (TD) for empyema thoracis (ET) in children and analyse the safety and efficacy of the procedure.

**Methods:** A retrospective analysis of all the cases of ET that underwent TD from January 2000 to December 2004 was done. The duration of symptoms, radiographic studies, operative findings were noted and the outcome and the complications were analysed.

**Results:** Thirty-nine consecutive patients (23 males and 16 females) aged 3 months to 8 years (mean,  $3.7 \pm 2$  years) underwent TD for ET. The mean duration of symptoms at presentation was  $8.3 \pm 4.9$  days and the period of in-patient medical management was  $4.8 \pm 3$  days before surgery. All patients underwent TD through 3 ports. Four patients needed minithoracotomy for completion of decortication and none needed pulmonary resection although lung abscess cavities were deeroofed. There were no operative complications. The operative duration was 45-177 minutes (mean,  $105.1 \pm 31.9$ ). The chest tubes were removed after a mean period of  $4.8 \pm 1.9$  days from surgery. The mean duration to reach afebrile status was  $6.5 \pm 3.3$  days and the postoperative hospital stay was for 5-17 days (mean,  $9.1 \pm 2.7$ ).

**Conclusion:** TD for ET in children is safe and ensures a steady recovery.

**SUR658****Laparoscopic versus Open Appendicectomy for Perforated Appendicitis in Children: A Comparative Case Survey****R RAI<sup>1</sup>, S PRASAD TR<sup>1</sup>, CH CHUI<sup>1</sup>, CCP ONG<sup>1</sup>, Y LOW<sup>1</sup>, TL YAP<sup>1</sup>, AS JACOBSEN<sup>1</sup>**<sup>1</sup>Paediatric Surgery, KK Women's and Children's Hospital, Singapore

**Aim:** To compare laparoscopic appendicectomy (LA) with open appendicectomy (OA) in children with perforated appendicitis.

**Methods:** A retrospective analysis of all the consecutive cases of perforated appendicitis who underwent open or laparoscopic appendicectomy between July 2001 and April 2004 was done.

**Results:** One hundred and twenty-eight consecutive patients with perforated appendicitis underwent either open ( $n = 46$ ) or laparoscopic appendicectomy

(n = 82). Both groups were comparable with respect to age, sex, duration of symptoms and operative findings. The mean operative time was 104.7 ± 30.5 minutes in the LA group and 92.8 ± 34.3 minutes in the OA group (P = 0.046). The return to afebrile state after surgery was significantly faster in LA group (mean, 42.7 ± 37.1 hours) than OA group (mean, 77 ± 70.2 hours) (P = 0.003). Hospital stay compared favourably in the LA group (mean, 6.4 ± 1.9 days) than with the OA group (mean, 8.1 ± 3.3 days) (P = 0.009). Postoperative complications included wound infection, adhesive obstruction and pelvic abscess formation. The incidence of these complications was 7.3 % in LA group and 21.7 % in the OA group (P = 0.025).

**Conclusion:** Our results indicate that laparoscopic appendectomy is safe and feasible in children with perforated appendicitis.

#### SUR659

##### Is It Viable to Convert High-response Superovulation-Intrauterine Insemination (SO-IUI) Cycles to Assisted Reproductive Techniques (ART) Programme?

**SKE LOH<sup>1</sup>, SF LOH<sup>1</sup>, CT YEONG<sup>1</sup>, S NADARAJAH<sup>1</sup>, ZJ CHEN<sup>1</sup>**

<sup>1</sup>Reproductive Medicine, KK Women's and Children's Hospital, Singapore

**Aim:** Our SO-IUI programme has an average success rate of about 15%. About 6% to 7% of our patients have an unexpected high ovarian response and face cancellation in order to avoid high-order multiple pregnancies. Our study assessed the viability of converting these cycles to ART and compared costs of cancellation and a subsequent SO-IUI attempt again.

**Method:** This is a prospective case control study (January 2002 to December 2004). Forty-three patients with high-response SO-IUI cycles accepted conversion to ART with daily GnRH antagonist injections (group A). One hundred and two control ART cycles (group B) were matched by the women's age and cycle number. Main outcome measures were failed oocyte retrieval rate and clinical pregnancy rate per embryo transfer (CPR). *t*-test and Fisher's exact test were applied to compare outcomes.

**Results:** Group A had 1 (2.3%) and group B had no failed egg retrievals. There was no significant difference in the CPR between groups (A: 51.22%, B: 44.44%). There were 2 cases (4.65%) of severe OHSS in group A and 1 (0.98%) in group B. Cost of cancellation and a subsequent SO-IUI cycle was S\$2500. Cost of converting an SO-IUI cycle to ART was S\$4600. The calculated cost incurred to achieve a clinical pregnancy was S\$16,850 for the cancellation group and S\$9330 for the conversion group.

**Conclusion:** Conversion of "high-response SO-IUI cycles to ART" seems to be an attractive cost-effective option for patients with high-response SO-IUI cycles as the higher costs was balanced by a higher pregnancy rate.

#### SUR660

##### Will Reducing the Number of Embryos Transferred Affect Success Rate in Our IVF/ICSI Programmes?

**SKE LOH<sup>1</sup>, Z CHEN<sup>1</sup>, SF LOH<sup>1</sup>, S NADARAJAH<sup>1</sup>**

<sup>1</sup>Reproductive Medicine, KK Women's and Children's Hospital, Singapore

**Aim:** To determine whether electively replacing only 2 cleavage stage embryos (eDET) will adversely affect the success rate in an IVF/ICSI programme.

**Methods:** This prospective 1-year study (January to December 2004) offered all women below 40 years old, in their first 3 cycles, who had more than 3 usable embryos (grade 3 to 5), an opportunity to replace only 2 cleavage-stage embryos and cryopreserve the remaining embryos. Fifty-one women took up this offer. We compared them with the results for women below 40 years where 3 embryos were the standard number transferred. Main outcome measures included clinical pregnancy per embryo transfer (CPR) and multiple pregnancy rates.

**Results:** The average age was 32.2 years (range, 24.9 to 38.3 years). The average number of usable embryos was 9.8 (range, 4 to 18). All 51 cycles had some supranumerary embryos frozen and the mean number of embryos frozen was 7.51. The CPR was 41.18% (21/51). The twin rate was 23.8% (5/21), whilst the incidence of triplet and higher order pregnancies was 0%. The

patients with 3 embryos transferred had a CPR of 40.8% with 24.5% of twin pregnancies and 8.8% of triplet and higher order pregnancies.

**Conclusion:** Electively reducing the number of embryos transferred to 2 (eDET) in selected IVF/ICSI patients has not affected their success rate. Good prognostic features for offering eDET include age below 40 years, in their first 3 cycles and having good embryos. This will also reduce the incidence of triplet and higher order pregnancies.

#### SUR661

##### Predictive Value of the Number of Oocytes Retrieved at Ultrasound-directed Follicular Aspiration with Regards to Fertilisation Rates and Pregnancy Outcome in ART Cycles

**SW SENG<sup>1</sup>, SF LOH<sup>1</sup>, N SADHANA<sup>1</sup>, SKE LOH<sup>1</sup>**

<sup>1</sup>Reproductive Medicine, KK Women's and Children's Hospital, Singapore

**Aim:** To determine the number of oocytes sufficient for satisfactory fertilization and pregnancy rates in fresh IVF/ICSI cycles.

**Methods:** A retrospective analysis of all fresh ART cycles done in KKIVF centre from January 2003 to December 2003.

**Results:** The numbers of oocytes obtained per cycle were classified into groups A, B, C and D, consisting of 78, 140, 116, 156 cycles, with 1-5, 6-10, 11-15, >15 oocytes retrieved from each patient in each group and the average number of embryos transferred were 2.3, 2.7, 2.8 and 2.7 respectively. The average number of usable embryos per cycle (2.26/cycle), percentage of frozen embryos (6.2%), pregnancy rates (29.5%) and live birth rates (16.7%) were the lowest in group A compared to the other groups. Highest pregnancy rates and live birth rates were seen in group B. The incidence of OHSS (9.6%) was the highest in group D.

**Conclusion:** Retrieval of between 6 and 10 oocytes per patient resulted in satisfactory pregnancy rates. Higher rate of oocyte retrieval was associated with increasing risk of OHSS.

#### SUR662

##### Clinical Experience with Two Different Gonadotropin-releasing Hormone Antagonists, Ganirelix And Cetorelix, in Women undergoing Controlled Ovarian Hyperstimulation for In vitro Fertilisation

**SW SENG<sup>1</sup>, SKE LOH<sup>1</sup>**

<sup>1</sup>Reproductive Medicine, KK Women's and Children's Hospital, Singapore

**Aim:** To evaluate and compare the clinical effectiveness of 2 different GnRH antagonists used in our IVF centre for controlled ovarian hyperstimulation.

**Method:** Retrospective, comparative study from January 2004 to May 2005 at KKIVF centre of women who had used an antagonist for ovarian hyperstimulation. Main outcome measures were total number of oocytes collected, total number of usable embryos, clinical pregnancy rate per embryo transfer and ovarian hyperstimulation syndrome (OHSS).

**Results:** A total of 34 patients were identified with 14 using Ganirelix and 20 using Cetorelix. There were no significant differences in the mean number of days of stimulation (9 vs 10 days), mean number of days of antagonist used (5 vs 5 days), the total number of oocytes collected (302 vs 278) and total number of usable embryos (137 vs 103) for Ganirelix and Cetorelix groups respectively. The clinical pregnancy rates (42.8% vs 20.0%, P < 0.2) was higher in the Ganirelix group but not clinically significant. The fertilisation rate for the Ganirelix group was significantly higher (83.8% vs 60.1%, P < 0.01). There were 2 cases of OHSS, both in the Ganirelix group.

**Conclusion:** The use of either GnRH antagonist Ganirelix or Cetorelix in controlled ovarian hyperstimulation had good clinical outcome and pregnancy rates in this initial experience.

**SUR663****Early Experience with the Gynecare TVT Obturator System****HC HAN<sup>1</sup>, LA TSENG<sup>1</sup>**<sup>1</sup>*Urogynaecology, KK Women's and Children's Hospital, Singapore*

**Aim:** Tension-free vaginal tape (TVT) is currently the gold standard in treating female stress urinary incontinence, but with a 3% incidence of bladder perforation and few cases of vascular and bowel injuries, could the TVT obturator (TVT-O) be a safer midurethral sling system?

**Methods:** A retrospective analysis of 98 women who had TVT-O surgery was done. Using de Leval's method, TVT-O was performed with concomitant surgeries like vaginal hysterectomy, pelvic floor repair and sacrospinous ligament fixation when indicated. The perioperative and early postoperative complications at 1 month were reviewed.

**Results:** Mean patient age was 53.7 years (SD: + 10.9 years), mean BMI 25.7 (SD: + 4.1) and 46% of the patients were menopausal. Thirteen (13.7%) patients had had previous continence surgery. Twelve (12.6%) patients had low pressure urethra. There were 3 (3%) cases of moderate wound bleeding, 1 (1%) bladder abrasion, and 1 (1%) labial haematoma. Two (2%) cases had postoperative bleeding requiring reoperation. Both of them had concomitant vaginal hysterectomy. Three (4%) cases needed catheter for up to 1 week. The readmission rate was 2%, both for acute retention of urine. One had TVT-O tape loosened after 1 week. There were other complications like mild wound bruising (12%), wound pain (22%), and backache (1%). Eighty-four (84%) patients were reviewed at 1 month. Only 3 (3.6%) had subjective complaints of SUI. Three (3.6%) patients had urge/urge incontinence. Three (3.6%) patients had decreased urinary flow, but all had RU <100 mL. Seven (8.3%) patients complained of thigh/wound pain at 1 month.

**Conclusion:** TVT-O produced different sets of postoperative problems. More randomised controlled trials are needed.

**SUR664****What Is Normal? A Prospective Study to Evaluate Pelvic Organ Position in Nullips using the Pelvic Organ Prolapse Quantification (POP-Q)****LC LEE<sup>1</sup>**<sup>1</sup>*Urogynaecology, KK Women's and Children's Hospital, Singapore*

**Aim:** Pelvic organ prolapse (POP) is a common condition in women. There are several systems developed to quantify the degree of POP. The latest was the POP Quantification (POP-Q) by the International Continence Society. We aimed to assess the pelvic organ positions of 50 nullips using the POP-Q.

**Methods:** This is a prospective study involving all nullips who are visiting our urogynaecology center and are sexually active. Vaginal examination was done and the results recorded according to the POP-Q.

**Results:** Our results show that in nullips, the genital hiatus is less than 3 cm and the perineal body is between 2 and 4 cm.

**Conclusion:** This study is important for all surgeons doing pelvic floor reconstruction. We need to know what is normal before we can restore the anatomy of patients with POP.

**SUR665****Gynemesh\* PS in Anterior Colporrhaphy — Does It Reduce Cystourethrocele Recurrence?****LA TSENG<sup>1</sup>, HC HAN<sup>1</sup>**<sup>1</sup>*Urogynaecology, KK Women's and Children's Hospital, Singapore*

**Aim:** Lucente (2004) quoted up to 40% recurrence risk after prolapse surgery. This study was to determine the efficacy and complication rates of Gynemesh\* PS in anterior colporrhaphy.

**Methods:** We conducted a retrospective review of 83 patients with grade 3 to 4 or recurrent cystourethrocele having anterior colporrhaphy utilising Gynemesh. Concomitant surgeries like vaginal hysterectomy, TVT, and

sacrospinous ligament fixation were performed when indicated. Follow-up was at 6 months. The ICS prolapse grading system was used. Cure was defined as grades 0 to 1 cystourethrocele, and failure as grade >2.

**Results:** The patients' mean age was 62 years (SD: + 8 years), mean BMI 26.0 (SD: + 4.4). The majority of patients (92.8%) were menopausal. Seventeen (20.5%) patients had grade 3, 59 (71.1%) had grade 4, and 7 (8.4%) had recurrent cystourethroceles. Only 3 (3.6%) patients had short-term voiding difficulties. Sixty-seven (80.7%) patients came for 6-month follow-up. Of the 61 patients with primary repair, 53 (87.0%) patients were cured; 6 (9.8%) had grade 2, 1 (1.6%) grade 3, and 1 (1.6%) grade 4 recurrences. There were 2 (3.3%) cases each of UTI and mesh erosion. There were 3 (4.9%) cases of de novo urge/urge incontinence. Of the 6 patients with recurrent cystourethrocele, 5 (83.3%) were cured and 1 (16.7%) had grade 2 recurrence. There was only 1 case (16.7%) of mesh erosion.

**Conclusion:** Our initial experience with Gynemesh was very favourable. More prospective randomised trials are needed.

**SUR666****The Use of Gynemesh\* PS in the Repair of Severe and Recurrent Cystourethrocele****LA TSENG<sup>1</sup>, HC HAN<sup>1</sup>**<sup>1</sup>*Urogynaecology, KK Women's and Children's Hospital, Singapore*

**Aim:** Sand (2002) reported a 43% and 11% risk of recurrent grade 1 and 2 cystourethrocele after an anterior colporrhaphy. This study was to determine the efficacy and complication rates of Gynemesh\* PS in the surgical repair of grade 4 and recurrent cystourethroceles.

**Methods:** A retrospective review of 44 patients was performed. A double-winged Gynemesh was placed tension-free over the cystourethrocele, with both wings extended retropubically. Kelly-suture plication and vaginal wall repair was then completed. Concomitant surgeries inclusive of vaginal hysterectomy, TVT, posterior repair, and sacrospinous ligament fixation were performed when indicated. Follow-up was at 12 months. The ICS prolapse grading system was used. Success was defined as grades 0 or 1, with failure >grade 2 cystourethrocele.

**Results:** The patients' mean age was 63 years (SD: + 9 years), mean BMI 25.5 (SD: + 3.7), and 89% were menopausal. Thirty-seven (84%) patients had grade 4 cystourethrocele. Seven had recurrent cystourethrocele. Postoperatively, only 3 (7%) patients had short-term voiding difficulties. Thirty-three (75%) patients came for 1-year review. Of the 27 patients with primary repair, 21 (77.7%) were cured, 5 (18.6%) had grade 2, and 1 (3.7%) grade 3 cystourethrocele. There was 1 (3.7%) case each of perineal pain and new SUI. Of the 6 patients with repeat surgery, 5 (83.3%) were cured. One (16.7%) had grade 2 recurrence. One (3.0%) patient had asymptomatic mesh erosion.

**Conclusion:** Our one-year experience with Gynemesh\* PS appears very favourable. A prospective randomised trial is currently underway.

**SUR667****Prospective Evaluation of Morbidity and Incidence of Arm Swelling after Axillary Lymph Node Dissection (ALND) for Operable Breast Cancer: A Pilot Study****WS YONG<sup>1</sup>, R WJAJAYA<sup>2</sup>, HK ONG<sup>3</sup>, DCS HO<sup>2</sup>, H HOSAIN<sup>3</sup>, YW CHAN<sup>3</sup>**<sup>1</sup>*Surgery, National Cancer Centre, Singapore, <sup>2</sup>Surgery, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>3</sup>Physiotherapy, Singapore General Hospital, Singapore*

**Aim:** Axillary lymph node dissection (ALND) remains the most accurate means of determining lymph node status. This is at the expense of morbidity, in particular limitation of shoulder function and arm swelling. The aim of this study was to pilot a 2-page assessment tool to assess both physical and psychological morbidity after ALND among the local breast cancer patient population.

**Methods:** Twenty patients who had undergone full unilateral ALND for



treatment of breast cancer at least 3 months prior in the surgical unit at the Singapore General Hospital and National Cancer Centre completed the assessment tool. Arm volumes were measured using an optoelectronic volometer and shoulder movements with a goniometer. A symptom- and function-specific questionnaire was also completed.

**Results:** 15% were found to have significant arm swelling (>200 mL). 40% had a difference in abduction, flexion or external rotation of 20 degrees or more on the affected side. 40% reported symptomatic complaints of pain, stiffness or heaviness. 45% reported difficulty in 1 of the 4 functional screening tasks. Though none reported avoidance of affected arm usage for recreational activities, 30% reported difficulty in performing daily household chores. 50% reported psychological morbidity.

**Conclusion:** This pilot study provided accurate documentation of morbidity associated with ALND and a method to standardise collection of morbidity data locally. The morbidity of ALND is common and a comprehensive prospective study should be carried out to obtain relevant data in the local breast cancer patient population.

### SUR668

#### The Effects of Locally Injected Steroid on Palatal Mucoperiosteum Secondary Wound Healing

JB LAI<sup>1</sup>, BT GOH<sup>1</sup>, G YIP<sup>2</sup>

<sup>1</sup>Oral and Maxillofacial Surgery, National Dental Centre, Singapore, <sup>2</sup>Anatomy, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** The classic palatal surgery for closure of cleft palatal defect involves undermining the palatal mucosa, swinging it medially to cover the defect of the palatine part and leaving the donor area with exposed bone for the mucoperiosteum to heal secondarily that eventually undergo wound contraction and scarring. The goal of this study is to analyse the effects of intralesional corticosteroid on mucoperiosteal wound healing process in 24 5-week-old rats.

**Methods:** The rats were divided into steroid-injected treated groups, normal saline-injected treated groups and noninjected groups. They were then sacrificed at 8 and 42 days and stained for alpha-smooth muscle actin, type I and III collagen and measurement of the wound margin were done under light microscope.

**Results:** The steroid-injected treated groups had lower alpha-smooth muscle actin, type I and III collagen compared with the other 2 groups, of which the differences for alpha-smooth muscle actin and type III collagen were statistically significant despite the small sample size. The steroid-treated group also had lesser wound contraction.

**Conclusion:** This may imply that intralesional steroid can reduce the amount of wound contraction and scarring in cleft palate repair.

### SUR669

#### Angiogenic Role of Vascular Endothelial Factor in Bone Regeneration

TS LO<sup>1</sup>, SH CHAY<sup>2</sup>, T CAO<sup>2</sup>, SH TEOH<sup>3</sup>

<sup>1</sup>Orthodontics, National Dental Centre, Singapore, <sup>2</sup>Preventative Dentistry, National University of Singapore – Faculty of Dentistry, Singapore, <sup>3</sup>Department of Mechanical Engineering, National University of Singapore, Singapore

**Aim:** To investigate the angiogenic capability of vascular endothelial Growth factor (VEGF) in bone defects using fibrin glue and poly-ε-caprolactone (PCL) scaffold.

**Method:** Defects were created in skulls of 32 rabbits (4 groups). Twelve rabbits were grafted with PCL with rhVEGF and fibrin glue (VEGF + fibrin + PCL). Twelve rabbits were grafted with PCL and fibrin glue only. The other 2 control groups were PCL only and empty. Histological analyses of blood vessels were done at 1 and 2 weeks. A 2-way analysis of variance and post-hoc comparisons between groups were done ( $P < 0.05$ ).

**Results:** Significantly more blood vessels were observed with the VEGF + fibrin + PCL group compared to control groups.

**Conclusion:** VEGF delivered by fibrin glue in PCL scaffold promotes angiogenesis in the early stage of bone regeneration and may be used for its angiogenic role in bone repair/reconstruction applications.

### SUR670

#### Effects of the Mandibular Advancement Device (MAD) on Chinese Adults with Obstructive Sleep Apnoea (OSA)

KH POON<sup>1</sup>, WC FOONG<sup>2</sup>, YH CHAN<sup>3</sup>, SH CHAY<sup>2</sup>

<sup>1</sup>Orthodontics, National Dental Centre, Singapore, <sup>2</sup>Preventative Dentistry, National University of Singapore – Faculty of Dentistry, Singapore, <sup>3</sup>Biostatistic Unit, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** A prospective study was done to evaluate the effects of the mandibular advancement device (MAD) on Chinese adult subjects with mild to severe obstructive sleep apnoea (OSA).

**Methods:** Fourteen (8 males, 6 females) subjects diagnosed with OSA by overnight (baseline) polynography were fitted with the MAD. Assessment of sleepiness was evaluated with the Epworth Sleepiness Scale (ESS). Three subjects dropped out of the study. The final sample consisted of 11 subjects (6 males, 5 females). The mean (standard deviation) baseline apnoea/hypopnoea index (AHI) was 38.4 (17.2) events/h, minimum arterial oxygen saturation (SaO<sub>2</sub>) was 75.5 (11.1)% and the ESS score was 8.9 (4). The final sample wore the MAD for an average of 13.7 (7.2) months before the second polysomnogram. Body mass index (BMI) and neck circumference (NC) of the final sample were measured at baseline and second polysomnogram. Treatment success was defined as more than 50% reduction in AHI together with AHI less than 20 events/h. Variables were compared using Wilcoxon signed-rank test to determine the statistical significance at the 5% level.

**Results:** At the second polysomnogram, the BMI and NC were statistically insignificant compared with the same measurements taken at the first polysomnogram. The AHI was significantly reduced to 10.9 (14.7) events/h. Minimum SaO<sub>2</sub> was significantly increased to 86 (8.4)%. Treatment was successful in 9 out of 11 subjects (81%). ESS score was significantly reduced to 4.8 (3.4).

**Conclusion:** There was an improvement in respiratory parameters and ESS scores with the MAD in this sample of Chinese adults subjects with mild to severe OSA.

### SUR671

#### Light-based Facial Imaging System – A 3D Validation Study

MY WOO<sup>1</sup>, KWC FOONG<sup>2</sup>, YH CHAN<sup>3</sup>, SK KAN<sup>4</sup>

<sup>1</sup>Orthodontics, National Dental Centre, Singapore, <sup>2</sup>Preventative Dentistry, National University of Singapore – Faculty of Dentistry, Singapore, <sup>3</sup>Biostatistics, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>4</sup>Private Practice (Orthodontics), Singapore

**Aim:** To assess the reliability of a light-based facial imaging system in registering a complex object as well as evaluating the reliability of interactive localisation of anthropometric landmarks on three-dimensional facial images.

**Methods:** Two experiments were carried out using the FaceVision 600 light-based facial scanner (Geometrix Inc, California, USA). Ten serial 3-dimensional images of a dry human skull with 8 steel ball bearings acting as visual cues for landmark localisation were obtained. The scanning protocol for the dry skull was repeated 2 weeks later. Interactive computer landmark localisation produced x, y, and z coordinates for each landmark on the dry skull. Ten facial images of a live subject with and without 8 pre-labeled anatomic landmarks were obtained, respectively. Images were obtained without varying the scanning protocol. Interactive computer landmark localisation produced x, y, and z coordinates for each landmark. Measurements for inter-canthal width, inter-alar width and inter-cupid width were taken as linear measures along the most direct line between 2 respective landmarks on the facial surface. Inter-commissure width was taken as a straight line linear measure.

**Results:** For the skull images taken at 2 weeks apart, Bland-Altman plots show all pairs of measurements for all 8 landmarks were found to lie within 95% limits of agreement. For the facial images, Bland-Altman plots showed all pairs of intercanthal, inter-alar, inter-cupid, and inter-commissure measurements with and without landmarks to lie within 95% limits of agreement.

**Conclusion:** Data from both experiments show that the FaceVision 600 facial imaging system is a reliable clinical tool for three-dimensional quantitative assessment of frontal facial surface anatomy.

## SUR672

### Vascular Endothelial Growth Factor (VEGF) Expression in Replanted Canine Teeth

**RANG<sup>1</sup>, V SAE-LIM<sup>2</sup>**

<sup>1</sup>Restorative Dentistry, National Dental Centre, Singapore, <sup>2</sup>Restorative Dentistry, National University of Singapore – Faculty of Dentistry, Singapore

**Aim:** To compare VEGF expressed within the periodontium of immediate and delayed replanted teeth versus non-extracted teeth.

**Methods:** Experimental canine roots were treated endodontically. Immediate group (Imm = 30) roots were extracted and replanted immediately. Delayed group (Del = 29) roots were extracted and replanted after 1 hour of dried time. Non-experimental group (NE = 10) roots were not extracted. Animals were sacrificed after 1, 2, 3 and 4 days. Structures were prepared using standardised immunohistochemical protocol. Cementum, periodontal ligament (PDL) and bone were evaluated semi-quantitatively and qualitatively. Statistical analyses were done using Kruskal-Wallis ( $P < 0.05$ ) and Mann-Whitney U tests ( $P < 0.001$ ).

**Results:** When comparing NE and Imm groups, cementum cell count (CCC) was significant for Imm group at day 3 and day 4. Cementum intensity score (CIS) was significant at all time groups. Periodontal ligament cell count (PCC) was insignificant at all time groups. Periodontal ligament intensity score (PIS) was significant at days 2, 3 and 4. Bone cell count (BCC) was insignificant at all time groups. Bone intensity score (BIS) was significant at day 4 for Imm. When comparing NE and Del groups, CCC was significant for day 2 and 3 in Del group. CIS was significant at all time groups. PIS was significant for days 2, 3 and 4 in Del group. PCC, BCC and BIS were insignificant for all time groups. When comparing Imm versus Del groups, the cementum, periodontal ligament and bone CC and IS were insignificant at all time groups.

**Conclusion:** There was significantly more VEGF expressed by cementum, periodontal and bone when immediate and delayed replanted teeth were compared to the NE group.

## SUR673

### The Effect of Crown Preparation Height on Resistance Form

**EWJ LEONG<sup>1</sup>, KBC TAN<sup>2</sup>, EK CHUA<sup>1</sup>, JCL NEO<sup>3</sup>, KM WONG<sup>3</sup>, JI NICHOLLS<sup>4</sup>**

<sup>1</sup>Restorative Dentistry, National Dental Centre, Singapore, <sup>2</sup>Restorative Dentistry, National University of Singapore – Faculty of Dentistry, Singapore,

<sup>3</sup>Private Practice, Singapore, <sup>4</sup>Restorative Dentistry, University of Washington, Seattle, USA

**Aim:** This study investigated the effect of tooth preparation height and luting agent on resistance form of full-coverage cast restorations as determined by load fatigue performance.

**Methods:** Eight groups of human maxillary premolars (Groups ZP2, ZP3, ZP4, ZP5, PF2, PF3, PF4 and PF5,  $n = 10$ ) were prepared to occluso-cervical dimensions of 2, 3, 4 and 5 mm and a total occlusal convergence of 20 degrees. Full metal crowns were cast with a gold-palladium alloy and cemented using either zinc phosphate cement (ZP groups) or Panavia F resin cement (PF groups). Using a custom-made fatigue machine, a bend-release cyclic fatigue load of 6.0 kg was applied to a standardised load point on the buccal cusp of the crown-tooth specimens at an angle of 135 degrees to the long axis of the tooth. A strain gauge was bonded to the palatal tooth-crown margin and the strain gauge output signal was monitored to detect preliminary failure. The

number of cycles to preliminary failure was compared among test groups using ANOVA and Scheffe's post-hoc test ( $P < 0.05$ ).

**Results:** Panavia F cement test groups were significantly different from zinc phosphate cement with regards to the number of cycles to preliminary failure. There was no statistically significant difference in the number of cycles to failure among groups ZP4, ZP5, PF2, PF3, PF4 and PF5. Group ZP2 was significantly different from all other test groups. Groups ZP5 and PF4 were significantly different from groups ZP2 and ZP3, but not from other groups.

**Conclusion:** A new concept whereby resistance form can be quantified in terms of resistance length (RL) is proposed.

## SUR674

### Clinical Evaluation of 215 Etched Porcelain Veneers over a 13-year Period

**C SIM<sup>1</sup>, KW YUEN<sup>1</sup>, YH CHAN<sup>2</sup>**

<sup>1</sup>Restorative Dentistry, National Dental Centre, Singapore, <sup>2</sup>National University Medical Institute, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** The aim of this study was to evaluate the clinical performance of etched porcelain veneers.

**Methods:** Fifty-five proximal veneers on 51 teeth and 160 full labial veneers were placed in 73 patients between 1989 and 1992. One hundred and eighty-one veneers had margins on tooth structure; 34 had margins on existing restorations. Veneers were evaluated at issue (baseline), 1-, 3-, 6-month post-issue and thereafter at 6-monthly intervals till 2002. Besides assessing periodontal parameters and vitality, marginal adaptation, marginal discoloration, colour match and caries recurrence were evaluated using modified USPHS criteria. Differences between veneer type and veneer margin on veneer survival and time to fracture, crack, marginal discoloration, recurrent caries and vitality loss were analysed using Kaplan-Meier methods. Their association with development of clinical performance parameters was assessed using chi-square/Fisher's exact tests.

**Results:** Four (1.9%) veneers had adhesive fractures and were replaced. Seventeen (7.9%) had cohesive fractures. Four veneers developed cracks; 1 was replaced. Four veneers developed recurrent caries; 1 was replaced and 3 restored. Nineteen (8.8%) veneers showed marginal discoloration. Of the 81 veneers that were colour-matched, 62 (76.5%) were well matched at baseline. Two teeth showed vitality loss and 1 developed endodontic failure. Veneer type had no significant effect on veneer survival and time to development of all clinical performance parameters. Full labial veneers were more likely to have fractures ( $P = 0.021$ ). Veneers with margins on existing restorations had a significantly shorter time to veneer survival ( $P = 0.0003$ ), fracture ( $P = 0.016$ ), crack ( $P = 0.0015$ ) and marginal discoloration ( $P < 0.001$ ). They had a significant association with fracture rates ( $P = 0.030$ ), crack development ( $P = 0.013$ ) and marginal discoloration ( $P = 0.001$ ).

**Conclusion:** Porcelain veneer survival in this study was independent of veneer type. Most clinical performance parameters were affected by placement of veneer margins on existing restorations.

## SUR675

### A Five-year Study of the Success and Survival of Fixed Partial Dentures

**KTAN<sup>1</sup>, ESY CHAN<sup>2</sup>, CPC SIM<sup>1</sup>, KH TEOH<sup>1</sup>, EK CHUA<sup>1</sup>, KW YUEN<sup>1</sup>, NN CHEN<sup>1</sup>**

<sup>1</sup>Restorative Dentistry, National Dental Centre, Singapore, <sup>2</sup>Evidence Based Medicine, Clinical Trials and Epidemiology Research Unit, Singapore

**Aim:** To determine the risk of survival and success of fixed partial dentures (FPDs) and the incidences of biological and technical complications after a period of at least 5 years.

**Methods:** Patients treated with FPDs at the National Dental Centre were identified through electronic records and recalled for a clinical examination by a prosthodontist. Secondary caries, progressive periodontal disease and loss of vitality were evaluated as biological complications and loss of

retention, fractures of teeth or the framework constituted technical complications.

**Results:** Eighty-five patients with a median age of 55 years and a total of 99 FPDs were recalled for the study. Fifty-eight (58.6%) were successes requiring no intervention during the observation period. Thirty-two (32.3%) FPDs remained in situ but suffered some complication, while 9 (9.1%) had failed and were removed. The mean age of failed FPDs was 3.1 years. The mean age of surviving FPDs was 6.1 years. Of the 32 with complications, 1 (1%) showed increased mobility due to periodontitis, 4 (4%) suffered vitality loss, 2 (2%) suffered retention loss, 2 (2%) showed recurrent caries, and 23 (23.2%) had partial ceramic fracture. The 5-year risk for FPD success was between 62.5% (95% CI 52.7, 71.2) and 68% (95% CI 59.5, 76). The 5-year survival was 92.3% (95% CI 86.5, 96.6). Caries incidence was 5.8% (95% CI 2.5, 11.8) and incidence of abutment vitality loss was 4.4% (95% CI 1.5, 9.5). FPDs with non-vital abutments and those with a longer span (5 or more units) were more likely to suffer a complication or a failure.

**Conclusion:** The 5-year risk for FPD survival and success was 92.3% and 62.5% to 68%, respectively.

### SUR676

#### Healing Response of Diabetics Following Non-surgical Periodontal Therapy — Clinical and Serum Lipid Results after 9 Months

CC TAN<sup>1</sup>, LP LIM<sup>2</sup>, F TAY<sup>3</sup>, AC THAI<sup>4</sup>, CF SUM<sup>5</sup>

<sup>1</sup>Restorative Dentistry, National Dental Centre, Singapore, <sup>2</sup>Preventive Dentistry, National University Hospital, Singapore, <sup>3</sup>Dental Service, Alexandra Hospital, Singapore, <sup>4</sup>Medicine, National University Hospital, Singapore, <sup>5</sup>Diabetics, Alexandra Hospital, Singapore

**Aim:** To determine the influence of glycaemic control and/or periodontal therapy on serum lipid levels.

**Methods:** This randomised controlled clinical trial was performed to evaluate the healing response of diabetic patients with varying metabolic control 9 months following non-surgical periodontal therapy. One hundred diabetics were recruited from the AH and NUH diabetic centres. Selected individuals were first divided into well- and poorly controlled diabetics, based on their glycated haemoglobin HbA1c levels, and then randomly subdivided into treatment (test) and non-treatment (control) groups. The treatment group received oral hygiene instructions and/or scaling and/or root planing. No treatment was rendered to the non-treatment group. All subjects were examined at baseline, 3 months and 9 months. Each examination included an assessment of HbA1c, serum lipid [including total cholesterol (TC), triglyceride (TG) and LDL] levels and a full mouth periodontal assessment, including mean plaque score and bleeding on probing (BOP).

**Results:** Poor glycaemic control was associated with poorer periodontal condition and higher TC/TG at baseline. Only the treatment groups showed significant improvement in mean plaque score and BOP ( $P < 0.04$  for the well-controlled diabetics;  $P < 0.01$  for the poorly controlled diabetics). The poorly controlled diabetics who received periodontal treatment also showed significant improvement in LDL levels ( $P = 0.006$ ).

**Conclusion:** This present study shows the beneficial effects of simple periodontal therapy in improving the periodontal health of patients with diabetes. The relative improvement appears more marked in patients with poor glycaemic control.

### SUR677

#### Minimally Invasive Carpal Tunnel Decompression

CL HO<sup>1</sup>, P HWANG<sup>1</sup>

<sup>1</sup>Neurosurgery, National Neuroscience Institute, Singapore

**Aim:** Carpal tunnel syndrome is a common condition causing hand pain, dysfunction and paresthesia. We have developed a new technique to release the carpal tunnel combining the advantages of the open and endoscopic procedures, without the need for endoscopic set-up, by using a new instrument called KnifeLight.

**Methods:** Between July 2003 and January 2005, 28 consecutive patients

with clinical signs and symptoms and electrodiagnostic findings consistent with carpal tunnel syndrome and had not responded to, or had refused, non-operative management were enrolled in our study and underwent the new procedure. Thirty-three procedures on 15 left and 18 right hands were performed on 28 patients, consisting of 18 women to 10 men. A small less than 10-mm incision was made in the wrist crease. The KnifeLight was inserted and the ligament incised completely. Follow-up evaluations were performed at 2 weeks, 3 months and 6 months after surgery.

**Results:** There were no related complications. During the first 3 months after surgery, the grip strength, pinch strength, and hand dexterity improved significantly in almost all our patients. No technical problems with respect to nerve, tendon, or artery injuries were noted in this group. Twenty-six patients had good to excellent improvement and only 1 had no improvement.

**Conclusion:** Our minimally invasive method offers a simple and effective alternative to the classic or endoscopic carpal tunnel decompression. This minimal invasive surgery hastens the resumption of routine activities and return to work.

### SUR678

#### Keyhole Surgery for Treatment of Brain Aneurysms

CL HO<sup>1</sup>, P HWANG<sup>1</sup>

<sup>1</sup>Neurosurgery, National Neuroscience Institute, Singapore

**Aim:** Many different surgical approaches were previously described for the treatment of intracranial aneurysms. A common feature of all the approaches have been the relatively extensive brain exposure and brain retraction, causing increasing surgical morbidity not related to the lesion itself. The ultimate goal is the smallest possible approach with optimal surgical results while preserving cosmesis. The aim of this study was to describe our experience with keyhole craniotomies in treating supratentorial aneurysms.

**Methods:** We retrospectively reviewed all patients with supratentorial aneurysms who underwent transorbital keyhole procedures. A total of 46 patients underwent 50 transorbital keyhole craniotomies from July 2003 to February 2005. The concept and technique of keyhole surgery is presented in detail.

**Results:** The 46 patients comprised 12 men (26%) and 34 women (74%). The average age of the patients was 57.3 years and the follow-up period ranged from 4 to 24 months. All patients (100%) were successfully clipped. Overall morbidity was 8.7%, with cerebral infarction being the most common complication (4.3%). Overall mortality was 2.2%.

**Conclusion:** The transorbital keyhole craniotomy is an effective technique for gaining access to and treating supratentorial aneurysms. The craniotomy extension allows greater exposure than the conventional keyhole supraorbital approach, which makes the technique safe for the patient. Our success was achieved through better microscopic illumination in the deep surgical field and by gaining access to the complete supratentorial vascular territory with minimal cerebral retraction and excellent cosmetic result.

### SUR679

#### Endoscopic Approach for the Treatment of Clival Chordoma

CL HO<sup>1</sup>, P HWANG<sup>1</sup>

<sup>1</sup>Neurosurgery, National Neuroscience Institute, Singapore

**Aim:** The present surgical approaches for removal of clival tumours are fairly extensive, invasive and associated with certain mortality and high morbidity. Here we describe a minimally invasive surgical technique for the surgical treatment of clival tumours. This navigated endoscopic endonasal transsphenoidal (NEETS) approach offers a direct and minimally invasive route for removal of clival tumours.

**Methods:** Three men — 43, 46 and 66 years old — presented with history of headaches, diplopia and cranial nerves deficits. MRI showed large clival tumours. With endonasal neuroendoscopy, there is no need for microscope. In every operation, we prepare patients with image guidance system as this neuronavigational tool will help us to detect the extent of tumour invasion in the depth and width.

**Results:** All 3 patients had subtotal removal of clival tumours using this method, and the histology revealed chordomas. No mortality and no morbidity has been reported in our series. Furthermore, this endoscopic clival surgery reduced patient's discomfort, hastening recovery as well as shortening hospital stay.

**Conclusion:** As a minimally invasive surgical strategy, the navigated endonasal endoscopic transphenoidal approach has been implemented for the surgical treatment of clival and midline posterior fossa tumours which conventionally require radical and extensive surgical exposure. By introducing this minimally invasive endoscopic transphenoidal approach with neuronavigation in treating clival tumours, we believe that safe exposure and tumour resection can be achieved with no morbidity and mortality.

#### SUR680

##### Keyhole Surgery for the Treatment of Large Pituitary and Suprasellar Tumours

CL HO<sup>1</sup>, P HWANG<sup>1</sup>

<sup>1</sup>Neurosurgery, National Neuroscience Institute, Singapore

**Aim:** Transphenoidal, subfrontal and supraorbital craniotomy techniques were previously described for the treatment of sella and parasellar tumours. We present our results with transorbital keyhole craniotomy, a frontal craniotomy that incorporates the orbital roof and is performed via an eyebrow incision. This technique was used in 10 patients treated surgically in Singapore.

**Methods:** A total of 10 patients underwent 10 transorbital craniotomies from July 2003 to February 2005. The primary indication for transorbital keyhole approach was mass lesion of the orbit, anterior fossa, sella and parasellar regions.

**Results:** A total of 7 women and 3 men, with a mean age of 50.8 years, underwent 10 procedures. The primary pathological finding was pituitary macroadenoma, which occurred in 5 patients (50%), followed by tuberculoma, sellar meningioma (10%), craniopharyngioma (10%), lymphoma (10%), orbital dermoid tumour (10%) and pure germinoma (10%). There was minimal morbidity and no mortality in this series.

**Conclusion:** The transorbital keyhole craniotomy provides excellent exposure to the orbit, anterior cranial fossa, sella, suprasellar and parasellar region with little morbidity, while preserving the cosmesis. From our experience, this approach provides a safe method for resecting tumours in these locations, with potential future applications for treating other pathologies in these regions as well.

#### SUR681

##### Keyhole Subtemporal Approach for Lesions Involving Cavernous Sinus, Posterior and the Middle Cranial Fossa

CL HO<sup>1</sup>, P HWANG<sup>1</sup>

<sup>1</sup>Neurosurgery, National Neuroscience Institute, Singapore

**Aim:** Skull base lesions that involve the cavernous sinus, middle and posterior fossa are difficult to treat, and usually require large extensive, invasive skull base approaches. Therefore we introduce subtemporal transtentorial keyhole approach for surgical management of these complicated skull base lesions.

**Methods:** Between July 2003 and January 2005, 10 patients underwent this subtemporal transtentorial keyhole approach for surgical treatment of multiple intracranial pathologies. All presented with multiple cranial nerve deficits and hemiparesis from brainstem compression. A 5-cm subtemporal incision was made, from which a small 3-cm diameter temporal craniotomy was opened. The middle fossa floor was drilled, extradural anterior petrosotomy performed, dura opened, and the tentorium was incised. The cavernous sinus was opened intradurally. Most patients achieved complete tumour removal, including the cavernous sinus portions.

**Results:** All patients improved neurologically after surgery. Four patients experienced partial improvement of their cranial nerve deficits. Very few complications were associated with this procedure. The histologies: 3 patients

had meningioma, 1 had trigeminal schwannoma, 1 had haemangiopericytoma, 1 had plasma cell tumour, 1 had chordoma, 1 had lymphoma, and 2 had anaplastic astrocytoma.

**Conclusion:** No major complications were associated with this approach. The subtemporal keyhole approach used in this series is designed to minimise patient morbidity while maximising lateral and superior exposure, as well as direct access to the ventral surface of the brainstem. The subtemporal transtentorial keyhole approach is a safe and effective surgical technique for removal of lesions involving cavernous sinus, posterior and middle cranial fossa.

#### SUR682

##### Transpetrosal Keyhole Surgery for Skull Base Tumours

CL HO<sup>1</sup>, P HWANG<sup>1</sup>

<sup>1</sup>Neurosurgery, National Neuroscience Institute, Singapore

**Aim:** Tumours of the cranial base and vascular lesions in the petroclival region are difficult to approach surgically. They usually require large extensive, invasive skull base approaches. We introduced a minimally invasive transpetrosal keyhole approach for surgical management of such lesions.

**Methods:** We describe our experience with transpetrosal keyhole approach to skull base lesions. A 5-cm retroauricular incision was made. A small, individually targeted pre-sigmoid limited petrosotomy was performed to expose the posterior and/or middle fossa dura. The superior petrosal sinus was ligated and cut. The dura was then opened. No brain retraction was used at all.

**Results:** Case 1: Large anterior inferior cerebellar artery aneurysm was uncoilable. A 63-year-old woman presented with subarachnoid haemorrhage in coma. The aneurysm was successfully repaired, and she eventually regained consciousness. Case 2: Giant intra-cranial dermoid in a 59-year-old Chinese man, involving all the cranial nerves. The dermoid was completely excised, and he improved neurologically.

**Conclusion:** The advantages of this approach are: 1) small incision, 2) minimal hair shaving, 3) minimal skull base drilling, 4) less postoperative pain and scarring, 5) no brain retraction, and 6) faster postoperative recovery. Transpetrosal operations have been shown to offer distinct advantages over traditional operations in approaching lesions of the petroclival area. These approaches were initially used to improve access to the cerebellopontine angle, but have subsequently been refined to expand exposure of the basilar artery, anterior brain stem, and clivus for a variety of lesions. Here we have introduced a minimally invasive trans-petrosal keyhole approach for surgical management of such lesions, which also preserve cosmesis and hasten our patients' recovery.

#### SUR683

##### Artificial Disc Surgery in Cervical Degenerative Disc Disease: A Review of 22 Cervical Arthroplasties

T KRCIK<sup>1</sup>, M AWAD<sup>1</sup>, KK TAN<sup>1</sup>, JSH TAN<sup>1</sup>

<sup>1</sup>Neurosurgery, National Neuroscience Institute, Singapore

**Aim:** To review cases that underwent cervical arthroplasties in NNI and to analyse the results of 22 cervical arthroplasties with regards to postoperative complications and preservation of segmental motion.

**Method:** A retrospective study of patients who underwent anterior cervical discectomy with 3 types of artificial discs in NNI from November 2002 till May 2005.

**Results:** A total of 22 artificial discs were included in this study, 10 Bryan discs, 5 PCM (Porous coated motion) and 7 Prodisc-C. Four patients had double levels. The mean operative time was 170 minutes. Two patients had a previous fusion at C5-6 and C4-5 respectively and were operated for adjacent levels disease. Artificial disc mobility was preserved in all implants except 1. All patient were improved neurologically at the follow-up periods.

**Conclusion:** Artificial disc surgery is still in its early phases and it has been shown to decrease patient morbidity. Artificial discs do preserve motion at the operated levels. Whether these devices can restore motion at operated

levels if already lost preoperatively needs to be studied in a large series and hence whether the preoperative loss of motion is a contraindication of arthroplasty. Long-term follow-up study for devices with failed mobility is also needed to detect their long-term complications, if any.

#### SUR684

##### Prevalence of Abnormal CT Scans Following Mild Traumatic Brain Injury

**KK LEE<sup>1</sup>, I NG<sup>2</sup>**

<sup>1</sup>Nursing, <sup>2</sup>Neurosurgery, National Neuroscience Institute, Singapore

**Aim:** To examine the prevalence of CT intracranial abnormalities following mild traumatic brain injury (TBI) patients.

**Methods:** This is a retrospective study using a prospectively maintained TBI database. Details of Glasgow Coma Score (GCS), signs and symptoms on presentation and CT imaging and numbers of patients who talk and deteriorate were examined.

**Results:** There were a total of 1036 patients admitted to National Neuroscience Institute with diagnosis of mild TBI from January to December 2004. CT head was performed on 601 (53%) patients with 134 (12.9%) with abnormal CT findings including 80 (9.3%) with presenting GCS 15, 19 (23.8%) with GCS 14, and 3 (14.3%) with GCS 13. Mean age of these 134 patients was 59.9 ± 18.7 (17-96), male 71.2%, and signs and symptoms on presentation included scalp injuries (45.8%), loss of consciousness (55.1%), headache (32.2%), vomiting (33.1%) and amnesia (39.8%). Neurosurgical operations were performed on 20 (14.9%) of them. There were 16 (12%) patients who subsequently deteriorated to GCS <8, 4 (25%) died, 8 (50%) had good outcome and 4 (25%) had poor outcome at 6 months.

**Conclusion:** Findings from this study indicate that early and accurate detection of patients who initially may seem to be at risk of developing intracranial lesions and appropriate treatment can reduce morbidity and mortality associated with TBI. Evidenced-based clinical practice guideline on the use of radiological investigations, hospital admission, observation and management may be useful.

#### SUR685

##### Correlation of Histology with Anorectal Function Following Stapled Haemorrhoidectomy

**MH KAM<sup>1</sup>, F SEOW-CHOEN<sup>1</sup>, M PAWAN<sup>1</sup>, XH PENG<sup>1</sup>, P KUMARASINGHE<sup>2</sup>, I CHEW<sup>2</sup>**

<sup>1</sup>Colorectal Surgery, <sup>2</sup>Pathology, Singapore General Hospital, Singapore

**Aim:** The inadvertent removal of smooth muscle during the use of stapled haemorrhoidectomy had raised concerns about its effects on postoperative anorectal function. We correlated the amount of smooth muscle removed with anorectal function in the early postoperative period.

**Methods:** Patients were assessed preoperatively with an Eypasch quality of life questionnaire and underwent anorectal manometry and physiology testing. This was followed by a similar examination at 3 months postoperatively. Patients were operated by a single surgeon and the excised anorectal mucosa was sent for histological examination. The amount of smooth muscle excised was expressed semi-quantitatively as a percentage of the total tissue removed.

**Results:** Sixty-eight patients (33 males) were recruited prospectively, with median age of 44 years. Six patients were lost to follow-up. Removal of anal transitional zone did not increase the incidence of incontinence. Both median pre and postoperative continence scores were good. Only 1 patient had incontinence to gas as a result of the operation. Median pre and postoperative quality of life scores were 114 and 131 respectively out of a total of 144, the higher postoperative scores showing an improvement. Correlation of quality of life scores and mean resting anal pressures with percentage of smooth muscle removed did not show any statistical significance.

**Conclusion:** Some smooth muscle will invariably be excised in stapled haemorrhoidectomy but the amount of smooth muscle removed did not significantly affect the continence score, quality of life or mean resting anal pressure after stapled haemorrhoidectomy. It remains a safe and preferred procedure for the treatment of haemorrhoids.

#### SUR686

##### Resection of Rectal Cancer Recurrence after Initial Curative Surgery

**PK KOH<sup>1</sup>, KW EU<sup>1</sup>, CL TANG<sup>1</sup>, BS OOI<sup>1</sup>, KS HO<sup>1</sup>**

<sup>1</sup>Colorectal Surgery, Singapore General Hospital, Singapore

**Aim:** Recurrent rectal cancer is difficult to manage and surgery offers the only hope for long-term survival. We examined the outcome of surgical versus non-surgical treatment of recurrent disease following an initial resection of a potentially curable rectal cancer.

**Methods:** Data on tumour location, stage, histology and follow-up were obtained from a retrospective review of all cases of rectal cancer operated in the Department of Colorectal Surgery, Singapore General Hospital between 1 January 1997 and 31 December 2001.

**Results:** Of the total of 813 cases of rectal cancers operated upon during the period of study, 642 patients were operated upon with curative intent. Of the latter, 81 patients (12.6%) developed recurrences. An in-depth review of these 81 patients with a median follow-up period of 25.4 months (inter-quartile range, 15.1 months) revealed 31 cases (4.8%) with local recurrence and 50 (7.8%) with distant metastasis. The mean disease-free interval after initial surgery was 11.8 ± 9.2 months. Forty-two patients underwent further surgery for recurrences with 25 patients (59.5%) operated for local recurrence. However, there was no statistical difference in overall survival between those who underwent further surgery and those managed non-surgically for tumour recurrence.

**Conclusion:** Further surgery for seemingly localised recurrence following initial curative surgery may not result in appreciable improvement in overall survival compared to non-surgical management of advanced recurrent rectal cancer.

#### SUR687

##### Cutaneous and Subcutaneous Metastases of Adenocarcinoma of the Colon and Rectum

**LS LEE<sup>1</sup>, KY TAN<sup>2</sup>, KS HO<sup>1</sup>, JF LIM<sup>1</sup>, BS OOI<sup>1</sup>, CL TANG<sup>1</sup>, KW EU<sup>1</sup>**

<sup>1</sup>Colorectal Surgery, Singapore General Hospital, Singapore, <sup>2</sup>General Surgery, Changi General Hospital, Singapore

**Aim:** The interesting topic of cutaneous and subcutaneous metastasis from rectal carcinoma is discussed using 3 cases which illustrate 2 different modes of spread.

**Case Report:** The first case is a 70-year-old man with T3N2M0 rectal mucinous adenocarcinoma who developed an inflammatory subcutaneous metastasis at the left scapula 2 years after anterior resection. The second case is a 51-year-old man with T4N2M0 splenic flexure mucinous adenocarcinoma who developed metastatic disease including a subcutaneous secondary. The third case is a 53-year-old lady who developed vulval recurrence 10 months after abdomino-perineal resection for a low T3N1M0 rectal adenocarcinoma.

#### SUR688

##### Laparoscopic Adrenalectomy for Benign Adrenal Disease Causing Cushing's Syndrome

**LS LEE<sup>1</sup>, YH TAN<sup>2</sup>, S YIP<sup>2</sup>, CWS CHENG<sup>2</sup>**

<sup>1</sup>Colorectal Surgery, <sup>2</sup>Urology, Singapore General Hospital, Singapore

**Aim:** Laparoscopic adrenalectomy was first described by Gagner in 1992. Since then, several studies have shown the advantages of this approach compared to open surgery. The objective of our study was to determine the efficacy of laparoscopic adrenalectomy in the treatment of Cushing's syndrome.

**Methods:** Between 1996 and 2004, more than 80 cases of laparoscopic adrenalectomy were performed. Of these, 4 cases were performed for treatment of Cushing's syndrome.

**Results:** All our patients were female, and their mean age was 40 years (range, 27 to 49). Common clinical presentations include hypertension, facial swelling and irregular menstrual cycles. A common biochemical abnormality was hypokalaemia. All patients underwent transperitoneal laparoscopic

adrenalectomy. The mean operating time was 136 minutes (range, 120 to 160). The estimated perioperative blood loss was minimal, and no patients required blood transfusions. Postoperative analgesia consisted mainly of oral analgesics. All patients resumed oral feeding on the first postoperative day and were discharged by the fourth postoperative day. Histopathology confirmed the presence of an adrenal adenoma in all specimens. Patients were followed up for a mean time period of 54 months (range, 36 to 72). The phenotypic features of Cushing's syndrome resolved in about 3-4 months postoperatively in all patients. The serum potassium levels normalised rapidly postoperatively, while the resolution of hypertension took between 3 to 7 months. So far, there has been no recurrence of phenotypic or biochemical features of Cushing's syndrome.

**Conclusion:** Laparoscopic adrenalectomy is a recommended modality of treatment for patients with Cushing's syndrome secondary to a benign adrenal adenoma in our institution.

#### SUR689

##### Laparoscopic Nephroureterectomy (LN) versus Hand-assisted Laparoscopic Nephroureterectomy (HALN) for Upper Tract Transitional Cell Carcinoma (TCC)

LS LEE<sup>1</sup>, YH TAN<sup>2</sup>, S YIP<sup>2</sup>, CWS CHENG<sup>2</sup>

<sup>1</sup>Colorectal Surgery, <sup>2</sup>Urology, Singapore General Hospital, Singapore

**Aim:** Since 2001, LN has evolved to become an established surgical technique in our institution. We report our experience with LN versus HALN for TCC of the upper urinary tract.

**Methods:** Between 2001 and 2004, patients who underwent LN were reviewed. There were more than 15 cases of LN performed in our institution for TCC in the upper urinary tracts.

**Results:** There were 6 cases of HALN and 11 cases of LN. In the HALN group, all were male. The mean age was 66.8 years (range, 47 to 75). In the LN group, 6 males and 5 females. The mean age 69.3 years (range, 46 to 75). The locations of the lesions were in the renal pelvis (n = 9), upper ureter (n = 2), mid ureter (n = 2) and lower ureter (n = 4). The mean operative time was 228 minutes (range, 165 to 290) and 246 minutes in the LN group (range, 120 to 350). The mean blood loss was 225 mL (range, minimal to 900) in HALN and 600 mL (range, minimal to 2000) in LN. The HALN group required a mean of 2 days (range, 1 to 3) of parenteral opioids, while the LN group needed a mean of 1.7 days (range, nil to 3). Both groups were able to rely on oral paracetamol as the mainstay for postoperative pain. The HALN group resumed ambulation in a median time of 2.5 days, while the LN group required a median of 3.5 days. The median length of stay was 5.5 in the HALN and LN groups.

**Conclusion:** Both techniques offer comparative results for the treatment of upper urinary tract transitional cell carcinoma.

#### SUR690

##### Robot-assisted Laparoscopic Radical Prostatectomy in Singapore General Hospital

LS LEE<sup>1</sup>, HG SIM<sup>2</sup>, YH TAN<sup>2</sup>, S YIP<sup>2</sup>, W LAU<sup>2</sup>, C CHENG<sup>2</sup>

<sup>1</sup>Colorectal Surgery, <sup>2</sup>Urology, Singapore General Hospital, Singapore

**Aim:** Robot-assisted laparoscopic radical prostatectomy (rLRP) has emerged as a feasible procedure in high-volume urologic oncology centres. We assessed the initial 2-year experience with rLRP and reviewed the perioperative outcome.

**Methods:** One hundred patients underwent rLRP by a dedicated team using the da Vinci robotic surgical system from February 2003 to May 2005. All patients had histologically-confirmed adenocarcinoma on biopsy and a negative bone scan. The da Vinci robot was employed. Perioperative and early surgical outcome data were collected prospectively and functional recovery was assessed by an independent oncology nurse clinician.

**Results:** The mean age at diagnosis was 63.5 years. The median Gleason sum was 6 and mean pre-treatment PSA was 9.4 ng/mL. The mean set-up time and dissection time were 24 minutes and 182 minutes, respectively. The mean

perioperative blood loss was 272 mL, and 7% of patients required blood transfusion. The mean duration of bladder catheterisation was 8.4 days, and mean hospital stay was 2.9 days. There was no perioperative mortality or conversion to open radical prostatectomy. Major complications (4%) included urethrovaginal leak requiring re-operation, postoperative cerebrovascular accident, and transient ureteric obstruction. Minor complications (7%) included minor urethrovaginal leak, bladder neck stenosis, and urinary tract infection. Mean follow-up was 6.6 months. Pathological assessment showed pT2 disease in 55% and pT3 in 45% of specimen.

**Conclusion:** Robot-assisted LRP showed significantly low perioperative blood loss, transfusion requirement and length of stay. The benefits of enhanced precision and dexterity for complex laparoscopic work in the pelvic cavity was apparent with the robot-assisted laparoscopic approach.

#### SUR691

##### Image-guided Radiofrequency Ablation of Liver Malignancies: Experience at Singapore General Hospital

SCS LOW<sup>1</sup>, R LO<sup>1</sup>, TN LAU<sup>2</sup>, LL OOI<sup>3</sup>, BS TAN<sup>1</sup>, A CHUNG<sup>4</sup>, P CHOW<sup>4</sup>

<sup>1</sup>Diagnostic Radiology, Singapore General Hospital, Singapore, <sup>2</sup>Radiology, Mount Elizabeth Hospital, Singapore, <sup>3</sup>Clinical Departments - Surgical Oncology, National Cancer Centre, Singapore, <sup>4</sup>General Surgery, Singapore General Hospital, Singapore

**Aim:** To study the efficacy, side effects and complications of radiofrequency (RF) ablation in the treatment of primary and metastatic liver malignancies.

**Methods:** From January 2002 to December 2004, 57 patients underwent RF ablation for liver malignancies. A total of 87 tumours were ablated - 71 (81.6%) were hepatocellular carcinomas and 16 (18.4%) were metastases (from primaries in the colon, stomach and pancreas). RF ablation was performed either percutaneously (n = 71) or intraoperatively (n = 16). Follow-up ranged from 1 to 41 months (mean 15.2 months) and included computed tomography (CT) 1 day, 1 month and 3 months after ablation, and half-yearly thereafter. Patients were observed for local tumour progression and for the emergence of new tumours.

**Results:** Four patients with a total of 5 tumours were lost to follow-up. Of the remaining 82 tumours treated, complete necrosis was attained in 66 tumours after a single ablation, giving a primary effectiveness rate of 80.5%. Seven (8.5%) required 2 ablations to achieve complete necrosis, giving a secondary effectiveness rate of 89% after 2 ablations. No procedure-related death or major complications were encountered. Minor complications were reported in 2 patients (3.8%): subcapsular haematoma and thermal injury to the adjacent gastric antrum, both not necessitating surgical intervention.

**Conclusion:** RF ablation is an effective, safe and relatively simple procedure for the treatment of unresectable liver malignancies.

#### SUR692

##### Endovenous Laser Treatment (EVLT) for Lower Limb Varicose Veins due to Great Saphenous Vein (GSV) Reflux

KH TAY<sup>1</sup>, SE LIN<sup>1</sup>, BS TAN<sup>1</sup>, SG TAN<sup>2</sup>, M SEBASTIAN<sup>2</sup>

<sup>1</sup>Diagnostic Radiology, <sup>2</sup>General Surgery, Singapore General Hospital, Singapore

**Aim:** To report our early experience with EVLT for treatment of lower limb varicose veins due to GSV reflux.

**Methods:** Fifty-six GSVs in 55 patients (40F:16M) with a mean age of 64 years (range, 25-90 years) were treated between February 2004 and June 2005. All patients had symptomatic varicose vein with 80% (45/55) of patients having CEAP Class 3 and above varicose veins, including 17 patients with non-healing venous ulcers. Treatment was performed with the Diomed 810-nm diode laser via a 600-µm fibre introduced percutaneously into the GSV under local anaesthesia using ultrasound and fluoroscopic guidance. No adjuvant injection sclerotherapy or avulsion phlebectomy was performed. Patients were followed clinically and with duplex ultrasound. The mean follow-up period was 3.7 months (range, 1 week to 15 months).



**Results:** There was 1 technical failure as the GSV could not be cannulated due to severe venospasm following guidewire insertion. The remaining 55 GSVs were successfully occluded with no evidence of recanalisation on follow-up duplex ultrasound. All patients reported significant improvement/resolution of symptoms (cramps/swelling) by 1 week. The majority of the venous ulcers (14/17) were healed by 3 months. Mild to moderate bruising and tenderness along the course of the treated vein, which resolved within 2 weeks, were noted in all patients. There was a case of skin burn (blisters over the lower thigh) which healed within 1 week.

**Conclusion:** Our early results suggest that EVLT is safe and effective treatment for symptomatic varicose veins secondary to GSV reflux.

## SUR693

### Identifying Radiotherapy Response in Rectal Cancer Patients using Global Gene Expression Profiling

JCF NG<sup>1</sup>, S AHMED<sup>2</sup>, R HANDS<sup>2</sup>, F HUANG<sup>3</sup>, P SHAW<sup>3</sup>, S BUSTIN<sup>2</sup>, S DORUDI<sup>2</sup>

<sup>1</sup>General Surgery, Singapore General Hospital, Singapore, <sup>2</sup>Colorectal Surgery, Royal London Hospital, UK, <sup>3</sup>Pharmacogenomics, Bristol-Myers-Squibb, USA

**Aim:** Preoperative radiotherapy reduces the local recurrence and increases the survival of rectal cancer patients. However, there is an inability to determine tumour response to radiotherapy. Recent advances in DNA microarray technology allow global gene expression profiling. With this tool, we aimed to compare gene transcripts between responders and non-responders to radiotherapy, to determine a genetic "signature" that identifies radiotherapy responders from non-responders.

**Methods:** Forty-eight rectal tumours from 16 patients with and 32 patients without preoperative radiotherapy were resected, snap frozen and stored at -70°C. Total RNA was extracted with the RNeasy Mini-kit (Qiagen), quantified and quality assessed using the 2100 Bioanalyzer (Agilent). Microarray experiments were performed on the HG-U133A Genechip® (Affymetrix). Pathological grading of tumour response to radiotherapy was performed and correlated to the results of microarray experiments using GeneSpring® 6 (Silicon Genetics).

**Results:** Nine of 16 patients showed little and 7 demonstrated a moderate pathological response to radiotherapy. Seven hundred and twenty-four genes were differentially expressed between these partial and non-responders (Welch *t*-test, *P* < 0.05). Irradiated rectal tumour tissue gave rise to good-quality RNA, suggesting cellular regeneration occurred immediately following sublethal radiotherapy damage. A significantly different gene expression profile existed between irradiated and non-irradiated tumours.

**Conclusion:** The gene expression profile for partial responders and non-responders to radiotherapy is significantly different. This reflects their respective biological responses to radiotherapy. Mapping of these genes to biological processes will improve our understanding of the response elicited by radiotherapy and in future, allow the prediction of response to radiotherapy in rectal cancer patients.

## SUR694

### Recurrent Pyogenic Cholangitis — Evolution of Surgical Management

M SEAH<sup>1</sup>, PKH CHOW<sup>1</sup>, SS GILL<sup>1</sup>, A YF CHUNG<sup>1</sup>, LL OOI<sup>1</sup>, WK WONG<sup>1</sup>

<sup>1</sup>General Surgery, Singapore General Hospital, Singapore

**Aim:** The surgical management of recurrent pyogenic cholangitis (RPC) has evolved over time. We review our experience with this condition.

**Methods:** Medical records of patients from January 1987 to August 2004 were extracted. The demographics, presentation, investigations and radiological imaging performed were reviewed, surgical procedures and their outcomes analysed in detail.

**Results:** A total of 48 patients, with a mean age of 56 years and a mean follow-up period of 41 months, were reviewed. Most patients presented with

abdominal pain (39 patients), fever (34 patients) and jaundice (12 patients). Ultrasonography remains useful as a first-line investigation (40 patients). More recently, MRCP has provided thorough delineation of the biliary tree as well as demonstrate the presence of cholangiocarcinomas. Definitive surgery involved a bilioenteric bypass in 37 patients, creation of a subcutaneous jejunal pouch in 20 patients and liver resection in 27 patients.

**Conclusion:** MRCP has overtaken diagnostic ERCP and will likely overshadow the utility of CT imaging. As a result, an early correct diagnosis of RPC has become more common and increasingly, patients undergo definitive surgical procedures from the onset. This is reflected in the decreasing number of initial cholecystectomies performed in the recent years. Where hepatic resection is performed, we find that a left lateral segmentectomy is sufficient in most cases. A hepaticojejunostomy with a subcutaneous jejunal pouch is now the bilioenteric bypass of choice as it facilitates passage of residual or recurrent intrahepatic stones while providing a non-operative route for stone clearance via the subcutaneous jejunal limb.

## SUR695

### Re-excision Rate after Breast Conservation Surgery for Invasive Breast Cancer or Ductal Carcinoma In Situ

SC TAN<sup>1</sup>, KW ONG<sup>1</sup>, B TAN<sup>1</sup>, CY WONG<sup>1</sup>

<sup>1</sup>General Surgery, Singapore General Hospital, Singapore

**Aim:** To find out the re-excision rate after breast conservation surgery in invasive breast cancer or ductal carcinoma in situ (DCIS) in a single institution.

**Methods:** Two hundred and fifty-two cases, who underwent breast conservation surgery for invasive breast cancer or DCIS in Singapore General Hospital from January 2004 to December 2004, were included in this study. Diagnosis of breast cancer was confirmed by histological evidence. Those cases which had a second operation, either re-excision of margins or completion mastectomy, were identified.

**Results:** Ninety-one patients (36.1%) had a second operation done after the initial wide local excision. A detailed analysis of reasons for re-excision will be discussed later.

**Conclusion:** This value was compared to another recent study done in Ireland of comparable study size and the local re-excision rate for breast conservation surgery is significantly higher (36.1% compared to 21.4%). Perhaps intraoperative macroscopic assessment of margins by trained pathologists can be done to improve this figure.

## SUR696

### A Review of Malignant Salivary Gland Tumours: Importance of Stage and Nodal Status

WS TAN<sup>1</sup>, D LIM<sup>1</sup>, BC TAP<sup>2</sup>, KC SOO<sup>1</sup>

<sup>1</sup>Surgery, Singapore General Hospital, Singapore, <sup>2</sup>Biostatistics, National University of Singapore, Singapore

**Aim:** Salivary gland tumours are diverse in histological subtypes, each of which has different morphological characteristics and clinical behaviour. They present a diagnostic and management challenge. The aim of this study was to review a single institution experience with malignant salivary gland tumours (MST) in an Asian population.

**Methods:** A retrospective review of 220 consecutive patients who had surgery performed for salivary gland lesions at our institution.

**Results:** Between 1995 and 2000, 220 patients with salivary gland lesions received treatment at the Department of General Surgery, Singapore General Hospital. Forty-seven out of these 220 patients (21.4%) had MST. The median follow-up was 5.5 years. The most common histological subtype reported was adenoid cystic carcinoma (36.2%). 48% of patients had stage 1 and 2 disease, and 52% had stage 3 and 4 disease. Significant differences in survival were noted between tumour stages. Twenty-five patients had neck dissections performed, of which 8 (32%) were positive for cervical lymph node metastases. All 8 patients had lymph node metastases to Level I, II or III. None of these patients had metastases to Level IV or V lymph nodes. Five out

of these 8 patients (62.5%) died during the follow-up period.

**Conclusion:** Unlike most previous studies, adenoid cystic carcinomas are more common than mucoepidermoid carcinomas in our series. Stage of disease is an important prognostic factor in MST. Our data suggest that prophylactic neck dissections for MST may be limited to Levels I to III, sparing Levels IV and V. Nodal status seems to be of greater importance to survival than previously thought.

#### SUR697

##### Major Splenic Injury – Is It Safe to Watch?

**A YEO<sup>1</sup>, MP KOH<sup>2</sup>, PK CHOW<sup>1</sup>, CY WONG<sup>1</sup>**

<sup>1</sup>General Surgery, <sup>2</sup>Trauma Service, Singapore General Hospital, Singapore

**Aim:** With the increasing use of CT scan, the image of a badly shattered spleen is worrying to most surgeons even in the face of a stable trauma patient. The aim of the study was to review the management of trauma patients with grade 4 and 5 splenic rupture admitted to our institution with a view to determining if conservative management is safe.

**Methods:** This is a retrospective review of the Trauma Registry database in Singapore General Hospital since 1998. All patients with splenic injury were identified and case-notes were retrieved and reviewed. Demographic data were analysed and the reasons for immediate operative management and conservative management were determined.

**Results:** Of the 110 patients with splenic injury, 15 patients were found to have a major rupture of the spleen (Organ Injury Score of grade 4 or 5). Two patients died in the Emergency Department. Eight patients underwent emergent laparotomy – 7 splenectomy and 1 splenorrhaphy. Four patients were successfully managed conservatively. Three had grade 3 and 1 had a grade 4 splenic laceration. Haemodynamic stability is the most important criteria for determining the success of conservative management.

**Conclusion:** The presence of a major splenic injury detected on CT scan does not necessarily imply the need for laparotomy. Although most patients would require laparotomy, a select few who are haemodynamically stable can be safely managed.

#### SUR698

##### Fetal Orbital Biometry: A Cross-sectional Study

**AC KUAH<sup>1</sup>, SL LEE<sup>1</sup>, S FOOK-CHONG<sup>2</sup>, LK TAN<sup>1</sup>, HK TAN<sup>1</sup>**

<sup>1</sup>Obstetrics and Gynaecology, <sup>2</sup>Clinical Research, Singapore General Hospital, Singapore

**Aim:** To construct nomograms of interocular distance (IOD) and binocular distance (BOD) for our local Asian population.

**Methods:** Patients were recruited when they turned up for screening and growth antenatal scans. Inclusion criteria included patients with well-established dates (confirmed by earlier ultrasound), and singleton, non-anomalous fetuses. The examinations were performed using the transabdominal technique and high-resolution ultrasound scanners. 70% of the patients in our cohort were ethnic Chinese, 25% Malays and 5% Indians. The IOD and BOD were measured on the axial section. Centiles of IOD and BOD in relation to gestational ages were obtained using the methodology described by Altman (1994). Polynomial regression models were fitted to the raw data to estimate the mean IOD and BOD. Standard deviation scores (SDS) were calculated for each observation  $y$  as  $SDS = (y - \text{fitted mean}) / \text{fitted SD}$ . The SDS were assessed for normality using Q-Q plot and the Kolmogorov-Smirnov test.

**Results:** Three hundred and twenty-eight patients of gestational ages 18 to 40 weeks were recruited. Measurement of the IOD and BOD were successful in 95% of patients. The relations between mean interocular/binocular distance and gestational age were excellently described by simple regression of mean orbital measurements on gestational age, and the SD by a linear regression on gestational age. A normal distribution was obtained.

**Conclusion:** Nomograms of interocular and binocular distances for fetuses 18 to 40 weeks gestation were constructed. They may be used for more objective evaluation of hyper- and hypotelorism.

#### SUR699

##### Beare-Stevenson Cutis Gyrata Syndrome with Clover-Leaf Skull: Two and Three-dimensional Findings

**SL LEE<sup>1</sup>, LK TAN<sup>1</sup>, HW TAN<sup>2</sup>, SG GOH<sup>2</sup>, HK TAN<sup>1</sup>**

<sup>1</sup>Obstetrics and Gynaecology, <sup>2</sup>Pathology, Singapore General Hospital, Singapore,

**Aim:** To report the 2- and 3-dimensional features of Beare-Stevenson cutis gyrata syndrome (BSS), the first case reported in Singapore. BSS is an autosomal dominant condition characterised by craniofacial anomalies, particularly craniosynostosis, and ear defects, cutis gyrata, acanthosis nigricans, anogenital anomalies, skin tags and prominent umbilical stump. This is a rare condition, and only a handful has been reported prenatally. We present a case with dysmorphic features at 22 weeks.

**Case Report:** A 34-year-old woman, gravida 1 para 0, was referred for fetal anomaly screening scan at 20 weeks. No obvious fetal abnormality was demonstrated, but owing to unfavourable fetal position, the fetal heart and lips were not evaluated. Hence, a repeat scan was arranged at 22 weeks. Defects detected included craniosynostosis, clover-leaf skull, low-set ears, dilated septum pellucidum and digital abnormalities suggesting syndactyly. Three-dimensional ultrasound demonstrated a narrow forehead. Fetal biometric measurements were below 5th centile, and liquor was decreased. Differential diagnosis included Pfeiffer syndrome, Crouzon syndrome and thanatophoric dysplasia. The patient opted for a termination of pregnancy at 23 weeks. Histopathology showed external congenital abnormalities such as furrowed skin, acanthosis nigricans, low-set ears, craniosynostosis (fused lambdoid and sagittal sutures), imperforate anus, polydactyly (supernumerary right thumb) and left talipes equinovarus. No internal congenital abnormality was detected except for the fused sagittal and lambdoid sutures. Final summary of pathological findings was syndromic craniosynostosis consistent with autosomal dominant Beare-Stevenson cutis gyrata syndrome.

**Conclusion:** Sonographic features of BSS are documented.

#### SUR700

##### Biometry of Early Pregnancy

**HLF MOK<sup>1</sup>, SL LEE<sup>1</sup>, LK TAN<sup>1</sup>, HK TAN<sup>1</sup>**

<sup>1</sup>Obstetrics and Gynaecology, Singapore General Hospital, Singapore

**Aim:** The advent of high-resolution transvaginal ultrasound (TVS) has enabled the embryo and associated structures to be evaluated accurately. The gestational sac diameters, yolk sac diameters, embryonic crown-rump length, heart rate and amniotic sac diameters may be measured with accuracy. Recently, many renowned researchers are looking into the evaluation of these structures as a predictor of fetal outcome and anomalies. To ensure accurate evaluation of these early structures we require biometric charts which are appropriate for our use. Our aim was to construct biometric charts of the gestational sac diameter (GSD), volume (GSV) and crown-rump length (CRL).

**Methods:** Three hundred first trimester pregnancies were scanned using the transvaginal technique. Inclusion criteria included patients with regular cycles, singleton, non-anomalous fetuses. Gestational sac measurements included the length (L), antero-posterior diameter (AP) and width (W). The volumes were calculated using the ellipsoid formula  $0.52 \times L \times AP \times W$ . The CRL was measured on the largest sagittal section of the embryo. Centiles of the GSD, GSV and CRL in relation to gestational ages were obtained using the methodology described by Altman (1994). Polynomial regression models were fitted to the raw data to estimate the mean GSD, GSV and CRL.

**Results:** Measurements of the GSD, GSV and CRL were successful in 100% of patients. Statistical analyses demonstrated normal distribution.

**Conclusion:** The constructed nomograms provide for more accurate evaluation of early pregnancy.

#### SUR701

##### **Yolk Sac Size and Embryonic Heart Rate in Early Pregnancy: A Useful Way to Suspect Fetal Anomalies**

**LK NG<sup>1</sup>, SL LEE<sup>1</sup>, D KANAGALINGAM<sup>1</sup>, HK TAN<sup>1</sup>**

<sup>1</sup>Obstetrics and Gynaecology, Singapore General Hospital, Singapore

**Aim:** It is not uncommon to encounter an abnormal size or shape of the yolk sac when performing early pregnancy transvaginal scans. Some of these were subsequently found to have a poor pregnancy outcome. We tried to analyse our observations over a 7-year period.

**Methods:** A retrospective review of 7300 cases over a 7-year period from 1 January 1997 to 31 December 2004 was carried out. Yolk sac size, embryonic heart rate and fetal outcome were reviewed. Yolk sac diameter was measured from outer to outer wall. Three diameters were measured, namely the length, antero-posterior diameter and width, and the average diameter was taken as the yolk sac diameter. Embryonic heart rate was also measured for all cases. Karyotyping were obtained for detection of fetal anomalies in the second trimester, advanced maternal age or bad obstetric history.

**Results:** Yolk sac diameter of more than 5 mm is classified abnormal. Poor pregnancy outcome included spontaneous abortion before 12 weeks' gestation, structural defects including sacral agenesis, imperforate anus, gross hydronephrosis and single limb. Chromosomal anomalies included trisomy 13 and 21. Embryonic heart rate when combined with yolk sac size were found to be of value in predicting a good or bad outcome.

**Conclusion:** The findings showed that yolk sac size, when measured before the 8th week of gestation along with embryonic heart rate, is a reliable indicator of pregnancy outcome and chromosomal anomalies.

#### SUR702

##### **Dissection of the Molecular Pathways Modulated by Fibulin-1C and 1D in NIH-Ovarian Cancer Cells**

**Y SHEN<sup>1</sup>, R SU<sup>1</sup>, MC WONG<sup>2</sup>, LL TAN<sup>2</sup>, SK TAY<sup>1</sup>**

<sup>1</sup>Obstetrics and Gynaecology, Singapore General Hospital, Singapore,

<sup>2</sup>Neurology, National Neuroscience Institute, Singapore

**Aim:** Fibulin-1 is a multifunctional extracellular matrix protein overexpressed in ovarian cancers. Fibulin-1 gene encodes 4 protein isoforms (A, B, C and D) with different carboxyl termini generated by alternative mRNA splicing. Fibulin-1C and D are the predominant variants in most tissues and cells studied. There is evidence to suggest that these 2 isoforms may have opposite role in biogenesis of ovarian cancer. Our study also demonstrates an association of overexpressed fibulin-1 with endometriosis. However, the molecular pathways modulated by fibulin-1C and D in ovarian cancer and endometriosis are not clear. Therefore, our aim was to study the molecular pathways modulated by fibulin-1C and D and to identify the isoform-specific differential gene expression profiles.

**Methods:** The objectives were accomplished by combined approaches of RNAi, Western blot, GeneChip microarray and real-time RT-PCR.

**Results:** The fibulin-1C and D were specifically knocked down by RNAi. The use of GeneChip microarray allowed us to capture the changes in the global gene expression profiles and to identify the affected pathways under different conditions of gene knockdown. The selected genes and pathways were further verified by real-time RT-PCR.

**Conclusion:** The networks of molecular pathways modulated by fibulin-1 isoform C and D have been determined in vitro. The study may potentially lead to discovery of more biomarkers and therapeutic targets for ovarian cancer and endometriosis.

#### SUR703

##### **Ultrasound Gray-scale and Power Doppler Features of Endometrial Polyps**

**WL WONG<sup>1</sup>, SL LEE<sup>1</sup>, D KANAGALINGAM<sup>1</sup>, HK TAN<sup>1</sup>**

<sup>1</sup>Obstetrics and Gynaecology, Singapore General Hospital, Singapore

**Aim:** The application of high-resolution transvaginal ultrasound has enabled

endometrial polyps to be detected with much greater accuracy. It may appear as a thickened endometrium with no obvious mass or it may present as a vaguely defined mass containing small areas of cystic degeneration. We found that the application of colour imaging, especially power Doppler, improved the detection of polyps in symptomatic as well as asymptomatic women.

**Methods:** 10,500 women were scanned using the transvaginal technique. The endometrium was measured on a largest sagittal section of the uterus. The measurement is an antero-posterior diameter including both anterior and posterior layers and is taken at approximately 1 cm from the fundal end of the endometrium. The endometrium was studied to check for the presence of any mass. Power Doppler was applied to demonstrate the flow to any region of suspected abnormality. Confirmation of findings was obtained from operative hysteroscopy and histological findings.

**Results:** Polyps were found in 3% of the women scanned in 2004. They were found to present as follows: 1) thickened endometrium with no obvious masses; 2) thickened endometrium with vaguely defined mass; 3) fairly well-defined echogenic mass containing small cystic areas; 4) well-defined mass when there was some fluid in the endometrial cavity; 5) a single feeding artery in the stalk of the polyp shown on power Doppler. Confidence in diagnosis was obtained when this finding was obtained.

**Conclusion:** Ultrasound together with application of power Doppler provides accurate diagnosis of endometrial polyps.

#### SUR704

##### **The Usefulness of Transvaginal Colour and Power Doppler Ultrasound in the Diagnosis of Ectopic Pregnancy**

**SC WONG<sup>1</sup>, SL LEE<sup>1</sup>, LK TAN<sup>1</sup>, HK TAN<sup>1</sup>**

<sup>1</sup>Obstetrics and Gynaecology, Singapore General Hospital, Singapore

**Aim:** The usefulness of transvaginal colour and power Doppler ultrasound in the diagnosis of ectopic pregnancy was assessed.

**Methods:** One hundred and two patients with a provisional diagnosis of ectopic pregnancy were scanned using transabdominal and vaginal ultrasound. Thirty-eight of them were found to have homogeneous or complex adnexal masses, ranging from 1.5 to 5 cm. Colour and power Doppler were utilised to check for the presence or absence of vascularity. Blood flow impedance indices were calculated from the spectral Doppler waveforms. The presence of corpus luteum and flow were also analysed in this study. Free fluid in the pelvis and upper abdomen was recorded.

**Results:** Colour vascularity was detected in 30 of 38 patients with ectopic pregnancies by transvaginal colour and power Doppler imaging. Especially in 12 patients with questionable adnexal mass showing no gestational sac on B-mode, colour vascularity was displayed in 8 of these patients. Even with the presence of a corpus luteum in the ipsilateral ovary, transvaginal power Doppler was able to define the adnexal mass distinctly.

**Conclusion:** Transvaginal ultrasound is superior to transabdominal ultrasound in the demonstration of adnexal masses. The detection of flow by transvaginal colour and power Doppler ultrasound in patients with an ectopic pregnancy is helpful in the diagnosis, especially in patients with a questionable adnexal mass.

#### SUR705

##### **Should All Male Patients do the Hyaluronan Binding Assay (HBA) during Male Infertility Investigation?**

**SC HUM<sup>1</sup>, YY YONG<sup>1</sup>, LM HO<sup>1</sup>, M ZHU<sup>2</sup>, SL YU<sup>1</sup>**

<sup>1</sup>Obstetrics and Gynaecology, Centre for Assisted Reproduction (CARE), Singapore General Hospital, Singapore, <sup>2</sup>Biostatistics, Clinical Trials and Epidemiology Research Unit, Singapore

**Aim:** The strict criteria normal sperm morphology (NSM) assessment has been used to predict male fertility potential, especially with regard to assisted reproduction intervention. Patients with <5% NSM, regardless of sperm motility and density, were recommended for assisted reproductive technology with intra-cytoplasmic sperm injection (ICSI). The new HYDAK sperm-

hyaluronan binding assay (HBA) using the in vitro sperm binding capability as a functional assay of sperm fertilising ability was compared to the conventional semen analysis.

**Methods:** In a retrospective study, hyaluronan binding scores and semen parameters from 304 males were collected and analysed. We correlated various semen parameters to NSM and HBA scores. Data analyses were carried out using SPSS software for Windows.

**Results:** Our study showed that 56.9% had NMS  $\leq$ 4% and were considered to have poor fertilising abilities. This group also showed lower HBA mean score ( $59.94 \pm 22.65\%$ ). However, more than half (31.9%) of this poor morphology group were found to have HBA score of 60% and above. Alternatively, when using HBA test alone, only 28.9% were found to have <60% binding abilities with semen parameters generally much poorer as well.

**Conclusion:** Assessment of patients by HBA test indicates that 31.9% men with apparently good semen parameters based on the conventional method of semen analysis but poor morphology would be given a choice to do non-invasive assisted reproduction treatment. The easy-to-perform HBA test should significantly improve the clinical management of infertile patients, saving time and reducing the overall treatment cost.

#### SUR706

##### A Retrospective Study Comparing Day 2 and Day 3 Embryo Transfer in Both IVF and ICSI

**ASN LEE<sup>1</sup>, MN LIM<sup>1</sup>, CF TO<sup>1</sup>, YY YONG<sup>1</sup>, SL YU<sup>1</sup>**

<sup>1</sup>Obstetrics and Gynaecology, Centre for Assisted Reproduction (CARE), Singapore General Hospital, Singapore

**Aim:** To determine whether extending the embryo culture period from 2 to 3 days would yield a more optimal selection of viable embryos, thereby increasing the pregnancy and implantation rates.

**Methods:** A total of 159 embryo transfers performed either on day 2 or day 3 from January 2004 to May 2005 in our IVF Centre were evaluated. Of these, 29 of them were from IVF cycles and 130 were from ICSI cycles. A maximum of 3 embryos was selected for each transfer.

**Results:** Pregnancy rate was slightly higher in patients who had embryo transfers on day 3 compared to those who had their embryos transferred on day 2 in both IVF and ICSI (33.3% versus 30% and 28.81% versus 25.35%, respectively). The implantation rate, as measured by the proportion of embryos developing to the fetal heart stage, was also slightly higher following transfer on day 3 than those transferred on day 2 in both IVF and ICSI (19.23% versus 11.86% and 14.55% versus 10.92% respectively). The differences were not statistically significant.

**Conclusion:** It is believed that delaying transfer until day 3 provides a further 24 h to observe embryo development which may help in selecting better quality embryos most likely to implant and develop after transfer. However, our study shows that it does not make a difference whether transfer is performed on day 2 or day 3 as similar pregnancy rates can be achieved. The results indicate that embryo transfer can be safely scheduled at the convenience of the patient and the IVF centre.

#### SUR707

##### Preimplantation Genetic Diagnosis (PGD) and Single Cell Polymerase Chain Reaction (PCR) for (Alpha/Beta) Thalassaemia

**MN LIM<sup>1</sup>, ASC TAN<sup>2</sup>, WC TAN<sup>1</sup>, SL YU<sup>1</sup>, SSC CHONG<sup>2</sup>, CHA YAP<sup>3</sup>**

<sup>1</sup>Obstetrics and Gynaecology, Centre for Assisted Reproduction (CARE), Singapore General Hospital, Singapore, <sup>2</sup>Paediatrics, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>3</sup>Women's Health and Fertility Centre, Mount Elizabeth Medical Centre, Singapore

**Aim:** To use preimplantation genetic diagnosis (PGD) to reduce the risk of pregnancies affected by alpha or beta thalassaemia through polymerase chain reaction (PCR)-based strategies.

**Methods:** Couples with homozygous or compound heterozygous alpha or beta thalassaemia underwent hyperstimulation cycles. Oocytes were retrieved by ultrasound directed follicle aspiration and the oocytes subjected to

intracytoplasmic sperm injection (ICSI). Fertilised embryos were cultured to day 3 to achieve 6-8 cells. Up to 2 blastomeres were biopsied from these embryos and analysed. Post-biopsied embryos were maintained in blastocyst medium until day 4. Based on the results of the blastomere analysis, only normal and carrier embryos were transferred.

**Results:** There were a total of 6 PGD cycles with a 75.4% oocyte maturation rate. Fifty-two metaphase II oocytes were injected. After ICSI, 39 oocytes fertilised and there were 28 6-8 cell embryos on day 3. Fifty-three blastomeres were analysed, 39% were normal, 43% were carriers and 18% were affected. Only normal and carrier embryos were transferred.

**Conclusion:** PGD can be reliably and efficiently employed to screen and avoid affected pregnancies with alpha or beta thalassaemia.

#### SUR708

##### A Comparison of the Fertilisation Rates and Developmental Potential of In Vitro Matured Metaphase I (MI) Human Oocytes after Intracytoplasmic Sperm Injection (ICSI)

**CCF TO<sup>1</sup>, ASN LEE<sup>1</sup>, MN LIM<sup>1</sup>, YY YONG<sup>1</sup>, SL YU<sup>1</sup>**

<sup>1</sup>Obstetrics and Gynaecology, Centre for Assisted Reproduction (CARE), Singapore General Hospital, Singapore

**Aim:** To compare the fertilisation rates and the developmental potential of in vitro matured and in vivo matured human oocytes on day 2.

**Methods:** Thirty-four patients who underwent ICSI cycles from November 2003 to June 2005 were studied. These patients had both in vitro matured MI and in vivo matured MII oocytes for ICSI. After denuding the cumulus surrounding the oocytes, they were assessed for the presence of the first polar body (PB), indicating its maturity. Those oocytes without the presence of the first PB were noted. After a further 3 hours of in vitro culture, ICSI was performed on all the oocytes with the first PB.

**Results:** A total of 316 oocytes were microinjected, including 79 in vitro matured MI oocytes and 237 sibling MII oocytes. The normal fertilisation rate for the in vivo matured oocytes was higher compared to the in vitro matured oocytes (74.68% vs 69.62%;  $P > 0.05$ ). The ability of the in vivo matured oocytes to reach the 4-cell stage on day 2 was also greater compared to the other group (55.37% vs 43.64%;  $P > 0.05$ ). The quality of embryos obtained from these 2 groups was not significantly different. The percentage of abnormally fertilised and degenerated embryos were reduced in the in vivo matured group [(6.33% vs 11.39%;  $P > 0.05$ ); (5.91% vs 8.86%;  $P > 0.05$ ) respectively]. A  $P$  value of  $< 0.05$  was considered significant.

**Conclusion:** It is worthwhile to inject in vitro matured MI oocytes in order to increase the number of embryos for selection and transfer even though the fertilisation rate is reduced.

#### SUR709

##### Significance of Tumour Volume Measurements in Tongue Cancer: A Proposed Novel Role in Staging

**MH CHEW<sup>1</sup>, J KHOO<sup>2</sup>, V CHONG<sup>3</sup>, BC TAI<sup>4</sup>, DTK LIM<sup>5</sup>, KC SOO<sup>5</sup>**

<sup>1</sup>Orthopaedics Surgery, Singapore General Hospital, Singapore, <sup>2</sup>Oncologic Imaging, National Cancer Centre, Singapore, <sup>3</sup>Diagnostic Imaging, National University Hospital, Singapore, <sup>4</sup>COFM, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>5</sup>Surgical Oncology, National Cancer Centre, Singapore,

**Aim:** Tongue cancers are the most common head and neck squamous cell carcinomas (SCCs) to present. Conventional AJCC staging is however a 1-dimensional measurement of a 3-dimensional object. We believe that volume assessment will provide a more precise assessment of tumour stage. In addition, a reliable and accurate methodology in assessing tumour volumes in tongue cancers has been performed. We aimed to study the feasibility of measuring tongue volumes accurately, identify the correlation between tumour volume and outcome for patients with tongue cancer, and suggest a novel approach to stage cancers in the future.

**Method:** The study is a descriptive analysis of patients who underwent complete resection for histology-proven tongue carcinoma from 2000 to

2002. The tumour volume was measured on staging T2-weighted MRI data sets via semi-automated methods.

**Results:** Seventeen patients who underwent complete surgical excision of tongue cancer and had preoperative tumour volume measured were included in the study. The median follow-up was 38.6 months. Correlation studies showed weak agreement between tumour volume (Tv) and tumour stage ( $\kappa = 0.22$ ) and Tv and tumour diameter ( $\kappa = 0.068$ ). The 1-year recurrence-free survival probability for tumour volume  $<5$  cc was 75% and 57% for tumour volume  $>5$  cc. One-year overall survival probability was 75% for tumour volume  $<5$  cc and 67% for tumour volume  $>5$  cc.

**Conclusion:** Tongue tumour volumes can be measured in an automated and an accurate fashion. Larger tumour volumes suggest worse disease free and overall survival. Our study has demonstrated the potential usefulness of tumour volume measurements in tongue cancer staging.

#### SUR710

##### Multimodal Treatment of Well-differentiated Thyroid Cancers in a Single Institution: A Review of Patients in the Last 14 Years

MH CHEW<sup>1</sup>, G CHAN<sup>2</sup>, MM A SIDDIQUI<sup>2</sup>, BC TAP<sup>2</sup>, THD LIM<sup>4</sup>, KC SOO<sup>4</sup>

<sup>1</sup>Orthopaedics Surgery, Singapore General Hospital, Singapore, <sup>2</sup>General Surgery, Singapore General Hospital, Singapore, <sup>3</sup>COFM, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>4</sup>Surgical Oncology, National Cancer Centre, Singapore

**Aim:** To review the outcome of the multimodal treatment of well-differentiated thyroid cancers over 14 years in a single institution, which to date is the largest series in Singapore.

**Methods:** A retrospective analysis of all well-differentiated thyroid cancers in the 14-year period from 1990-2003 was performed. Patients were classified into low-, intermediate- and high-risk groups. Evaluation of results of multimodal management with overall and disease-free survival was done.

**Results:** A total of 389 patients were evaluated and 22 patients were excluded. 75.7% of the patients were female and the majority of our patients were in the low- and intermediate-risk group categories. There were 290 papillary thyroid cancers (high-risk = 41), 77 follicular cancers (high-risk = 5). For surgical management, 68.1% underwent total thyroidectomy, while 27.8% underwent hemithyroidectomy. 31.9% of our patients also had concurrent neck dissection. 46.9% of our patients had adjuvant radioactive iodine therapy and 16.9% underwent external beam radiotherapy. In addition, 9.5% of intermediate-risk group patients and 44.7% of high-risk group patients underwent combined radiotherapy and RAI. The 5-year disease free survival was 97%, 82% and 47% for low-, intermediate- and high-risk, respectively. The overall survival was 100%, 95% and 79%, respectively.

**Conclusion:** Our results are comparable with most large-scale reviews worldwide. Thus, risk groups assignment is important in the management of patient with well-differentiated thyroid cancers. In addition, aggressive multi-modal treatment of intermediate- and high-risk thyroid cancers can result in good disease-free and overall survival.

#### SUR711

##### A Problem Encapsulated — A Rare Case of Peritoneal Encapsulation and a Review of the Literature

MH CHEW<sup>1</sup>, SHB IBRAHIM<sup>2</sup>, G CHAN<sup>2</sup>, HS ONG<sup>2</sup>, WK WONG<sup>2</sup>

<sup>1</sup>Orthopaedic Surgery, <sup>2</sup>General Surgery, Singapore General Hospital, Singapore

**Aim:** Peritoneal encapsulation (PE) is a rare condition that has been described interchangeably with sclerosing encapsulated peritonitis (SEP) as well as abdominal cocoon. This is, however, a distinctive pathology and was first described in 1868. We present a case with this condition that is the first reported in our country as well as in the region.

**Method:** Case report and a review of the literature.

**Results:** We report an otherwise well 38-year-old gentleman who presented with 2 episodes of intestinal obstruction about 2 months apart. A computed tomography (CT) of the abdomen showed characteristic features of peritoneal

encapsulation syndrome. Exploratory laparotomy was performed and small bowel was freed of adhesions and the encapsulation. Postoperative recovery was uneventful.

**Conclusion:** PE is an extremely rare condition. It is a congenital occurrence whereby there is abnormal return of the midgut loop to the abdominal cavity in the early stages of development. The small intestine is thus covered by the original dorsal mesentery which ordinarily forms the transverse mesocolon thus forming the characteristic accessory peritoneal sac. Management of cases is difficult as CT findings may not be characteristic and may only be diagnosed at laparotomy. There are however no data on survival of patients with such a syndrome. Till today, it remains rare and poorly understood.

#### SUR712

##### Giant Cell Tumour of Bone: A Unique Tumour — A Clinical Review of Cases in a Single Institution

WS TAN<sup>1</sup>, D SU<sup>1</sup>, MH TAN<sup>1</sup>

<sup>1</sup>Orthopaedic Surgery, Singapore General Hospital, Singapore

**Aim:** Giant cell tumours of bone (GCT) have unique biological behaviour. They are benign but locally aggressive tumours. However, pulmonary metastases may occur in a patient with a histologically benign GCT. GCT may also undergo malignant sarcomatous change. There are few clear cut clinical and microscopic features that allow prediction of tumour behaviour and prognosis. The aims of this study were to determine the presentation and management of these tumours in an Asian population, as well as to investigate the histopathological features that may influence malignant transformation and recurrence.

**Methods:** Between 1990 and 2004, a total of 39 patients with histologically confirmed GCT received treatment at the Department of Orthopaedic Surgery, Singapore General Hospital. Medical records of these patients were reviewed retrospectively.

**Results:** All the patients had an initial histology that was reported as benign GCT. Two patients had cytologic atypia on initial histology. None of them had metastases at presentation. Four developed pulmonary metastases and 3 had subsequent sarcomatous transformation. Of the 2 patients with cytologic atypia on initial histology, 1 had malignant transformation and other patient developed pulmonary metastases. However, the other patients who had pulmonary metastases and sarcomatous transformation had no atypical features on initial histology.

**Conclusion:** GCT have unpredictable biological behaviour. The presence of cytologic atypia is a good predictor of aggressive tumour behaviour. However, the lack of cytologic atypia does not predict indolent behaviour. Close follow-up of these patients is thus warranted.

#### SUR713

##### Stress Fracture of Distal Tibia Secondary to Osteoarthritic Knee with Severe Varus Deformity: A Case Report

IK TEY<sup>1</sup>, KW CHONG<sup>1</sup>

<sup>1</sup>Orthopaedic Surgery, Singapore General Hospital, Singapore

**Aim:** Stress fracture of tibia secondary to sports-related activities are relatively common. However, stress fracture of the tibia as a complication of osteoarthritis of the knee joint is rare. Reported cases of such fractures involved mainly the proximal tibia. We report a case of stress fracture of distal tibia caused by osteoarthritis of the knee with severe varus deformity.

**Methods:** A 61-year-old woman with bilateral osteoarthritis associated with severe varus deformity who previously refused surgery, sustained a stress fracture of left distal tibia after a minor trauma. The fracture was not picked up until a few months later.

**Results:** The patho-mechanics, diagnosis and management of this injury are discussed.

**Conclusion:** In conclusion, stress fracture of the tibia should be considered in a case of trauma to the lower limb associated with severe varus deformity because of the inherent stress placed on the bone. A high index of suspicion is required to diagnose it in the absence of positive radiographic findings. Last

but not least, the underlying aetiology should be corrected to prevent further stress imposed by the varus deformity. A high tibial osteotomy or total knee replacement would be indicated.

#### SUR714

##### Arthroscopic Bankart Repair for Traumatic Anterior Shoulder Instability Using Fibrewire Suture: Preliminary 6-month Outcome Study

**IK TEY<sup>1</sup>, A TAN<sup>1</sup>**

<sup>1</sup>Orthopaedic Surgery, Singapore General Hospital, Singapore

**Aim:** The use of fibrewire suture in arthroscopic Bankart repair for traumatic anterior shoulder instability eliminates the problem of non-fibrewire suture snapping easily during surgery. However, it is thought that the use of fibrewire suture affects the glenohumeral joint articulation. This study aims to evaluate the outcome at 6-month post-surgery of arthroscopic Bankart repair using fibrewire sutures.

**Methods:** For the purpose of the study, we utilised 3 different shoulder assessment tools i.e. the modified Simple Shoulder Test (SST), UCLA scoring system and the shoulder instability score. Eighteen cases were reviewed using such questionnaires.

**Results:** For 8 out of 12 items in the modified SST, there was a significant increase in the proportion of patients who were able to perform the tasks as compared to before surgery ( $P < 0.0005$ ). UCLA scoring system ( $P < 0.05$  for all dimensions as well as total score) and shoulder instability score ( $P < 0.005$ ) also showed statistically significant improvement following surgery. The recurrence rate of shoulder dislocation or subluxation was 0% at 6 months. There was also good correlation among all 3 shoulder assessment tools.

**Conclusion:** Arthroscopic Bankart repair using fibrewire suture gives excellent results in our patients 6 months after surgery.

#### SUR715

##### Comparison of the Results of Open Carpal Tunnel Release and a Minimal Access Technique (KnifeLight®) Carpal Tunnel Release

**KQ YEO<sup>1</sup>, YM YEO<sup>2</sup>**

<sup>1</sup>Orthopaedic Surgery, Singapore General Hospital, Singapore, <sup>2</sup>Student, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** The study compares the results of open release of carpal tunnel syndrome with a release done with a proprietary instrument, the KnifeLight® which uses a minimal access approach.

**Methods:** The 2 groups of patients were operated on by a single orthopaedic surgeon in private practice. The groups were tested for statistical comparability. The preoperative EMG was correlated with the severity of symptoms. At the 4th to 6th postoperative week, the following parameters were used for comparison: relief of pain, relief of numbness, changes in EMG and patient satisfaction.

**Results:** The preoperative EMG did not correlate well with symptoms nor was it a good prognosticating parameter. There was no difference in results based on the parameters used for comparison at the 4th to 6th postoperative week.

**Conclusion:** The KnifeLight® technique shows no advantage over the conventional open method except that the incision is smaller and patient acceptability appears to be high. It can be safely used as an office procedure.

#### SUR716

##### Use of the Combined Latissimus Dorsi-Serratus Anterior Muscle Flap for Closure of Persistent Pulmonary Air Leaks

**E WOO<sup>1</sup>, BK TAN<sup>2</sup>, CH LIM<sup>3</sup>**

<sup>1</sup>Otolaryngology, <sup>2</sup>Plastic, Reconstructive and Aesthetic Surgery, <sup>3</sup>Cardiothoracic Surgery, Singapore General Hospital, Singapore

**Aim:** We aimed to demonstrate the usefulness of the combined latissimus dorsi (LD)-serratus anterior (SA) muscle flap in solving the problems of

redundant space after lung resection and persistent air leak.

**Methods:** This technique was used on 2 patients in whom non-surgical treatment had failed and patients' poor lung reserve made operations that interfere with ventilating mechanism such as phrenic nerve crush, thoracoplasty unsuitable. Via a lazy S incision extending from the mid-axillary line to the inferior limit of LD, the entire LD muscle and the proximal slips of the SA muscle were raised as pedicled flaps. The 2nd and 3rd rib resections superior to the SA muscle created an 8 x 4 cm axillary window. The LD and SA were transposed in tandem. The LD was passed through the axillary window, laid over the lung apex and sutured to the visceral pleural to seal the leak. The SA muscle was used to close the axillary window. Primary closure with suction drainage was performed.

**Results:** Postoperative recovery was uneventful. The lungs re-expanded and chest drains were removed within 5 days post surgery. There was no recurrent pneumothorax at 1-year follow-up with both patients.

**Conclusion:** For patients who require preservation of lung function, the combined latissimus dorsi-serratus anterior flap can solve persistent air leaks and space problems. The combined LD-SA flap allowed normal ventilation while providing a seal over the broncho-pleural fistula. The muscle bulk of the LD also solved the space problem faced in both patients. The SA seals the axilla and prevents subcutaneous emphysema.

#### SUR717

##### Computer Simulation of the Slit Arteriotomy Technique for Arterial End-to-Side Microanastomosis

**A CHUA<sup>1</sup>, H GU<sup>2</sup>, BK TAN<sup>1</sup>**

<sup>1</sup>Plastic, Reconstructive and Aesthetic Surgery, Singapore General Hospital, Singapore, <sup>2</sup>Institute of High Performance Computing, A\*STAR, Singapore

**Aim:** In conventional end-to-side arterial microanastomosis, an elliptical arteriotomy on the recipient artery is used to ensure adequate blood flow to the donor artery. A technique of using the slit arteriotomy was developed and tried with success in 60 free flaps for extremity reconstruction. However, slit arteriotomy is not universally adopted because of concerns that the slit may not open, leading to thrombosis. The purpose of this study was to demonstrate, using computer simulation, the reliability of slit arteriotomy for end-to-side arterial anastomoses.

**Methods:** Different phases of the anastomoses were simulated using the finite element method to determine factors contributing to slit opening. The procedure was simulated in 3 large deformation steps. In the first step, the slit and the donor artery were deformed to fit each other by prescribed displacements. Next, rigid beams were added to join the arteries and displacement constraints released to allow equilibration. Finally, blood pressure was applied.

**Results:** The key factors for anastomotic patency were elastic recoil of the donor artery and blood pressure. This second factor was responsible for more than 60% of slit opening. The blood vessels expanded with pressure, with more expansion occurring in the region of the slit.

**Conclusion:** Slit arteriotomy is simple, reliable, and can be used consistently for free tissue transfers to the extremities. The results of computer simulation show that the slit will remain open after microanastomosis due to several factors, including residual stress, interaction between the donor and recipient arteries, and blood pressure.

#### SUR718

##### A Bi-layered Scaffold for the Development of Composite Skin Construct

**J KWOK<sup>1</sup>, A CHUA<sup>1</sup>, C SONG<sup>1</sup>, S CHIAN<sup>2</sup>, MF LEONG<sup>2</sup>, DR MA<sup>1</sup>, IC SONG<sup>3</sup>**

<sup>1</sup>Plastic, Reconstructive and Aesthetic Surgery, Singapore General Hospital, Singapore, <sup>2</sup>School of Mechanical and Aerospace Engineering, Nanyang Technological University, Singapore, <sup>3</sup>Experimental Surgery, Singapore General Hospital, Singapore

**Aim:** Our aim is to tissue-engineer a cost effective viable bi-layered scaffold of composite skin using electrospinning technology. Currently, commercially



available bi-layered skin substitutes are sold at exorbitant prices. This prompted us to develop a cheaper alternative that does not compromise the quality of healthcare for patients suffering from burns and chronic wounds.

**Methods:** This skin regeneration model revolves around tissue-engineering and cell biology. We used organotypic cocultures as our control. i) Collagen matrix with human skin fibroblasts (HSF). ii) Collagen matrix without HSF. Human skin keratinocytes (HSK) were then seeded and left to attach and proliferate. Our electrospun scaffold was fabricated by dissolving poly (D,L-Lactide) in volatile solvents. Removal of the solvent and random whipping of the polymer drawn through a capillary resulted in the formation of submicron size fibres on a charged rotating metal mandrel. HSF were then seeded to test for cell attachment and biocompatibility.

**Results:** Comparing our controls, HSK were substantially more differentiated on the collagen matrix with HSF embedded. This is proof that HSK proliferates and differentiates better in the presence of HSF due to cell-cell signalling. Our main focus now is to fabricate a scaffold that will allow fibroblasts to penetrate and proliferate within. Currently, the fibroblasts are unable to penetrate the matrix. However, preliminary studies show that HSF attaches very well onto the surface of the scaffold.

**Conclusion:** Initial studies show the importance of mesenchymal-epithelial interaction for the development of a viable bi-layered skin and that the fibrous scaffolds fabricated by electrospinning is suitable for tissue engineering.

#### SUR719

##### Correlation between Prostate Needle Biopsy and Pathological Radical Prostatectomy in Asian Patient

**BMZ NOR AZHARI<sup>1</sup>, HG SIM<sup>1</sup>, PH TAN<sup>2</sup>, W LAU<sup>1</sup>, C CHENG<sup>1</sup>**

<sup>1</sup>Urology, <sup>2</sup>Pathology, Singapore General Hospital, Singapore

**Aim:** Studies have shown that involvement of multiple biopsy cores on systematic prostate biopsy is a powerful predictor of adverse pathological findings at radical prostatectomy. We examined our preoperative data to seek any correlation with the final pathological findings at radical prostatectomy.

**Methods:** Ninety-six patients underwent radical prostatectomy between 1 January 2003 and 31 December 2004. Preoperative clinical data (PSA, stage) and needle biopsy pathological data (number of cores, percent of tumour per core, Gleason sum, perineural invasion, high-grade PIN) were collected and compared with the final pathological data on the radical prostatectomy specimen. Statistical analysis was performed using SPSS.

**Results:** Mean pre-biopsy PSA was  $9.9 \pm 13.9$  (2SD). The median number of cores and maximal percent tumour involvement per core were 10 (range, 3-16) and 50% (range, 5%-100%). Median Gleason sum on TRUS biopsy was 6 (range, 4-9). The prostatectomy specimen had a median Gleason sum of 7 (range, 5-9). 29.2% had perineural invasion and 33.3% had concomitant high-grade PIN. Out of the total 96, 11% were T2a, 5.5% were T2b, 39.6% were T2c, 39.6% were T3a and 4.4% were T3b. Compared to the final prostatectomy Gleason score, 28.9% of the needle biopsy scores were upgraded, 7.8% were downgraded and there was no change in 63.3%.

**Conclusion:** Our results demonstrate good correlation between prostate needle biopsy data with final pathological findings at radical prostatectomy. More patients had upgrading of Gleason score after prostatectomy. The information is useful in counselling and prognostication of patients preoperatively.

#### SUR720

##### Outcome of Endopyelotomy for the Treatment of Uretero-pelvic Junction Obstruction (UPJO)

**PA SUNGA<sup>1</sup>, WY SIOW<sup>1</sup>, HG SIM<sup>1</sup>, YH TAN<sup>1</sup>, M WONG<sup>1</sup>**

<sup>1</sup>Urology, Singapore General Hospital, Singapore

**Aim:** Endopyelotomy is an accepted treatment option for UPJO. We reviewed our 7-year experience with antegrade endopyelotomy for UPJO.

**Methods:** We reviewed the records of 35 consecutive antegrade endopyelotomies performed in a single institution between 1996 and 2002. Patients were included if they had radiographic evidence of UPJO on diuresis

urography or intravenous urogram that was associated with clinical symptoms and signs and/or deterioration of renal function.

**Results:** A total of 34 consecutive patients underwent 35 antegrade endopyelotomy procedures in 35 renal units. One patient had bilateral endopyelotomy for bilateral UPJO. Eighteen renal units (51%) had concomitant renal calculi that required percutaneous nephrolithotomy; this included 8 renal units with pelvi-ureteric junction stones. Twenty-four renal units (69%) had moderate degree of hydronephrosis whilst 11 renal units (31%) had severe hydronephrosis. The mean operating time for antegrade endopyelotomy was  $94 \pm 28$  minutes and the mean hospital stay was  $4.7 \pm 2.8$  days. No patients had conversion to open pyeloplasty and no patient required perioperative blood transfusion. The mean follow-up was  $33 \pm 23$  months and the overall success rate following endopyelotomy was 83% (n = 29 renal units). The success rate for primary UPJO was 81%, whilst the success rate for secondary UPJO was 84%. Four renal units (11%) required ancillary procedures for failed endopyelotomy: 2 required repeat endopyelotomy and 2 needed open pyeloplasty. Two patients were lost to follow-up.

**Conclusion:** Endopyelotomy is a viable therapeutic alternative for UPJO compared to open reconstruction. Careful patient selection can optimise the surgical outcome.

#### SUR721

##### Overnight Orthokeratology-related Infective Keratitis — A Case Series

**EWL CHEE<sup>1</sup>, L LIM<sup>1</sup>, D TAN<sup>1</sup>**

<sup>1</sup>Corneal and External Eye Disease Service, Singapore National Eye Centre, Singapore

**Aim:** To report a case series of 3 patients who developed corneal ulcers following the use of overnight orthokeratology.

**Methods:** Observational case report of 3 patients with corneal ulcers seen in the Singapore National Eye Centre over a period of 4 years from 2001 to 2005.

**Results:** Three children between the ages of 9 and 14 years, who wore the lenses for an average of 2 to 3 months, were seen at our tertiary hospital and treated as for orthokeratology-related corneal ulcer. All 3 patients had cultures which were positive for *Pseudomonas aeruginosa*.

**Conclusion:** Orthokeratology, otherwise known as corneal re-shaping, is the remodelling of the cornea through the programmed application of contact lenses in order to correct myopia. It has been found to produce a temporary reduction in myopia, but there has been no scientific evidence that it can prevent the progression of myopia in children. In addition, there have been several reports of orthokeratology-related complications, most importantly, the potentially blinding complication of corneal ulcers. Hence, in view of the safety issues, orthokeratology should be used with caution and greater public awareness is needed to educate the public on the potential complications that could arise.

#### SUR722

##### A Survey of the Habits of Myopic Children in a Singapore Paediatric Clinic

**EWL CHEE<sup>1</sup>, Y LING<sup>2</sup>**

<sup>1</sup>Corneal and External Eye Disease Service, <sup>2</sup>Paediatric Ophthalmology and Strabismus Service, Singapore National Eye Centre, Singapore

**Aim:** 1) To find out how much time the child spends at various near work and outdoor activities after school hours. 2) To raise awareness among parents to the amount of time the children spend indoors and on near work 3) To help ophthalmologists and parents check on near work/outdoor activity ratio in order to encourage a healthy balance for the eyes.

**Methods:** 1) Informal survey of myopic patients in a paediatric clinic over 2 months (June to July 2005). 2) Questionnaire regarding near work parameters (homework, computer, handheld games, television and reading) and outdoor activities and the hours spent doing each activity per day. 3) Cycloplegic refraction.

**Results:** The pattern of time spent at each of the activities was shown with

respect to the degree of myopia and age group, and the average amount of time spent on near work was 4.75 hours per day, while the amount spent on outdoor activities was much less, with an average of only 0.84 hours per day.

**Conclusion:** Singapore has the reputation of having one of the highest rates of myopia among school-going children in the world. Much has been written about the association of myopia development with near work activity. In this survey, the amount of time spent on near work was significantly more than that for outdoor activities. In view of the possible link between near work and myopia, there is a need to raise this awareness and encourage the young to engage in more outdoor activities as this is a possible modifiable risk factor for myopia.

#### SUR723

##### Clinical Results of Osteo-Odonto Keratoprosthesis Surgery in Singapore

**SHLIU<sup>1</sup>, J THENG<sup>1</sup>, A TAY<sup>2</sup>, E LYE<sup>2</sup>, A PARTHASARATHY<sup>1</sup>, D TAN<sup>1</sup>**  
<sup>1</sup>Corneal and External Eye Disease Service, Singapore National Eye Centre, Singapore, <sup>2</sup>Oral and Maxillofacial Surgery, National Dental Centre, Singapore

**Aim:** To evaluate the outcome of osteo-odonto keratoprosthesis (OOKP) surgery performed in Singapore for severe, end-stage cornea and ocular surface blindness.

**Methods:** OOKP surgery involves a radical 2-stage procedure performed 2 to 4 months apart. Stage 1 involves using a canine tooth to embed an optical cylinder which is implanted into the cheek, and replacing the ocular surface with a buccal mucosal graft. Stage 2, 2 months later, involves implantation of the tooth-cylinder complex into the front of the eye, after lens and iris removal and vitrectomy.

**Results:** Thirteen bilaterally blind patients from various countries, including Singapore, Malaysia, Indonesia, Sri Lanka and Bangladesh, received OOKP surgery between February 2004 and August 2005 (7 males, 6 females, mean age of 31 years), with 11 having completed Stage 2. Patient diagnoses were Stevens-Johnson syndrome (n = 6) and severe chemical or thermal burns (n = 7), and had previously undergone many failed surgical procedures or were deemed totally unsuitable for conventional surgery. The mean follow-up period was 6.45 months (range, 1-14 months). Of the 10 patients who have attained stable vision, 4 (40%) attained 6/6 vision, and 9 (90%) attained at least 6/15 vision, with the remaining patient having 6/60 vision limited by glaucomatous optic neuropathy. No significant complications have occurred to date.

**Conclusion:** Early-to-moderate term results of our OOKP programme appear excellent, with good visual outcomes and minimal complications to date. OOKP surgery is a radical but highly viable surgical procedure to visually rehabilitate the most severe forms of end-stage corneal and ocular surface blindness.

#### SUR724

##### Optic Disc Changes after Acute Primary Angle Closure

**S SHEN<sup>1</sup>, A FONG<sup>1</sup>, YH CHAN<sup>2</sup>, R HUSAIN<sup>3</sup>, G GAZZARD<sup>3</sup>, S SEAH<sup>1</sup>, T AUNG<sup>1</sup>**

<sup>1</sup>Glaucoma Service, Singapore National Eye Centre, Singapore, <sup>2</sup>Ophthalmology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>3</sup>Institute of Ophthalmology, UK

**Aim:** To evaluate the changes in optic disc in the first 16 weeks after an episode of acute primary angle closure (APAC) using stereoscopic optic disc photography and a digital optic disc planimetric programme.

**Methods:** This was a prospective, observational study of 47 Asian patients presenting with APAC, who were successfully treated with laser peripheral iridotomy. Stereoscopic optic disc photographs were taken at week 2 and week 16 during the follow-up period after the APAC. The images were then analysed with a computer-assisted planimetric measurement programme, corrected for ocular magnification. The overall and quadrant areas of the optic disc, cup-disc ratio (CDR) and neuroretinal rim (NRR) were measured by 2 independent graders and the mean of the readings were used to calculate

the changes in optic disc parameters during the period.

**Results:** The mean age of the study population was  $67.6 \pm 11.2$  years (range, 40-104 years). The majority of the subjects were female (66%) and Chinese (90%). From week 2 to week 16, the mean CDR increased from  $0.56 \pm 0.05$  to  $0.59 \pm 0.03$  ( $P < 0.001$ ) and the mean surface area of NRR decreased from  $1.74 \pm 0.31 \text{ mm}^2$  to  $1.59 \pm 0.27 \text{ mm}^2$  ( $P < 0.001$ ). There was no significant change in the mean optic disc area ( $P = 0.19$ ).

**Conclusion:** This study demonstrates significant changes in optic disc parameters, namely CDR and NRR, from week 2 to week 16 after an episode of APAC.

#### SUR725

##### The Relationship between Optic Disc Cupping, Angle Configuration and Intraocular Pressure in Chronic Angle Closure Glaucoma

**MCC LIM<sup>1</sup>, YH CHAN<sup>2</sup>, P ROJANAPONGPUN<sup>3</sup>, P CHEW<sup>4</sup>, T AUNG<sup>5</sup>**  
<sup>1</sup>Ophthalmology, Singapore National Eye Centre, Singapore, <sup>2</sup>Clinical Epidemiology, National University of Singapore - Staff & Student - Office of Life Sciences, Faculty of Science, Singapore, <sup>3</sup>Ophthalmology, Chulalongkorn University, Bangkok, Thailand, <sup>4</sup>Ophthalmology, National University Hospital, Singapore, <sup>5</sup>Ophthalmology, Singapore National Eye Centre, Singapore

**Aim:** To investigate the relationship between drainage angle configuration with untreated intraocular pressure (IOP) and optic disc cupping in chronic angle closure glaucoma (CACG) subjects.

**Methods:** The sample comprised 275 Asian subjects with CACG who participated in a randomised controlled trial that investigated the IOP-reducing effect of Latanoprost and Timolol. CACG was defined as the presence of glaucomatous optic neuropathy (with or without a visual field defect), a non-visible pigmented trabecular meshwork for at least 180 degrees on gonioscopy, and evidence of peripheral anterior synechiae (PAS) in association with IOP  $> 21$  mm Hg. Static and dynamic gonioscopy were performed, the angles were graded in each quadrant using Shaffer's system and the number of clock hours of PAS, IOP and cup-disc ratio (CDR) were recorded.

**Results:** 75% of subjects were female, with a mean age of  $62.9 \pm 9.4$  years. The mean angle width was  $0.77 \pm 0.53$  and the mean number of clock hours of PAS was  $4.77 \pm 3.2$ . Untreated IOP correlated with angle width ( $r = -0.23$ ,  $P < 0.001$ ) and clock hours of PAS ( $r = 0.22$ ,  $P < 0.001$ ). Vertical CDR correlated with angle width ( $r = -0.17$ ,  $P = 0.004$ ) and PAS ( $r = 0.28$ ,  $P < 0.001$ ). Multiple linear regression using baseline IOP as the outcome variable showed a 0.39-mm Hg (95% CI 0.15-0.63) increase in baseline untreated IOP for each unit increase in clock hours of PAS ( $P = 0.002$ ).

**Conclusion:** In subjects with CACG, the extent of PAS and a narrower width of the drainage angle were associated with higher untreated IOP and a larger vertical cup-disc ratio.

#### SUR726

##### Validation Study of Polaroid and Digital Diabetic Retinal Photography in the Screening of Diabetic Retinopathy

**JWK LIM<sup>1</sup>, L CHI<sup>1</sup>, I YEO<sup>1</sup>**

<sup>1</sup>Vitreo-Retinal Service, Singapore National Eye Centre, Singapore

**Aim:** To validate the use of single- and 3-field digital non-stereoscopic diabetic retinal photography (DDRP) and polaroid non-stereoscopic retinal photography against clinical assessment by the ophthalmologist, for the screening and grading of diabetic retinopathy.

**Methods:** A prospective study of 808 consecutive patients, with 1616 eyes recruited from referrals by the primary healthcare service. Each patient underwent 3 different modalities of photographic screening. The polaroid and digital images were read by 2 ophthalmologists on separate occasions. All patients underwent clinical diabetic retinopathy grading by ophthalmologists. The gradings were based on the Early Treatment Diabetic Retinopathy Study grading protocol.

**Results:** Whilst the use of non-stereoscopic retinal photographs allowed for good ability to screen for diabetic retinopathy, the ability to grade proved to be more difficult. The agreement rates between clinical assessment vs polaroid photography, 1-field and 3-fields DDRP were 72.8% (K = 0.45,  $P < 0.001$ ), 74.2% (K = 0.49,  $P < 0.001$ ) and 75.9% (K = 0.54,  $P < 0.001$ ) respectively. For diabetic maculopathy, the agreement rates between clinical assessment vs polaroid photography, 1-field and 3-fields DDRP were 86.4% (K = 0.46,  $P < 0.001$ ), 86.9% (K = 0.53,  $P < 0.001$ ) and 86.5% (K = 0.51,  $P < 0.001$ ) respectively.

**Conclusion:** Both single-field and 3-fields of DDRP, and polaroid photography performed equally well in the screening of diabetic retinopathy. Diabetic maculopathy showed higher agreement with clinical assessment by an ophthalmologist.

## SUR727

### Pelvic Trauma : Factors that Influence Mortality

LT TEO<sup>1</sup>, MT CHIU<sup>2</sup>

<sup>1</sup>Medical Manpower, SingHealth HQ, Singapore, <sup>2</sup>Surgery, Tan Tock Seng Hospital, Singapore

**Aim:** To study the factors that influence the mortality of patients with pelvic trauma.

**Methods:** A retrospective study of patients admitted to a level 1 trauma centre with pelvic trauma and ISS of equal to or more than 20. Patients were gathered from the trauma registry. The group of patients was further divided into those that died (study group) and those that survived (control group). These patients were subsequently studied based on age, sex, co-morbidities, type of trauma, admitting GCS, type/severity of fractures, type of management, time from presentation to definitive MX/decision, time of death and complications post-trauma.

**Results:** There were 66 patients in the study group (A) and 46 patients in the control group (B). In both groups, 98% of all injuries were caused by blunt trauma. 78% of patients in group A had ISS >30 compared to 30% in group B. 68% of group A had pelvic injuries grade 3 and above, compared to 72% in group B. Significant neuro trauma was noted in group A (77%). Significant thoracic trauma and abdominal trauma were also contributory factors to mortality.

**Conclusion:** The 2 major influences of mortality in patients with pelvic fractures are severity of the primary pelvic fracture and other associated injuries. Patients with pelvic fracture of grade 3 and above had a poor outcome. Poor outcome was also seen in patients with concomitant thoracic and euro trauma. The ISS scoring system correlates well. In this study, patients with ISS >30 had poor outcome.

## SUR728

### High Impact Fall Injuries – A Single Institution Experience of 125 Cases

LT TEO<sup>1</sup>, V APASAMY<sup>2</sup>

<sup>1</sup>Medical Manpower, SingHealth HQ, Singapore, <sup>2</sup>Surgery, Tan Tock Seng Hospital, Singapore

**Aim:** To study the pattern of high impact free fall injuries and factors that influence mortality/morbidity.

**Methods:** A retrospective analysis of patients admitted to a level 1 trauma centre between January 2003 and December 2004 following a high impact fall (>3 m). Demographic data, cause of fall, impact site, injury pattern,

clinical management and outcome were analysed.

**Results:** One hundred and twenty-five cases were admitted during the 2-year study period. The mean age was 37 years (range, 15 to 91, SD 14.99); 75% males. Industrial accidents accounted for 58% while domestic work, recreational activities and suicide attempts made up the rest. In 86%, impact surface was concrete. At least 1 episode of hypotension/shock (systolic BP <90 mm Hg) occurred in 80% of patients on admission to the emergency department. Major injury distributions were head injuries (84%), long bone fractures (80%), thoracic injuries (78%), spinal injuries (57%), abdominal injuries (47%) and pelvic fractures (39%). 75% of patients had injuries in 3 or more body regions. Twenty-one patients died in the resuscitation room and 69 underwent surgery, of whom 11 patients died within 6 hours of surgery. Two haemodynamically unstable patients underwent in-theatre pelvic angio-embolisation. Both survived. There was a total of 93 survivors with overall mortality of 25.6%. The major causes of death were thoracic (25%), head (24%), and abdominal and pelvic (23%) injuries.

**Conclusion:** High impact falls result in major multi-system injuries which require a well coordinated and aggressive multi-disciplinary team approach. High-risk patients include those with combined head and thoracic injuries. In-theatre angio-embolisation proved to be effective in managing unstable patients with pelvic fractures and arterial bleeding who cannot be transferred to radiology suite.

## SUR729

### In-theatre Angiogram for Abdominal Trauma — Our Initial Experience

LT TEO<sup>1</sup>, IX SOO<sup>2</sup>, V APASAMY<sup>2</sup>

<sup>1</sup>Medical Manpower, SingHealth HQ, Singapore, <sup>2</sup>Surgery, Tan Tock Seng Hospital, Singapore

**Aim:** To review the results of in-theatre angiogram embolisation for patients with abdominal trauma and to compare with those done in the angiogram room.

**Methods:** We conducted a retrospective analysis of patients admitted to a level 1 trauma centre in Tan Tock Seng Hospital between January 2003 and June 2005 following abdominal trauma. Demographic data, injury severity score, parameters on admission, time to start of angiogram, clinical management and outcome were analysed.

**Results:** Twenty cases were studied. Fifteen (75%) were done as in-theatre angiograms. Road traffic accidents accounted for 12 cases (60%), while falls made up the rest. Injury severity score (ISS) ranged from 9 to 75. Six patients on admission had systolic BP <90 mm Hg and needed intubation. Fourteen cases (70%) were pelvic angiograms with 3 hepatic angiograms, 2 splenic and 1 renal. The time from decision for angiogram to start of angiogram ranged from 15 minutes to 3 hours for those done in-theatre. Figures were similar to that in the angiogram room. Of the 20 cases who had angiograms, 16 underwent surgery, of whom 6 patients died within 48 hours from the time of surgery, and 2 died after 48 hours. Overall survival was 60%.

**Conclusion:** In-theatre angio-embolisation is proving to be effective in managing unstable patients with abdominal trauma and intra-abdominal bleeding. With the exceptions of those severely injured with high ISS scoring, majority (60%) of the patients who had successful angiogram survived. Time taken to mobilise angiogram team to perform in-theatre angiogram was comparable to that in the angiogram room. With quick mobilisation of facilities, in-theatre angio-embolisation is proving to be a useful adjunct along with surgery for trauma patients.

C1

**Integrin-mediated Focal Adhesion Kinase and Protein Kinase C is Required for the Internalisation of West Nile Virus into Cells**

**J CHU<sup>1</sup>, ML NG<sup>1</sup>**

<sup>1</sup>*Microbiology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore*

**Aim:** The infectious entry process of virus often involves complex signal transduction pathways of the host cells. Anti-viral strategies can be designed to target these pathways and prevent the subsequent replication of the virus. In this study, the activation of virus internalisation signaling pathway upon the engagement of West Nile virus (WNV) and integrin  $\alpha V\beta 3$  on the cell surface was analysed in detail.

**Methods:** A combination of molecular techniques, gene silencing technology, gene-knockout cell lines and bio-imaging techniques are employed.

**Results:** Binding of WNV to integrin  $\alpha V\beta 3$  triggered the activation of focal adhesion kinase (FAK) by inducing the autophosphorylation of Tyr576-577 residues at the kinase domain loop. Phosphorylated FAK was observed to associate with vinculin at focal adhesion by immunofluorescence microscopy. Using FAK-deficient cell line (FAK<sup>-/-</sup>), binding of WNV to the cell surface was not affected but the infectious entry of WNV into cells was reduced drastically by more than 1000-fold. The rearrangement of F-actin filaments for the clathrin-mediated endocytosis of WNV was also mediated by the activated FAK. Protein kinase C (PKC), one of the downstream signaling molecules activated by the interaction of WNV and integrin, is also required for trafficking WNV along the endo-lysosomal pathway. Transfection of functional blocking antibodies and generation of siRNA against PKC and its isoforms suggested that PKC is essential for the entry process of WNV.

**Conclusion:** This study provides a novel insight to the signal transduction pathway involved in the entry process of WNV. Potential development of anti-viral agents targeting these specific sites can be considered.

C2

**Glucose Deprivation Sensitises Tumour Cells to Receptor-induced Apoptosis by Decreasing Intracellular Superoxide Anion**

**J HIRPARA<sup>1</sup>, S PERVAIZ<sup>1</sup>**

<sup>1</sup>*Physiology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore*

**Aim:** Cancer cells have high glucose uptake and high rate of glycolysis. Here we investigated the mechanism by which glucose deprivation sensitised tumour cells to apoptotic triggers.

**Methods:** Superoxide production was checked by lucigenin-based assay and cell death was assayed by MTT and PI staining. Caspase activity and processing was checked by enzymatic assays and Western blot analysis. Mitochondrial and cytosolic fractions were made to assess mitochondrial translocation of the pro-apoptotic protein Bax and the reciprocal release of cytochrome C to the cytosol.

**Results:** We have previously shown that death signaling in tumour cells is regulated by the cellular redox status in that a slight increase in superoxide anion ( $O_2^-$ ) inhibited apoptotic signalling. Here we report that glucose deprivation increased apoptosis induced by anti-CD95 in human leukaemia cells (CEM and Jurkat), irrespective of the anti-apoptotic protein Bcl-2. Glucose deprivation of tumour cells for 30-60 minutes resulted in a significant drop in  $O_2^-$  and triggered

strong activation of caspases 8, 9, and 3, translocation of Bax to the mitochondria and subsequent release of cytochrome C, independent of Bcl-2 expression. To provide further evidence to link  $O_2^-$  to death inhibition, cells were incubated with PMA (62.5 ng/mL), a strong inducer of intracellular  $O_2^-$  and the effect on glucose deprivation induced apoptosis was assessed. Indeed, increasing  $O_2^-$  strongly inhibited death signalling in both cell lines, through hitherto unknown mechanism involving increased activation of caspase 8.

**Conclusion:** Overall, these findings suggest that the glycolytic pathway may be important in sensitising tumour cells to death receptor ligands by facilitating the activation of caspase-8 via a drop in intracellular  $O_2^-$  and provides a novel target for tailoring tumour cell response to death stimuli.

C3

**Natural Plant Products as Anticancer Drugs: Mechanism-based Growth Inhibition of Tumour Cells In Vitro**

**AK KHAW<sup>1</sup>, MP HANDE<sup>1</sup>**

<sup>1</sup>*Physiology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore*

**Aim:** Growing evidence, based on in vitro studies on human cancer cell lines and in vivo mice studies, suggests that natural plant products could be potential anti-cancer agents. The molecular mechanism(s) of action of these drugs remains to be elucidated. In the present study, we investigated the anti-proliferative activity of 3 potential anticancer drugs, plumbagin, genistein and curcumin, on human glioblastoma cell lines and human medulloblastoma cell lines with human normal primary fibroblasts as control.

**Methods:** Crystal violet assay, flow cytometric analysis, quantitative fluorescence in situ hybridisation (qFISH), flow cytometric fluorescence in situ hybridisation (FLOW-FISH), terminal restriction fragments (TRF) analysis and telomeric repeat amplification protocol (TRAP).

**Results:** There was a dose-dependent effect on cell viability on the cancer cell lines used following drug treatments. While glioblastoma cell lines showed the highest sensitivity to the cell-killing effect of plumbagin, medulloblastoma cell lines were more susceptible for cell death following curcumin treatment. Glioblastoma cell lines were more resistant to curcumin-induced cell death. Both curcumin and genistein were shown to inhibit telomerase activity and impair telomere function in the cancer cell lines. The telomerase inhibition effect was dependent on the drug dose and duration of treatment.

**Conclusion:** As telomerase is expressed in more than 90% of human tumours, telomerase inhibition seems to be an attractive target for anticancer therapy. We propose that the above drugs may elicit their effect on cancer cells on the telomerase inhibition pathway. This characteristic could have implications in cancer treatment with regard to preventing the recurrence of tumours.

C4

**Involvement of Nm23-m2, a Gene Which Encodes Nucleoside Diphosphate Kinase Beta (NDPK-B), in Dopaminergic Neuronal Cell Cycle Arrest and Differentiation**

**CC LOH<sup>1</sup>, TM LIM<sup>1</sup>**

<sup>1</sup>*Ageing/Neurobiology Programme, National University of Singapore - Staff & Student - Office of Life Sciences, Faculty of Science, Singapore*

**Aim:** The Nm23 genes which encode nucleoside diphosphate kinases (NDPKs) are ubiquitous metabolic enzymes, responsible for the

synthesis of nonadenine nucleoside triphosphates from the corresponding diphosphates, with ATP as phosphoryl donor. Several reports suggest an involvement of NDPK in the functional differentiation of epithelial and neural tissues. In the brain, nm23/NDPK have been implicated in modulating neuronal cell proliferation, differentiation, and neurite outgrowth. Its expression accumulates preferentially in the nervous system during the early embryonic development, suggesting that NDPK would play a pivotal role in brain functions. In our previous study, Nm23-m2 was one of the candidate genes which was found to be up-regulated upon sodium butyrate acid-induced MN9D differentiation through subtractive library screening and micro-array analysis. This study aims to elucidate the role of Nm23-m2 in dopaminergic neuronal differentiation.

**Methods:** Cell culture, western immunoblots, flow cytometry, fluorescent microscopy, RNA interference.

**Results:** Overexpression of Nm23-m2 in MN9D cell line resulted in significant increase in the number of neurites and an alteration of the cell cycle, increased G1-phase. Analysis of immunoblots revealed that this morphological differentiation was accompanied by increased expression of markers of maturation such as the synaptosomal protein SNAP-25. We also used the GFP reporter system to analyse the ectopic expression of GFP-Nm23-m2 protein in the MN9D cell line using fluorescent microscopy techniques. Sodium butyrate acid-induced neurite outgrowth in MN9D cells was also abolished by Nm23-m2 siRNA treatment and the level of SNAP25 remained unaltered by RNA interference.

**Conclusion:** Data support the idea that Nm23-m2 plays a role in dopaminergic neuronal differentiation.

## C5

### A Novel CD38-mediated cADPR Signaling Pathway in CHO Cell

F QIAN<sup>1</sup>, CF CHANG<sup>1</sup>

<sup>1</sup>Biochemistry, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** CD38 is both a receptor and multifunctional ectoenzyme. CD38 plays an important role in calcium signaling as it catalyses the production of several calcium-mobilising metabolites, including cyclic ADP-ribose (cADPR) and nicotinic acid adenine dinucleotide phosphate (NAADP). A topology paradox exists as the active site of CD38 is located extracellularly while the targets of cADPR lie within the cell. The present study was set to investigate the relationship between CD38 cellular localisation and its function.

**Methods:** An EGFP-tagged human CD38 was stably expressed in CHO cells under a tetracycline-controlled CMV promoter. After ligand ( $\beta$ -NAD<sup>+</sup>) induction, cellular localisation of CD38 was analysed by immunocytochemistry, immunoblotting, cell surface biotinylation, flow cytometry, and immunoelectron microscopy. CD38 enzyme activity was measured by cyclase activity assay following subcellular fractionation. Endogenous cADPR level in cells was measured by cycling enzymatic assay.

**Results:** We found that  $\beta$ -NAD<sup>+</sup> induced a time-dependent migration of CD38, which was from plasma membrane to cytoplasm and to nuclear envelope. Real-time confocal microscopy showed that CD38 internalisation was initiated at 15 min, and completed about 100 min after  $\beta$ -NAD<sup>+</sup> incubation. During this process, a significant portion of CD38 migrated from the cell surface towards the peri-nuclear region and a proportional decrease was observed in the plasma membrane. Correspondingly, following ligand induction, a gradual increase in nuclear cyclase activity was detected. Subcellular

fractionation and immunoblotting confirmed a significant increase of CD38 in the nuclear fraction.

**Conclusion:** Our study, for the first time, directly demonstrated that CD38 undergoes ligand-induced internalisation from plasma membrane to nucleus, which may represent a novel surface to nuclear CD38-mediated cADPR signaling pathway.

## C6

### Overexpression of the FAT10 Gene is Associated with Increased Chromosomal Instability through Relocalisation of MAD2, the Mitotic Checkpoint Protein

JW REN<sup>1</sup>, A KAN<sup>2</sup>, SH LEONG<sup>2</sup>, L OOF<sup>3</sup>, S CHONG<sup>4</sup>, OL KON<sup>2</sup>, C LEE<sup>1</sup>

<sup>1</sup>Biochemistry, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Research Divisions – Medical Sciences, National Cancer Centre, Singapore, <sup>3</sup>Clinical Departments – Surgical Oncology, National Cancer Centre, Singapore, <sup>4</sup>Paediatrics, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** We have previously found that FAT10, a member of the ubiquitin-like modifier family of proteins, is overexpressed in several cancers. Since FAT10 was reported to associate with MAD2, a mitotic checkpoint protein, we hypothesised that FAT10 may play a role in the regulation of genomic stability.

**Methods:** HCT116 cells stably expressing the FAT10 gene either constitutively or under the tetracycline-inducible promoter were utilised. Immunoprecipitation was performed to demonstrate the interaction between FAT10 and MAD2. Subcellular localisation of FAT10 and MAD2 was visualised using confocal microscopy. Cell cycle profile was examined by fixing the cells in 2% paraformaldehyde, staining them with propidium iodide or MPM-2 antibody and analysing the stained cells using the flow-cytometer. G-banded chromosome analysis was performed to determine the chromosome numbers of the cells after 100 to 250 cell doublings.

**Results:** FAT10 was found to interact and co-localise with MAD2 during mitosis. Notably, subcellular localisation of MAD2 was altered in FAT10 overexpressing cells. Double-thymidine synchronised HCT116 cells overexpressing FAT10 showed delayed entry into mitosis but not G1, suggesting a shortened mitotic phase. Additionally, more nocodazole-treated FAT10 overexpressing cells escape mitotic arrest and are multi-nucleate compared to parental cells. Significantly, a higher degree of variability in chromosome number was observed in cells overexpressing FAT10.

**Conclusion:** High levels of the FAT10 protein in cells can lead to increased mitotic non-dysjunction and chromosome instability, and this effect may be mediated by an abbreviated mitotic phase through the alteration of subcellular localisation of MAD2 during mitosis.

## C7

### Interaction of the Anti-apoptotic Protein Bcl-2 with the Small GTPase Rac1: A Possible Mechanism for Bcl-2-mediated Production of Intracellular Superoxide

R VELAITHAN<sup>1</sup>, S PERVAIZ<sup>1</sup>, MV CLEMENT<sup>2</sup>

<sup>1</sup>Physiology, <sup>2</sup>Biochemistry, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** Bcl-2 protein is a widely known anti-apoptotic molecule. Studies have shown that Bcl-2 binds to proteins of the Bcl-2 family, such as Bax and Bak, to prevent their pro-apoptotic function. In addition, we recently showed that overexpression of Bcl-2 in CEM

leukaemia cells induced an increase in the intracellular level of superoxide, resulting in their resistance to drug-induced apoptosis. Interestingly, reducing the intracellular superoxide anion levels sensitised tumour cells to cell death. Constitutively active GTPase Rac-1 is also shown to inhibit apoptosis in tumour cells through increased production of intracellular superoxide. Therefore, we hypothesised that Bcl-2 might be interacting with small GTP binding protein Rac-1 to form a superoxide-producing complex.

**Methods:** To investigate the physical interaction between Rac-1 and Bcl-2, co-immunoprecipitation and GST pull down assays were done using different tumour cell lines. Synthetic BH4 and BH3 peptides are used to identify the putative binding sites *in vitro* and *in vivo*. Confocal microscopy was done on HeLa Neo and HeLa Bcl-2 cells to observe colocalisation of Rac-1 and Bcl-2.

**Results:** Bcl-2 interacts with GTPase Rac-1 in various tumour cell lines. BH3 peptides inhibited the interaction between Rac1 and Bcl-2. This was further supported by confocal microscopy in human cervical cancer cells (HeLa) where TAT-tagged BH3 peptides were used for inhibition of the interaction *in vivo*.

**Conclusion:** These findings suggest a novel role for Bcl-2 in redox regulation. A detailed study of the functionality of this interaction will provide a pathway for future drug screening procedures.

## C8

### Sequential Nuclear and Cytoplasmic Degradation of Mutant Transcripts Containing Premature Termination Codons – Evidence for Translation-dependent and Translation-independent Mechanisms

**W WANG<sup>1</sup>, DLM GOH<sup>1</sup>, CG LEE<sup>2</sup>, SS CHONG<sup>1</sup>**

<sup>1</sup>Paediatrics, <sup>2</sup>Biochemistry, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** Nonsense-mediated mRNA decay (NMD) is an mRNA quality control surveillance mechanism that selectively degrades mutant transcripts containing premature translation termination codons (PTCs). Using  $\beta$ -thalassaemia as the disease model, we investigated the effect of PTC position within the  $\beta$ -globin gene (HBB) on NMD efficiency and investigated the sub-cellular localisation of the transcript degradation process.

**Methods:** HBB gene constructs (consisting of its native promoter, a 5'-UTR iron-responsive element and either wildtype or 1 of 5 naturally occurring PTCs) were transfected into HeLa cells. Cytoplasmic- and HBB-specific translation was regulated via iron depletion/repletion. Global translation inhibition was achieved using cycloheximide, puromycin, or anisomycin. Cytoplasmic and nuclear RNAs were separately extracted from the transfected cells treated with various translation regulation regimes, and HBB transcript levels were analysed by reverse-transcription quantitative real-time PCR.

**Results:** Transcripts with PTCs located at or upstream of codon 17 were resistant to degradation, while transcripts with PTCs at or downstream of codon 21/22 were subject to a significant degree of degradation. Translation-dependent degradation was detected in the nucleus, supporting a nuclear-localised NMD mechanism. Further degradation was detected in the cytoplasm but was translation-independent.

**Conclusion:** HBB transcripts containing PTCs located at or upstream of codon 17 escape detection by the NMD surveillance machinery. Nuclear-localised NMD degradation only partially accounts for the total transcript degradation of NMD-susceptible transcripts, the

remaining degradation being mediated by a cytoplasmically localised translation-independent mechanism.

## C9

### Generation and Characterisation of Insulin-producing Cells Derived from Mouse Embryonic Progenitor Cells

**JP ZHANG<sup>1</sup>, RH LUO<sup>1</sup>, OL KON<sup>2</sup>, F XIE<sup>1</sup>, SK LIM<sup>3</sup>, GD LI<sup>1</sup>**

<sup>1</sup>NUMI (National University Medical Institute), National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Research Divisions – Medical Sciences, National Cancer Centre, Singapore, <sup>3</sup>Stem Cell Biology, Genomic Institute of Singapore, Singapore

**Aim:** Transplantation of human pancreatic islets is an efficient therapy for type 1 diabetes. However, only a limited number of patients could benefit from this promising remedy because of the shortage of cadaver pancreas. Therefore, the generation of propagational, functional insulin-secreting cells by differentiation of embryonic or adult stem/progenitor cells has become the enthusiastic approach.

**Methods:** In this study, insulin-producing cells differentiated from early (E6.0-7.5) mouse embryo progenitor cell lines were characterised by RT-PCR, radioimmunoassay, glucose responsiveness profile, and animal transplantation.

**Results:** These cells could be expanded for >7 months without loss of insulin-producing phenotype or compromise in cell proliferation rate. They expressed both proinsulin-1 and -2 mRNA, but not other islet hormones. Their insulin and C-peptide contents were almost equal (about  $\mu\text{g}/10^6$  cells). Elevation of glucose concentrations from 2.8 to 7-15 mM evoked membrane depolarisation, raised cytosolic free  $\text{Ca}^{2+}$  levels and significantly increased insulin secretion in these cells. Like islet beta-cells, such glucose-induced insulin secretion was enhanced by cAMP-elevating agents, but suppressed by diazoxide, verapamil, or inhibitory hormones (somatostatin or epinephrine). Transplantation of these cells into the kidney subcapsules in streptozotocin-induced diabetic mice was able to ameliorate the hyperglycaemia. Our insulin-producing cells are also non-tumorigenic, as they did not induce teratomas when implanted in SCID mice.

**Conclusion:** The insulin-producing cells derived from mouse embryo progenitor cells exhibit many key properties of primary beta-cells and can be propagated *in vitro* for the long term. Our findings provide strong evidence for the feasibility of generating functional insulin-secreting cells from human ES cells for type 1 diabetes therapy.

## C10

### Dexamethasone Reduces Chitinase Level in Allergic Airway Inflammation in Mice

**J ZHAO<sup>1</sup>, FWS WONG<sup>1</sup>**

<sup>1</sup>Pharmacology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** Asthma is a disease characterised by airway inflammation and remodeling. Inhaled steroid is the first-line anti-inflammatory therapy for asthma. We have recently reported increased levels of chitinase in mouse allergic airway inflammation and other has shown a pathogenic role of acidic mammalian chitinase (AMCase) in asthma. The present study explored novel mechanisms of action of dexamethasone in allergic airway inflammation by analysing the proteome of mouse bronchoalveolar lavage (BAL) fluid.

**Methods:** BALB/c mice were sensitised and challenged with ovalbumin (OVA). Dexamethasone was given intratracheally. BAL



fluid proteins were resolved by 2-dimensional (2-DE) gel electrophoresis and identified by MALDI-TOF mass spectrometry.

**Results:** BALB/c mice sensitised and challenged with OVA developed pulmonary inflammatory cell infiltration, airway mucus hypersecretion and serum OVA-specific IgE level elevation. Dexamethasone inhibited all these parameters. The levels of 26 BAL fluid proteins were found to be significantly altered by dexamethasone. These include gob-5 (related to mucus production), surfactant protein D (related to host defence), lungkine (related to inflammatory cell chemotaxis), and a family of chitinase proteins such as AMCcase, Ym1 and Ym2 proteins

(related to airway inflammation). Effects of dexamethasone on the proteome of mouse airway inflammation were confirmed by RT-PCR. Dexamethasone was also shown to significantly reduce chitinase enzymatic activity.

**Conclusion:** Proteomics is a useful tool in unraveling changes in BAL fluid protein expression induced by glucocorticoid in the treatment of allergic airway inflammation. We have identified a novel anti-inflammatory mechanism of action of inhaled dexamethasone in asthma by blocking the expression of a family of chitinases.

**D1**

**Adjuvant Effects of an Immunomodulatory Protein in Tumour Immunotherapy**

**Y DING<sup>1</sup>, KY CHUA<sup>1</sup>, SV SEOW<sup>1</sup>**

<sup>1</sup>Paediatrics, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** The aim of this study was to evaluate the use of a fungal immunomodulatory protein, Fve, as an adjuvant for human papillomavirus tumour antigen E7 in a mouse tumour model.

**Methods:** 1) ELISA for E7-specific antibodies analysis. 2) ELISA for cytokines assay. 3) Intracytoplasmic cytokine staining and flow cytometry analysis. 4) In vivo tumour protection experiments. 5) In vivo tumour therapeutic experiments.

**Results:** We observed that mice immunised with E7 plus Fve had enhanced E7-specific antibody and T-cell responses, accompanied by a remarkable increased production of IFN- $\gamma$  as compared to the control mice immunised with E7 alone. Furthermore, intracellular cytokine and cell surface marker staining assays revealed that there was increased activation and expansion of E7-specific IFN- $\gamma$ -producing T cells. In vivo studies with TC-1-induced tumour murine model revealed that animals treated with E7 plus Fve resulted in a significant suppression of tumour growth and extended survival time in both prophylactic and therapeutic models as compared with mice treated with E7 alone.

**Conclusion:** The results indicated that co-administration of E7 and Fve could be a potent approach to enhance cell-mediated immune responses for the control of HPV-associated cervical cancer.

**D2**

**VEGF-A Mutations and Possible Polymorphisms in Gastrointestinal Stromal Tumours**

**HC HAN<sup>1</sup>, MI HO<sup>1</sup>, D ANUAR<sup>1</sup>, SS NG<sup>1</sup>, ME NGA<sup>2</sup>, R SOONG<sup>1,2</sup>, M SALTO-TELLEZ<sup>1,2</sup>**

<sup>1</sup>NUMI (National University Medical Institute), National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Pathology, National University Hospital, Singapore

**Aim:** Gastrointestinal stromal tumours (GISTs) are the commonest mesenchymal neoplasms in the gastrointestinal tract. They are primarily associated with c-kit mutations, leading to overexpression of the CD117 antibody. Their prognostication is controversial; while some authors indicate that c-kit exon 11 mutations are associated with a worse prognosis, this view has been challenged recently. The aims of this study were to investigate the presence of mutations of VEGF-A in GISTs and to explore their possible prognostic significance as well as their suitability as possible new drug targets.

**Methods:** Thirteen GISTs from the Pathology archives in NUH were characterised, and the DNA extracted (GENTRA Cell and Tissue Kit). Analyses of mutations in exons 9, 11, 13 and 17 of c-kit and exons 1 and 4 of VEGF-A were performed by PCR, followed by denaturing high-performance liquid chromatography using previously reported methodologies and our own developed protocols. The mutations were confirmed by direct sequencing where relevant.

**Results:** The c-kit mutation analysis confirmed the reported pattern, with 5/13 cases exhibiting exon 11 mutations. Interestingly, we detected 3 possible single nucleotide polymorphisms (SNPs) in the exon 4 of VEGF-A, as well as 1 bona fide mutation in exon 1 of the same gene.

**Conclusion:** The finding of VEGF-A SNPs and mutations in GISTs

is novel and unreported to date. This may hold important implications in the biology of this tumour (including synergies between VEGF-A and c-kit). Furthermore, VEGF-A appears as a potential target to synergise with the existing imatinib regimes, or as a second choice drug for cases refractory to imatinib therapy.

**D3**

**Fetal HLAG Genotype Is Associated With Significantly Increased Risk for Pre-Eclampsia But Not Gestational Hypertension in the Malay Population**

**JFV HO<sup>1,6</sup>, YS CHONG<sup>2</sup>, YH CHAN<sup>3</sup>, KJ LIM<sup>4</sup>, A LOGANATH<sup>2</sup>, CGL LEE<sup>5</sup>, SS CHONG<sup>1</sup>**

<sup>1</sup>Paediatrics, <sup>2</sup>Obstetrics & Gynaecology, <sup>3</sup>Biostatistics Unit, Dean's Office, National University of Singapore, Yong Loo Lin School of Medicine, Singapore, <sup>4</sup>Obstetrics & Gynaecology, Hospital Sultanah Aminah, Malaysia, <sup>5</sup>Biochemistry, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>6</sup>School of Medicine, University of Melbourne, Australia

**Aim:** Pre-eclampsia (PE) and gestational hypertension (GH) only occur during pregnancy. Alterations in HLAG function, the predominant HLA gene expressed at the maternal-fetal interface, have been postulated to affect placental vascular remodeling, predisposing the mother to PE. We postulated that paternal alleles of HLAG might increase risk for PE/GH in susceptible mothers.

**Methods:** We tested for association between HLAG and PE/GH using a case-control approach. DNA was extracted from venous blood of mothers and cord blood of babies from 31 PE, 46 GH, and 164 normotensive Malay women. HLAG was amplified in 6 fragments in a single-tube multiplex PCR reaction and genotyped for 19 SNPs using a multiplex minisequencing strategy. Haplotype/haplogroup analyses and case-control comparisons were performed statistically.

**Results:** Risk for PE was not associated with maternal HLAG genotype, but was strongly associated with the presence of fetal haplogroup E ( $P = 0.007$ ; RR = 6.613, 95% CI, 1.827-23.939). Heterozygote frequency of non-synonymous SNP16, which defines haplogroup E, also differed strongly between case and control babies ( $P = 0.006$ ; RR = 6.013, 95% CI, 1.88-23.256). Furthermore, the frequency of SNP16 genotype mismatch between mother (homozygous wildtype) and child (heterozygous) was significantly increased in PE pregnancies compared to normal pregnancies ( $P = 0.002$ , RR = 21.2, 95% CI, 2.45-183.03). Risk for GH was not associated with either maternal or fetal HLAG genotype.

**Conclusion:** The contribution of paternal HLAG haplogroup E (defined by the variant allele of SNP16) in the fetus significantly increases risk for PE (but not GH) in wild type haplogroup mothers. Increased risk for PE may be mediated by a maternal immune response to the variant paternal histocompatibility antigen in the fetus.

**D4**

**Novel Prenatal Diagnosis of HbBart's Hydrops Fetalis by Microsatellite Analysis within the Breakpoints**

**SSY HO<sup>1</sup>, W WANG<sup>2</sup>, SS CHONG<sup>2</sup>, ESC KOAY<sup>3</sup>, M RAUFF<sup>1</sup>, A BISWAS<sup>1</sup>, MA CHOOLANI<sup>1</sup>**

<sup>1</sup>Obstetrics & Gynaecology, <sup>2</sup>Paediatrics, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>3</sup>Laboratory Medicine, National University Hospital, Singapore

**Aim:** Short tandem repeats (STRs) within the breakpoints of –SEA  $\alpha$ -thalassaemia were used to diagnose HbBart's hydrops fetalis. We hypothesised that the presence of STRs excludes Bart's hydrops and enables differentiation between maternal and paternal alleles. The identification of paternally-inherited allele is useful in noninvasive prenatal exclusion of Bart's hydrops using fetal DNA from maternal plasma.

**Methods:** Two –SEA/–SEA and three  $\alpha\alpha$ /–SEA samples were used as controls. In the blinded study, 21 families each consisting of both parents and fetal DNA were analysed. STRs within the breakpoints of –SEA were amplified as targets (STR- $\alpha$ ) while an STR outside the breakpoints is the control (D16S539).

**Results:** Two D16S539 peaks were detected in all samples while 1 STR- peak was detected in all  $\alpha\alpha$ /–SEA controls. No STR- $\alpha$  peaks were detected in –SEA/–SEA. In the blinded study, only samples with one or two D16S539 peaks were analysed. Samples were identified either as  $\alpha\alpha$ /–SEA or homozygotes if only 1 STR- $\alpha$  peak was detected. Samples with 2 STR- peaks were identified as normal ( $\alpha\alpha/\alpha\alpha$ ). With this analysis protocol, 3 fetal samples were identified as Bart's hydrops, 41 samples as  $\alpha\alpha$ /–SEA or homozygotes and the remaining 19 samples as normal. The results were compared with their respective molecular diagnostic genotypes.

**Conclusion:** We achieved 100% accuracy in prenatal diagnosis of  $\alpha$ -thalassaemia. This strategy will be useful for the noninvasive prenatal exclusion of Bart's hydrops. By analysing the paternally-inherited STRs within the deleted region of –SEA, Bart's hydrops can be excluded using fetal DNA from maternal plasma.

**D5**

**Polymorphisms of MTHFR (677C>T and 1298A>C) are Associated with Decreased Risk of Developing Childhood Acute Leukaemias**

**SKY KHAM<sup>1</sup>, TC FOO<sup>1</sup>, H ARIFFIN<sup>2</sup>, YH CHAN<sup>3</sup>, TC QUAH<sup>1</sup>, AEJ YEOH<sup>1</sup>**

<sup>1</sup>Paediatrics, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Paediatrics, University of Malaya, Malaysia, <sup>3</sup>Medicine, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** About 50% of childhood leukaemia start in utero but the main underlying cause is unknown. We postulated that polymorphic variants of methylenetetrahydrofolate reductase (MTHFR), that lead to enhanced thymidine pools and better DNA quality, may protect against the development of childhood leukaemia.

**Methods:** Three hundred and twenty-six childhood leukaemias and 401 unselected cord blood samples were genotyped using PCR/RFLP. Specific leukaemia subtypes were assessed by flow cytometry: 265 B-lineage acute lymphoblastic leukaemia (ALL), 13 T-lineage ALL and 48 acute myeloid leukaemia (AML). Oncogene fusions (MLL rearrangements and TEL-AML1) were screened by RT-PCR. Statistical analysis using odd ratios (ORs) and 95% confidence interval (CI) to examine if one or both of these polymorphisms were associated with the risk of childhood leukaemia.

**Results:** The 677CT polymorphism was significantly protective against development of ALL in both races (Chinese:  $P = 0.017$ , OR = 0.6, 95% CI, 0.4-0.9; Malays:  $P = 0.04$ , OR = 0.5, 95% CI, 0.3-1.0). Subgroup analysis on the 71 childhood leukaemias with onset in utero (MLL rearrangements and TEL-AML1), 677CT polymorphism occurred at a significantly lower frequency compared to the controls (Ch = 26% vs 37%, Mal = 8% vs 74%,  $P = 0.05$ ). In 10 children with MLL rearrangements, only 1 harboured 677CT genotype ( $P < 0.05$ ). This was also observed in the Malay TEL-AML1 cohort, where only 1/20 harboured 677CT genotype ( $P = 0.05$ ). In the Chinese AML cohort ( $n = 30$ ), the combined genotypes of 1298AC and 1298CC tend to be protective ( $P = 0.068$ ) and not 677CT genotype.

**Conclusion:** We report the intriguing observation that polymorphisms of the MTHFR gene resulted in enhanced thymidine pools, significantly reducing the risk of developing childhood leukaemia, especially those with onset in utero.

E1

**Non-surgical Periodontal Treatment and High-sensitivity C-reactive Protein Levels in Diabetics**

**KATAULLAH<sup>1</sup>, LP LIM<sup>1</sup>, F TAY<sup>2</sup>, CF SUM<sup>3</sup>, AC THAI<sup>4</sup>**

<sup>1</sup>Preventative Dentistry, National University of Singapore – Faculty of Dentistry, Singapore, <sup>2</sup>Dental Service, Alexandra Hospital, Singapore, <sup>3</sup>Diabetics, Alexandra Hospital, Singapore, <sup>4</sup>Medicine, National University Hospital, Singapore

**Aim:** A randomised, controlled clinical trial was carried out to determine the effects of non-surgical periodontal treatment on systemic high-sensitivity C-reactive protein (hsCRP) level in patients with type 1 or type 2 diabetes mellitus.

**Methods:** One hundred and nine subjects underwent detailed periodontal and medical examination before being randomised into the 3 groups: non-surgical periodontal treatment with oral hygiene instructions (OHI) group (group 1), OHI group (group 2) and control group (Group 3) that did not receive OHI or periodontal treatment. C-reactive protein was quantified with a high-sensitivity assay. Examinations were repeated at 3 and 9 months from baseline, with reinforcement of OHI in group 1 and 2 and re-treatment in group 1. At the end of the 9-month trial, all patients received periodontal treatment.

**Results:** Seventy-four subjects completed the trial while complete periodontal and medical data was available for 65 subjects. No significant differences were seen between groups at baseline. Significant improvement in mean bleeding on probing (BOP) and plaque scores were noticed in group 1 and 2. At all times, higher BOP was noted in patients with CRP >2 mg/L as compared to subjects with CRP ≤2 mg/L. However, ANCOVA failed to show any significant change in CRP in patients in any of the groups. Binary logistic-regression analysis showed that BOP is significantly related only to plaque and calculus, and CRP is not affected by periodontal variables.

**Conclusion:** Periodontal treatment in diabetic subjects does not have significant effect on serum CRP level despite a cross-sectional association whereby high CRP is associated with high BOP.

E2

**Effects of Ascorbic Acid 2-phosphate on Human Periodontal Ligament Fibroblasts under Low and High Serum Conditions In Vitro**

**AM CHOU<sup>1</sup>, V SAE-LIM<sup>2</sup>, DW HUTMACHER<sup>3</sup>, TM LIM<sup>1</sup>**

<sup>1</sup>Faculty of Science, National University of Singapore - Staff & Student - Office of Life Sciences, Singapore, <sup>2</sup>Restorative Dentistry, National University of Singapore – Faculty of Dentistry, Singapore, <sup>3</sup>Tissue Engineering Programme, National University of Singapore - Staff & Student - Office of Life Sciences, Singapore

**Aim:** The periodontal ligament is the connective tissue between alveolar bone and root. To address the effects of ascorbic acid and evaluate conditions for collagenous matrix synthesis, human periodontal ligament fibroblasts (hPDLF) were examined over 21 days in vitro.

**Methods:** hPDLF were seeded at 10,000 cells/cm<sup>2</sup> and cultured under 4 conditions: A: 0.2% serum, B: 0.2% serum + 200 microM ascorbic acid 2-phosphate (AscP), C: 10% serum, D: 10% serum + 200 microM ascP. Experiments were performed weekly.

**Results:** AscP resulted in an 1.8-fold increase in cell proliferation in B and D, and a 2-fold increase in ALP activity in D at day 21. Significant increases in type I collagen C-terminal propeptide were observed in B and D ( $P < 0.01$ ). Conversely, the proportion of collagens fell most significantly at day 7, remaining lower under high

serum. Pepsin digests of B and D demonstrated multiple collagen types, including I, III, V and possibly XII. Collagen cross-linking was shown in cell layer from day 7 onwards. Comparatively, low amounts of collagen I was observed in medium of A at day 1 and hyper-confluent cell layer of C after day 14. Immunofluorescence at day 21 for collagen I revealed distinct fibrous network in B and dense organisation in D.

**Conclusion:** AscP exerted strong growth-stimulatory effects, and induced significant but differential collagen synthesis and deposition in hPDLF in low and high serum. This study yields important insights into the role of ascP and serum in hPDLF proliferation and collagen deposition for periodontal regeneration.

E3

**Rapid Optical Diagnostic Sensors (RODS) in Dentistry**

**A KISHEN<sup>1</sup>**

<sup>1</sup>Restorative Dentistry, National University of Singapore – Faculty of Dentistry, Singapore

**Aim:** In the past, there have been many clinical cases in which premium technical standards of dental treatment is followed and yet failed. These failures have been attributed to the factors associated with the primary diagnosis. This study aims to develop multi-parametric, rapid, chair-side diagnostic sensors for clinical application in dentistry.

**Methods:** In this study, an optical spectroscopy-based approach was used to develop and test biosensors for (a) quantitative detection of enamel demineralisation, (b) determination of mutans Streptococcal activity in saliva (caries activity) and (c) structural health assessment of the teeth. A bundle of optical fibre consisting of 7 optical fibres (6 illumination fibres and 1 detection fibre) was used in this study to detect demineralisation of enamel and to monitor caries activity of saliva. A fibreoptic micro bend sensor was developed to test the structural integrity of the teeth.

**Results:** The biosensor (a) showed that that the light-induced fluorescence (at 520 nm) linearly decreased with demineralisation. The biosensor (b) displayed an increase in the transmitted light intensity at 590 nm with time. The biosensor (c) displayed a decrease in output light intensity with increase in applied loads, which corresponded with the tooth structural response. The slope of the linear portion of the response curve (stage 1) decreased conspicuously with structural changes in the tooth.

**Conclusion:** These experiments highlight the potential application of optical biosensors as rapid chair side diagnostic sensors to quantitatively monitor enamel demineralisation, caries activity and tooth structural loss.

E4

**Effect of Occlusal Splints on Masticatory Muscle EMG During Clenching**

**WO LOKE<sup>1</sup>, AUJ YAP<sup>1</sup>, TSZ JEE<sup>1</sup>, AWZ LEE<sup>1</sup>, BWP LAI<sup>1</sup>**

<sup>1</sup>Restorative Dentistry, National University of Singapore – Faculty of Dentistry, Singapore

**Aim:** This study compared the effect of anterior (MCI), soft (Proform or PF) and full arch stabilisation (SS) splints on the activity of masticatory muscles during clenching. It was hypothesised that anterior splints would reduce both temporalis and masseteric muscle activity, in contrast with other splints evaluated.

**Methods:** Twelve patients with bruxism and no debilitating temporomandibular disorders (TMD)/psychological distress and 3 aged-matched controls were recruited. The mean age of the subjects was 23.5 years. A crossover design was used where the EMG activity of subjects was measured after the insertion of each splint type. Subjects were randomly divided into 3 groups (with a control in each group) and tested in the following sequence: Group 1 – SS, MCI, PF; Group 2 – MCI, PF, SS; Group 3 – PF, SS, MCI. EMG measurements were repeated 3 times for each splint and with a 5-min interval between each splint type. Results were analysed using the Kruskal-Wallis and Mann-Whitney tests ( $P < 0.05$ ).

**Results:** Average percentage reduction in masseter EMG ranged from –44.8% (PF) to 49.8% (MCI), while reduction in temporalis EMG ranged from –38.8% (SS) to 59.4% (MCI). Significant differences in percentage EMG reduction were observed for both temporalis and masseteric muscles and were as follows: masseter – MCI > SS > PF; temporalis – MCI > SS, PF.

**Conclusion:** The use of soft and full arch stabilisation splints may increase masticatory muscle activity during clenching. The anterior splint was effective in reducing both temporalis and masseteric muscle activity during clenching.

E5

**Chondrogenesis Recapitulated in Human Embryonic Stem Cells – Effects of Growth Factors**

**WS TOH<sup>1</sup>, BC HENG<sup>1</sup>, H LIU<sup>1</sup>, AJ RUFAlHAH<sup>2</sup>, CP YE<sup>1</sup>, LW STANTON<sup>3</sup>, T CAO<sup>1</sup>**

<sup>1</sup>Stem Cell Laboratory, National University of Singapore - Faculty of Dentistry, Singapore, <sup>2</sup>Surgery, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>3</sup>Genome Institute of Singapore, Singapore

**Aim:** Pluripotent human embryonic stem cells (hESCs) represent a promising cell source for treatment of cartilage lesions in the temporary mandibular joint and for repair of other cartilage defects. This study investigated the progressive stages of chondrogenic differentiation of hESCs within a serum-free culture milieu supplemented with BMP2.

**Methods:** Embryoid bodies formed from hESCs were plated directly on gelatin-coated culture dishes, or were dissociated into a single-cell suspension prior to being plated as a micromass aggregate. Chondrogenesis of hESCs were characterised by semi-quantitative RT-PCR, immunofluorescence and histochemical staining, as well as quantitative sulfated glycosaminoglycan (s-GAG) and alkaline phosphatase (ALP) measurements.

**Results:** In both culture systems, distinct cartilage spheroids were formed after 21 days of culture. BMP2 treatment significantly enhanced chondrogenic differentiation, as evidenced by upregulated expression of several characteristic marker genes associated with the chondrocyte phenotype: Sox9, ColI, ColII and link protein, as well as by increased formation of chondrogenic nodules positively stained for s-GAG and collagen type II. Additionally, mesenchymal-like condensation of hESCs was observed, which was accompanied with a time-dependent increase in matrix glycosaminoglycan accumulation for up to 14 days, followed by a subsequent decrease thereafter, which would suggest hypertrophic development. This was further supported by upregulated ColX gene expression and increased ALP activity up to day 21. Terminal differentiation was marked by mineralisation of cartilage nodules, as observed under Von Kossa staining.

**Conclusion:** This study successfully recapitulated chondrogenesis in hESCs. The chondrogenic cells could be utilised for cartilage tissue regeneration, as well as provide a useful tool to characterise cartilage development, and for toxicity screening of cartilage-related biomaterials and drugs.

F1

**A Retrospective Study on the Incidence of Infection in Open Tibial Shaft Fractures Comparing Patients who Underwent Definitive External Fixation Versus those who Underwent External Fixation with Subsequent Conversion to Either Intramedullary Nailing or Plate Osteosynthesis**

**K KALIYAPERUMAL<sup>1</sup>, V SRIDHAR<sup>1</sup>, JZ NGIAM<sup>1</sup>, SX LEE<sup>1</sup>, J THAMBIAH<sup>2</sup>, J RUIZ<sup>2</sup>**

<sup>1</sup>Medicine, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Orthopaedic Surgery, National University Hospital, Singapore

**Aim:** The mainstay of treatment for open tibial shaft fractures with associated soft tissue injury has been external fixation with repeated debridements. Delayed internal fixation (via intramedullary nailing/plate osteosynthesis) is sometimes employed to reduce infection and other complications following external fixation. We aim to ascertain whether this influences the development of subsequent infection.

**Methods:** Patients selected had open tibial shaft fractures initially treated by external fixation by surgeons in the Department of Orthopedic Surgery of National University Hospital from 1 January 2000 to 31 December 2004. Patients were grouped into 2 groups, group 1 consisting of patients who underwent external fixation as the sole definitive treatment and group 2 of patients who underwent external fixation with subsequent conversion to internal fixation.

**Results:** Twenty-nine patients were identified and 19 fit our inclusion criteria: 11 into group 1 and 8 into group 2. In the latter, 5 patients (62.5%) underwent conversion to plate osteosynthesis and 3 (37.5%) underwent intramedullary nailing which was locked. In group 1, 4 patients (36.4%) developed infection compared to 2 (25.0%) in group 2. These 2 patients underwent secondary plating. Statistical analyses show that these 2 groups are similar with regard to age, type of injury, Gustilo grade, associated injuries and time to first surgical intervention.

**Conclusion:** Our findings show that external conversion as a definitive treatment for tibial shaft fractures is associated with a high infection rate and hence should not be recommended. Therefore, delayed nailing should be further explored as a definitive treatment option for such patients.

F2

**The Neuropathic Diabetic Foot: Its Common Ulcer Sites and its Associated Deformities at Presentation**

**VYL KOH<sup>1</sup>, A ERASMUS<sup>2</sup>, K STONE<sup>2</sup>, S DAS DE<sup>3</sup>**

<sup>1</sup>Orthopaedic Surgery, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Rehabilitation, <sup>3</sup>Orthopaedic Surgery, National University Hospital, Singapore

**Aim:** The neuropathic diabetic foot is prone to ulcer formation. This study aims to determine if some areas of the foot are more prone to ulcer formation than others and to assess the presence of associated deformities at presentation.

**Methods:** Over a 4-week study period, patients with diabetes from a podiatry clinic at NUH were assessed for neuropathy using standard monofilament and biothesiometry. The patients' demographics, diabetic control, ulcer characteristics and joint deformities were recorded.

**Results:** Fifty-nine patients (61.1% males) with a mean (SD) age of 60.3 (11.9) years and median duration of diabetes of 12 (2 to 43) years were included in the study. At presentation, 70.7% had ulcers and

39.7% had joint deformities. 69% of the ulcers occurred on the plantar surface of the foot. Most of the ulcers (65.1%) were on the plantar forefoot. 2.3% were on the midfoot due to a rocker bottom deformity and 9.3% were on the heel. The commonest specific area was the plantar surface of the 1st metatarsal head, which accounted for 20.9% of all ulcers. Diabetic control and insulin dependency were not predictors of presentation.

**Conclusion:** The plantar forefoot is the commonest site of ulceration. Interestingly, 1/3 of the ulcers occurred on the dorsum of the foot. Possible causes could be claw toes, metatarsal head drop and poor-fitting footwear. Neuropathic diabetic feet are in a dynamic situation in which the progression of the neuropathy causes loading patterns and the biomechanics of the feet to change. They should be regularly reassessed regardless of diabetic control.

F3

**Association Between p53 and Chaperonin Containing Tailless Complex Polypeptide 1**

**SC LEE<sup>1</sup>, J CHAN<sup>1</sup>, N SIM<sup>1</sup>, S PERVAIZ<sup>2</sup>**

<sup>1</sup>NUMI (National University Medical Institute), <sup>2</sup>Physiology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** Acquired mutations in the p53 gene are found in all major types of human cancers. These mutations often lead to its functional defects, which are strongly associated with cancer progression as well as poor prognosis. p53 plays important roles in the regulation of cancer cell apoptosis; transactivation of its target genes is a recognised mechanism. However, recent experimental data increasingly support the view that p53 can also regulate gene expression through repression. Identification and understanding of p53 responsive genes/proteins are of great scientific and clinical significance.

**Methods:** In the recent pilot study using proteomic analysis, we compared the protein compositions between the colon cancer cell line HCT116 cells with (wild type) or without (knockout) the p53 gene.

**Results:** Western blot confirmed the presence and absence of p53 protein in the wild type and knockout cells respectively. At the loading level of 100 µg per gel, a protein was found in abundant quantity in the knockout cells. In contrast, it was either not detectable or in small quantity in the wild type cells. The ratio of the protein concentration between the knockout and wild type cells was estimated to be approximately 50 to 1. Results from peptide mass fingerprinting suggested that the protein was likely to be the chaperonin containing tailless complex polypeptide 1 (CCT1); MASCOT score was 668, without a coverage of 50%.

**Conclusion:** In conclusion, CCT1 appears to be a p53-responsive protein. Further confirmation of the preliminary findings might identify CCT1 as a novel p53-regulated protein.



F4

**Prognostic Value of Baseline Glycated Haemoglobin A1C for In-hospital and 1 Year Mortality after Acute Myocardial Infarction in Patients with Type 2 Diabetes Mellitus**

**DAYMLOW<sup>1</sup>, M CHAN<sup>2</sup>, YT LIM<sup>2</sup>, HC TAN<sup>2</sup>, V TAN<sup>3</sup>, TC YEO<sup>2</sup>**

<sup>1</sup>Medicine, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Cardiology, National University Hospital, Singapore, <sup>3</sup>Cardiology, National Heart Centre, Singapore

**Aim:** To determine the prognostic value of baseline glycated haemoglobin A1C (HBA<sub>1C</sub>) for in-hospital and 1 year mortality after acute myocardial infarction in patients with type 2 diabetes mellitus.

**Methods:** We measured HBA<sub>1C</sub> levels in 414 consecutive patients with type 2 diabetes mellitus within 24 hours of admission for AMI, using DCA2000® (Bayer Diagnostics Europe Ltd) and VARIANT™ (BioRAD Laboratories) assays. We then sought to determine the association between their HBA<sub>1C</sub> levels and both in-hospital and 1-year total mortality.

**Results:** Mean age was 62 ± 12 years, with 60% males. The receiver operating characteristic curve for HBA<sub>1C</sub> yielded an area under the curve (AUC) value of 0.473 (*P* = 0.56) for in-hospital mortality. While the AUC was 0.399 (*P* = 0.004) for mortality at 1 year, HBA<sub>1C</sub> was not significantly predictive after adjusting for covariates [odds ratio (OR) 1.59 for HBA<sub>1C</sub> ≥7% compared to HBA<sub>1C</sub> <7%, 95% confidence interval (CI) 0.85-2.98, *P* = 0.15]. Each 1% increase in HBA<sub>1C</sub> is associated with an OR of 0.96, 95% CI 0.82-1.13 (*P* = 0.63). Independent predictors of both mortality endpoints were age (*P* <0.0001) and Killip class (*P* <0.0001).

**Conclusion:** In our cohort of patients with type 2 diabetes and AMI, baseline HBA<sub>1C</sub> levels were not predictive of both in-hospital and 1-year mortality. Variables other than HBA<sub>1C</sub> appear to be better predictors.

F5

**Screening for Vancomycin-resistant Enterococci Using Stools Sent for *C. difficile* Cytotoxin Assay is Effective. Results of a Survey of 300 Patients in a Large Singapore Teaching Hospital**

**JTAY<sup>1</sup>, E BODLE<sup>2</sup>, D FISHER<sup>1</sup>, R LIN<sup>3</sup>, PA TAMBYAH<sup>1</sup>**

<sup>1</sup>Medicine, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Medicine, Columbia University College of Physicians & Surgeons, USA, <sup>3</sup>Laboratory Medicine, National University Hospital, Singapore,

**Aim:** To assess the efficacy of screening stools sent for *Clostridium difficile* cytotoxin assay (CDTA) for determining the hospital prevalence of vancomycin-resistant enterococci (VRE).

**Methods:** From April to May 2005, all stools submitted for CDTA were prospectively screened for VRE using vancomycin-containing culture media. Isolates were identified to species level and vancomycin resistance confirmed, followed by PCR for detection of vancomycin resistance genes and DNA fingerprinting. Over 2 consecutive days during that period, screening stool cultures or rectal swabs were also obtained from all consenting patients in high-risk units (haematology, oncology, renal and intensive care). Fifty-one patients in each group were compared in terms of previously identified VRE risk factors.

**Results:** The prevalence of VRE in both groups was similar: 3/204 (1.5%) in the CDTA arm and 1/97 (1.0%) in the high-risk arm (*P* = 1.0, Fisher's exact test). Prevalence of risk factors for VRE colonisation, including age, duration of hospitalisation, exposure to antibiotics, exposure to surgical procedures, presence of malignancy and diabetes mellitus was similar in both groups (*P* >0.05). Only renal failure (*P* <0.05) was more common in the high-risk group. All 4 isolates of VRE identified were genetically distinct by VNTR typing; 3 were *E. faecium* (2 with the vanB gene, 1 with vanA) and 1 *E. faecalis*.

**Conclusion:** Less than 2% of our high-risk patients were VRE carriers. In-hospital VRE screening using stools sent for CDTA is a simple, reasonable surrogate for screening individual high-risk patient as the patient risk profile is similar and the yield comparable in a low prevalence setting.

P1

**In Vitro Characterisation Studies of Human Embryonic Stem Cells-derived Embryoid Bodies Transduced with Adenoviral Carrying Human VEGF165 Gene**

**R ABDUL JALIL<sup>1</sup>, T CAO<sup>2</sup>, EKW SIM<sup>1</sup>**

<sup>1</sup>Surgery, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Stem Cell Laboratory, National University of Singapore, Faculty of Dentistry - Dean's Office, Singapore

**Aim:** To investigate the transduction efficiency of human VEGF165 gene into human embryonic stem cells-derived embryoid bodies and the fate of such embryoid bodies.

**Methods:** Human embryonic stem cell line, H1, was induced to form embryoid bodies (EBs) by culturing them in low attachment plates for 7, 14 and 21 days. Adenoviral vector carrying human VEGF165 gene (Ad-hVEGF165) was then used to transduce the EBs. Both transduced and untransduced EBs were immunostained for several endothelial markers including CD31, CD34, ACC133, Tie-2, VEGF and GATA-2. Further confirmation of the expression efficiency was done using RT-PCR of endothelial gene markers and ELISA to measure the VEGF165 protein expression.

**Results:** Endothelial expression was optimal in 14-day EBs. Maximum transduction efficiency in the 14-day EBs was achieved by 4-hour exposure of the EBs to virus for 3 consecutive days. In combination with the optimal endothelial expression and VEGF165 gene transduction, transduced 14-day EBs showed the highest expression for vascular markers in both immunostaining and RT-PCR results. ELISA results also showed a significant upregulation in VEGF165 protein in these transduced 14-day EBs.

**Conclusion:** High transduction efficiency of hVEGF165 in 14-day EBs enhances endothelial cell differentiation which would be beneficial for applications such as engineering of new blood vessels and cell transplantation for induction of angiogenesis in the treatment of regional ischaemia.

P2

**Uncoupling Proteins as Endogenous Oxidative Stress Regulators in Acute Myocardial Ischaemic Insult**

**Z ALMSHERQI<sup>1</sup>, OLL TAN<sup>2</sup>, N KOCHERGINSKY<sup>3</sup>, I KOSTETSKI<sup>3</sup>, YR DENG<sup>2</sup>**

<sup>1</sup>National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Physiology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>3</sup>Biophysics Laboratory, Division of Bioengineering, National University of Singapore, Singapore

**Aim:** There is growing evidence that the increased production of reactive oxygen species (ROS) and altered antioxidants levels following acute myocardial ischaemia create oxidative stresses in the remote non-ischaemic myocardium. The oxidative stress may contribute to the observed pathophysiological alterations of the viable cardiac tissues post myocardial infarction. ROS-antioxidant balance derangements at the integrated system can be interpreted at the cellular and molecular levels in terms of upregulation of certain mitochondrial proteins such as uncoupling proteins (UCPs). Increased levels of ROS may lead to activation of UCPs, which in turn could decrease mitochondrial ROS production. In this study we investigate the expression and activity of UCPs and mitochondrial cristae morphology at the non-ischaemic myocardium in response to remote acute myocardial ischaemia.

**Methods:** Regional ischaemia was induced on the anterior wall of the left ventricle through coronary artery ligation in canine ischaemic model. Blood samples were collected from coronary sinus for ROS detection. After 6 and 24 hours of continuous ischaemia, myocardial mitochondria were isolated from non-ischaemic posterior wall of the left ventricle for bioenergetics studies.

**Results:** Our Western blot and bioenergetics data showed increased UCP activity and expression over time in association with reduced ROS levels.

**Conclusion:** We demonstrated that isolated mitochondria from non-ischaemic myocardium following remote ischaemia are more uncoupling due to upregulation of UCPs, which may in turn attenuate ROS production. This

mechanism would support a role of the molecular regulation of an inducible ROS-modulating mitochondrial transporter (UCPs) as an endogenous regulator augmenting the myocardial tolerance to ischaemic insult.

P3

**The Regulation of Annexin-A1 Expression and Function(s) by Oestrogen in MCF7 Breast Cancer Cells**

**EZF ANG<sup>1</sup>, LHK LIM<sup>1</sup>**

<sup>1</sup>Physiology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** To investigate the possible regulation of Annexin-A1 (Anx-A1) expression and function(s) by oestrogen in the breast cancer cell line, MCF7, and hence, examine the possible role(s) of Anx-A1 in breast tumorigenesis.

**Methods:** MCF7 cells were pre-incubated in steroid hormone-free medium before being treated with physiological doses of 17-beta-oestradiol (a strong oestrogen) or tamoxifen (a weak oestrogen) for periods of 24, 48 and 72 hrs. Anx-A1 expression and tyrosine-phosphorylation of Anx-A1 were observed using Western blot analysis. Separate cell proliferation, apoptotic and viability assays were also performed to observe for possible changes in cell function regulation which could be correlated with differential Anx-A1 expression in drug-treated cells. Activation of ERK1/2 was also probed using immunoprecipitation for the enrichment and subsequent western blot analysis of phosphorylated ERK1/2.

**Results:** We found that physiological levels of oestrogen (17-beta-oestradiol) could induce the expression of Anx-A1 in a dose-dependent manner after a period of at least 24 hours. Surprisingly, a high expression of Anx-A1 by oestrogen led to reduced cell proliferation (which was not associated with apoptosis) as compared to cells treated with lower doses of estrogen. This was accompanied by a high level of phosphorylated ERK1/2. An overexpression of Anx-A1 may thus have resulted in constitutive activation of the MAPK pathway and a subsequent inhibition of cell proliferation via the expression of cell cycle arrest proteins.

**Conclusion:** Our results suggest that oestrogen may regulate cell proliferation via activation or induction of Anx-A1 expression for the stimulation of the MAPK/ERK cell signaling pathway.

P4

**Performance Characteristics of a Denaturing High Performance Liquid Chromatography Assay for Sensitive and Objective Microsatellite Instability Analysis of Five Mononucleotide Repeat Markers**

**D ANUAR<sup>1</sup>, HC HAN<sup>1</sup>, M SALTO-TELLEZ<sup>2</sup>, R SOONG<sup>2</sup>**

<sup>1</sup>Oncology Research Institute, <sup>2</sup>Pathology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** Recent results have led to the recommendation of microsatellite instability (MSI) testing for hereditary non-polyposis colorectal cancer screening. However, current methods for MSI analysis have a number of limitations. Capillary electrophoresis has stutter peaks introducing subjectivity into interpretation. Two DHPLC methods allowing more objective analysis have been developed, but a lack of performance characteristics has made it difficult to rate their relative merits. Moreover, optimal conditions for MSI analysis at 5 mononucleotide repeat loci, which have recently been suggested to provide a more accurate analysis than the popular "Bethesda panel" containing 2 mononucleotide and 3 dinucleotide repeat loci, have yet to be delineated. We undertook this study to develop and describe the performance characteristics of a DHPLC assay for MSI analysis using the Bethesda panel and 5 mononucleotides.

**Methods:** Optimal conditions for the 3 DHPLC formats of non-, partially and fully denaturing (FD) were determined and tested on 4 cell lines with MSS and 3 with MSI.

**Results:** All 3 formats distinguished MSS from MSI samples based on retention time, with FD giving the clearest discrimination. For BAT26, retention times for MSS samples of  $5.729 \pm 0.003$  minutes while the retention

time of the closest MSI sample was 5.600 minutes. Inter-run and intra-run standard deviations ranged between 0.002 and 0.018 minutes. Mixing experiments showed MSI alleles detectable in samples with MSI:MSS ratios of 1:200.

**Conclusion:** The developments describe here an objective, sensitive and specific, reproducible assay for routine MSI analysis of 5 mononucleotides. Further testing on clinical samples will help define the potential value of these developments.

## P5

### Collagen Matrix Enhancement in Fibroblast Culture using Poly-anionic Macromolecules

**L ARSIANTI<sup>1</sup>, K HARVE SUBRAMHANYA<sup>1</sup>, S JOSHI<sup>1</sup>, M RAGHUNATH<sup>2</sup>**

<sup>1</sup>Division of Bioengineering, <sup>2</sup>Division of Bioengineering, Department of Biochemistry, National University of Singapore, Singapore

**Aim:** The construction of engineered tissue constructs depends on the presence and thriving of living cells, their specialised functions and the production of connective tissue for tissue cohesion and full biological functionality. A major component of connective tissue is collagen. For the production of a stable collagen network in tissue constructs, several enzymatic steps are needed to convert procollagen to collagen and to initiate its crosslinking. This process is very tardy in cell culture and represents a major obstacle in producing connective tissue using fibrogenic cells like fibroblasts. In this study, we assessed the application of dextran sulfate (DexS), a poly-anionic derivative of dextran, to facilitate enzymatic processing of procollagen.

**Methods:** WI-38 human lung fibroblasts and hypertrophic scar fibroblasts were cultured in the presence or absence of DexS. Pepsin digestion was carried out to retrieve collagen from the cell layer and the culture medium. Collagen and procollagen content were monitored by SDS-PAGE and immunoblotting, ECM morphology was studied by immunofluorescence using specific antibodies against collagen and fibronectin.

**Results:** SDS-PAGE and immunoblotting revealed that in normal cell culture most (pro)collagen remained unconverted in the culture medium, whereas in the presence of DexS the most (converted) collagen was associated with the cell layer. This observation was confirmed with immunolabelling showing a film-like deposition and aggregates containing colocalising collagen and fibronectin. Proliferation assays showed unimpaired growth in the presence of the polyanion.

**Conclusion:** DexS and related substances may be interesting facilitators for the enhancement of matrix formation in tissue engineering applications.

## P6

### Protective Effect of *Ocimum sanctum* against Arsenite-induced Oxidative Damage in Mammalian Cells

**L BALAKRISHNAN<sup>1</sup>, MP HANDE<sup>1</sup>**

<sup>1</sup>Physiology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** Reactive oxygen species (ROS) partly mediate the mutagenic response of arsenite. Flavonoids isolated from leaf extracts of *Ocimum sanctum* Linn. (Labiatae), popularly known as tulsi and holy basil, have been shown to have antioxidant and radio-protective properties. This study thus aims to assess the protective effect of *Ocimum sanctum* against arsenite-induced oxidative damage in normal and poly (ADP) ribose polymerase (PARP-1) and/or p53 deficient mouse embryonic fibroblasts (MEFs).

**Methods:** MEFs were treated with sodium arsenite (a potent inducer of oxidative damage) following a one-hour pre-treatment with the leaf extract from *Ocimum sanctum*. The effects on cell viability, cell cycle progression and DNA damage were then assessed by crystal violet assay, propidium iodide staining with flow cytometry analysis and single cell gel electrophoresis (SCGE)/Comet assay respectively.

**Results:** The addition of *Ocimum sanctum* increased cell viability in both normal- and repair-deficient MEFs as compared to those treated with arsenite

alone. *Ocimum sanctum* treatment also significantly reduced DNA damage in MEFs. The repair-deficient MEFs appeared to sustain greater levels of DNA damage, with those deficient in both PARP and p53 sustaining greatest damage at all doses of arsenite, with and without *Ocimum sanctum* as compared to the normal and MEFs deficient in either PARP or p53.

**Conclusion:** Hence, it is evident that arsenite is able to cause a dose dependent increase in cell death and damage. *Ocimum sanctum* reduces the level of cell death and damage caused by arsenite. Furthermore, PARP and p53 appear to play critical roles in withstanding arsenite-induced damage.

## P7

### Hypoxia Inducible Factor May Play a Central Role in Colorectal Cancer Tumorigenesis as Revealed by Proteomic Analysis in the Metabolic Pathways

**XZ BI<sup>1</sup>, QS LIN<sup>1</sup>, JTW FOO<sup>1</sup>, SH WU<sup>1</sup>, T YOU<sup>1</sup>, SB JOSHI<sup>1</sup>, CL HEW<sup>1</sup>**

<sup>1</sup>Structural Biology and Proteomics Programme, National University of Singapore - Staff & Student - Office of Life Sciences, Singapore

**Aim:** To identify specific protein markers for early colorectal cancer detection and diagnosis, therapeutic targets, as well as clues for understanding the molecular mechanisms governing cancer progression.

**Methods:** We used 2-dimensional gel electrophoresis (2DE) coupled with mass spectrometry (MS) for the identification of basic proteins differentially expressed in tumour and adjacent normal mucosa from 7 patients of stage 3 colorectal cancer. Two-dimensional differential gel electrophoresis (2D DIGE) and gel-free isotope-coded affinity tags (ICAT)-LC-MS were also performed to verify the results.

**Results:** We detected differences in the abundance of 34 proteins with statistical significance. Ontology analysis showed that 14 out of the 34 proteins identified are mainly involved in the glycolysis (ALDA, GAPDH, Enolase), TCA cycle (Aconitase, MDH) and glucuronate metabolism (UGDH and UGP2). The changes in protein expression levels revealed a significantly enhanced glycolysis pathway (Warburg effect), a suppressed glucuronic acid pathway and an impaired TCA cycle. ICAT LC-MS not only confirmed part of the 2DE-MS results by the overlapping proteins identified (GAPDH, Enolase, MDH, UGDH), but also complementarily provided more evidence for the enhanced glycolysis pathway as indicated by other up-regulated glycolytic enzymes: phosphoglycerate kinase 1, pyruvate kinase 3 isoform 1, triosephosphate isomerase 1 and dihydrodipolyl dehydrogenase.

**Conclusion:** These up- or down-regulated enzymes could be potential biomarkers or therapeutic targets after confirmation via Western blot and validation with more patient samples. We suggest that hypoxia-inducible factor could provide a linkage among the unbalanced TCA cycle, the enhanced glycolysis and the suppressed glucuronic acid metabolic pathways.

## P8

### Ultrasound in Emergency Medicine – Case Studies

**KW CHAN<sup>1</sup>, SL CHENG<sup>2</sup>, KF LEONG<sup>3</sup>**

<sup>1</sup>Paediatrics, <sup>2</sup>Medicine, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>3</sup>Emergency Medicine, Singapore General Hospital, Singapore

**Aim:** Ultrasonography (US) has become a useful diagnostic tool in a variety of clinical emergencies such as abdominal trauma, chest wounds, and abdominal aortic aneurysms. Its advantages include rapidity, convenience, non-invasiveness as well as improving clinical outcome and reducing time to operative intervention compared to traditional diagnostic modalities. Our aim is to review the suitability and usefulness of US in the local emergency department setting.

**Methods:** We analysed 2 cases seen at Singapore General Hospital's Emergency Department where bedside US was performed prior to CT scans. The first, a haemodynamically stable elderly male presented with an abdominal aortic aneurysm (AAA). Visualisation of the AAA and measurement of its dimensions such as widest diameter, were performed with US to determine risk of rupture. The second case involved a construction worker who fell from

a height and presented with various problems, including hypotension, possibly due to blunt abdominal trauma. A focused assessment with sonography for trauma (FAST) was subsequently performed.

**Results:** US for the first case determined the AAA to be infrarenal with the widest diameter measuring 5.9 cm, indicating a high risk of rupture. For the second case, US detected free fluid in the hepatorenal space, indicating haemoperitoneum.

**Conclusion:** The cases demonstrate the advantages of US for both stable and unstable patients in the emergency department, including early detection and the findings correlating well with subsequent CT scans. The second case demonstrates certain limitations of US in comparison with other imaging modalities with regard to localisation of injury and detection of parenchymal injuries.

## P9

### Characterisation of Targeted CD38 Expression in Mitochondria

**MY CHAN<sup>1</sup>, CF CHANG<sup>1</sup>**

<sup>1</sup>Biochemistry, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** The aim of this study was to characterise and investigate the functional role of CD38 expressed in mitochondria.

**Methods:** CD38-myc, together with the specific mitochondria-targeting sequence, was transiently expressed in COS-7 cells. The cellular localisation of CD38-myc was investigated by immunostaining and co-staining with mitotracker dye. This was followed by subcellular fractionation of mitochondria from transfected cells and subjected to ADP-ribosyl cyclase activity assay and Western blotting. The topology of CD38 expressed in mitochondria was further analysed using proteinase K treatment.

**Results:** Immunostaining with anti-myc and anti-CD38 antibody showed the CD38-myc expression in mitochondria. This was further supported by co-localisation of CD38-myc with mitotracker dye. The cyclase activity assay indicated a relatively high cyclase activity in the mitochondria, comparable to WT-CD38, which is expressed predominantly on plasma membrane of COS-7 cells. The proteinase K treatment revealed the C-terminal region of CD38 is localised on the outer membrane of mitochondria facing the cytosol side.

**Conclusion:** Our study has directly demonstrated the expression of functionally active CD38 in mitochondria. Based on the high cyclase activity and specific topology of CD38 observed from the data, this may suggest that CD38 in mitochondria plays a role in cADPR synthesis and may participate in a novel pathway of intracellular Ca<sup>2+</sup> signaling.

## P10

### Non-surgical Periodontal Treatment and Lipid Levels in a Population of Singaporean Diabetics

**HK CHEE<sup>1</sup>, F TAY<sup>2</sup>, M GUNARATNAM<sup>3</sup>, LP LIM<sup>1</sup>**

<sup>1</sup>Preventative Dentistry, National University of Singapore - Faculty of Dentistry, Singapore, <sup>2</sup>Dental Service, Alexandra Hospital, Singapore, <sup>3</sup>Dentistry, Private Practice, Singapore

**Aim:** Diabetes has been found to be significantly associated with periodontal disease. Periodontitis has also been associated with cardiovascular disease in recent studies. Cardiovascular disease is also a major cause of mortality and morbidity in diabetics, particularly those with type 2 diabetes mellitus. The treatment of periodontitis in diabetics has shown to improve the metabolic glucose control in these patients. Our aim was to assess whether periodontal treatment causes changes in serum lipid levels, as measured by high-density lipoprotein (H-LDL) levels.

**Methods:** A single-blinded randomised clinical control trial was carried out on a multi-racial population of Singaporean diabetics with varied levels of metabolic control. The groups compared were: scaling plus oral hygiene instructions group; oral hygiene instructions alone group, and a control group without treatment or instructions. Full mouth periodontal recordings and lipid panel (total cholesterol, HDL-C, LDL-C and triglycerides) taken at 3, 6 and 9 months were compared to baseline. The total cholesterol: HDL-C and

the LDL-C : HDL-C ratios were also calculated. Serum HbA1c and CRP levels were also taken at all the examination time points.

**Results:** A significant and sustained improvement in periodontal parameters was seen in both treatment and oral hygiene instruction groups, while the non-treatment group also showed minor improvement. No concurrent changes were noted in lipid levels, and no particular pattern was recognised.

**Conclusion:** Within the confines of this study, periodontal treatment does not seem to affect systemic health as measured by serum lipid levels. This research was supported by NUS Research grant 222-000-016-213.

## P11

### Are In Vitro Hepatitis B Core Promoter Mutations Clinically Important in Viral Load Regulation?

**Y CHENG<sup>1</sup>, BL SEET<sup>1</sup>, CSL ONG<sup>1</sup>, S WASSER<sup>1</sup>, TMC TAN<sup>2</sup>, FJ PETER<sup>3</sup>, SG LIM<sup>1</sup>**

<sup>1</sup>Medicine, <sup>2</sup>Biochemistry, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>3</sup>Hepatology Programme, National University of Singapore - Staff & Student - Office of Life Sciences, Singapore

**Aim:** We tested the hypothesis that hepatitis B virus core promoter mutations in the transcription factor binding sites/regulatory element were responsible for the differences in viral load (viral replication in vivo) following HBeAg seroconversion.

**Methods:** A consensus sequence of the core promoter transcription factor binding sites/regulatory regions (wild type) was constructed based on published studies. Serum from 2 time points in 33 seroconverters and 10 interferon non-responders (controls) were utilised. Genotyping, HBV DNA quantification and direct sequencing of core promoter were performed.

**Results:** Seroconverters had a significant reduction in HBV DNA level by a mean of 3.8-log after HBeAg seroconversion, while HBV DNA levels remained unchanged over time in IFN non-responders. There were 216 new mutations following HBeAg seroconversion but few in controls. Mutations or mismatches to the consensus transcription factor/regulatory region sequence clustered in 14 nucleotide positions appeared genotype-specific, non-group-specific or baseline mismatches and were discounted as having significant impact on viral replication. Only 2 nucleotide mutations in 1 seroconverter (3%) were specific, while 39.4% of these seroconverters had no new mutations that could be confidently attributed to the reduction in viral load following HBeAg seroconversion. In 57.6% of seroconverters, they were of uncertain significance because they predominantly occurred in the demonstrated non-critical clustered nucleotide positions. Post-seroconversion core promoter mutations associated with decreased viral load did not correlate with transcription factor/regulatory region mutations shown to be functionally important in vitro.

**Conclusion:** Core promoter mutations may not be clinically important in the reduction of viral load post-seroconversion.

## P12

### Retrospective Study of the Psychosocial Profile of End-stage Renal Failure Patients Presenting to an Acute Care Hospital

**EQ CHEOW<sup>1</sup>, M POON<sup>2</sup>, E LEE<sup>3</sup>**

<sup>1</sup>Medicine, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Medical Social Work, <sup>3</sup>Medicine, National University Hospital, Singapore

**Aim:** A retrospective study was done to study the psychosocial profile of end-stage renal failure patients presenting to the Nephrology department of an acute care restructured hospital in the year 2004.

**Methods:** Data on the financial profile, acceptance of the disease availability of caregiver, suitability for dialysis, and choice of modality were gathered from the dialysis placement committee and the medical social worker reports kept by the department.

**Results:** Ninety-three patients were studied. The mean age ( $\pm$ SD) was 58.2 ( $\pm$  13.5) years (range, 24-85 years). There were more females (58.1%) than males. Malay patients appeared to be over-represented in the study population compared to the year 2000 population census (23.7% vs 13.9%). Twenty-six

patients were retired. Of the remaining 67 patients, only 12 (17.9%) were earning a salary. Fifty-two (55.9%) patients had Medishield coverage, 29 (31.2%) patients only had Medisave accounts and 12 (12.9%) patients had neither. Eighty-four (90.3%) patients required a subsidy for their dialysis. Of the 52 patients with some form of medical insurance, 45 (86.5%) required a subsidy. Seventy-six (84.4%) patients had a per-capita income of less than \$700 a month. The acceptance level of the patient and family was poor in 11 (11.8%) patients. Eighteen (19.4%) patients had no caregiver. Seventy-two (77%) patients were suitable for either haemodialysis or peritoneal dialysis. Ten (11%) were only suited for haemodialysis and 11 (12%) only for peritoneal dialysis. Forty-five (48.4%) patients chose haemodialysis, 44 (47.3%) chose peritoneal dialysis and 4 (4.3%) declined dialysis.

**Conclusion:** The main psychosocial problems were financial difficulties, acceptance of disease and the availability of caregiver.

### P13

#### Expression and Functional Analysis of Recombinant Dengue Virus Receptor Binding Domain (DIII) of the Envelope Glycoprotein

J CHIN<sup>1</sup>, J CHU<sup>1</sup>, ML NG<sup>1</sup>

<sup>1</sup>Microbiology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** Dengue virus has emerged as one of the most important flavivirus disease in man in the last 3 decades. It has been estimated that about 100 million cases of dengue fever occur every year, with about 500,000 cases of dengue haemorrhagic fever. The domain III (virus attachment site) of dengue virus serotype 1 (Den1-DIII) envelope protein was first expressed as a soluble recombinant protein and its antagonistic effect in preventing virus infection was assessed.

**Methods:** Molecular cloning techniques, recombinant protein expression and purification, virus-receptor competition assay.

**Results:** So far, limited success has been achieved in the expression of functional DIII proteins of flavivirus in bacterial system. In this study, attempts were carried out to express functional DIII protein in bacterial system. The gene encoding for Den1-DIII protein was first cloned into pET16 bacterial expression vector. However, the recombinant Den1-DIII protein was expressed as insoluble protein localised within inclusion bodies. The Den1-DIII protein was not functional. To overcome this problem, Den1-DIII protein was expressed as a fusion protein with thioredoxin to increase the solubility of the virus protein. Interestingly, high concentration of soluble Den1-DIII protein can be obtained after subsequent cleavage of thioredoxin and purification procedures. The ability of the soluble Den1-DIII protein in blocking the infectious entry of dengue 1 virus into mammalian and mosquito cells were also determined.

**Conclusion:** This study has devised an innovative technology to express functional dengue virus receptor binding domain in large quantities and was subsequently used to set up screening platform for anti-viral drugs.

### P14

#### Prediction of Total Body Water in Singapore Infants aged 3 to 12 Months using Simple Anthropometric Variables

YS CHONG<sup>1</sup>, S NG<sup>2</sup>, C NURFARAH<sup>3</sup>, M RAUFF<sup>1</sup>, P DEURENBERG<sup>4</sup>

<sup>1</sup>Obstetrics & Gynaecology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Neonatology, <sup>3</sup>Obstetrics & Gynaecology, National University Hospital, Singapore, <sup>4</sup>Nutrition Consultant, Singapore

**Aim:** Little information is available about body composition in Asian infants. We investigated the relationship between simple anthropometric variables and total body water in infants, and studied whether this relationship is dependent on age, gender, and ethnicity.

**Methods:** Total body water (TBW) was measured in infants, aged 3 to 14 months, of different gender and race, using the deuterium oxide dilution technique. Deuterium was analysed using Fourier transform infrared spectroscopy in pre- and post-dosing saliva samples. A population-specific formula for TBW based on anthropometric variables and age was developed.

In addition, TBW was predicted using Mellits and Cheek formula.

**Results:** Two hundred and seventy-one measurements were made in 194 infants: 145 Chinese, 21 Eurasians, 16 Malays, 8 Indians, and 4 others at 3, 6 and 12 months of age. TBW could be predicted using stepwise multiple regression from weight and age with a standard error of estimate of 0.35 kg and an explained variance of 0.87:  $TBW = 0.495 * \text{weight} + 0.053 * \text{age} + 0.64$ . The bias of predicted TBW was not different in the various age groups and was comparable with that of the Mellits and Cheek formula. The bias of either prediction formula was not different across genders, ethnic groups, and age groups. Both the new formula and the Mellits and Cheek formula tend to underestimate at higher levels of TBW.

**Conclusion:** We conclude that both the new formula we developed and Mellits-and-Cheeks formula are valid prediction tools for total body water in Singapore infants aged 3 to 12 months. Total body water is dependent on age but not gender and ethnicity in infants.

### P15

#### Early Nutrition and Nearsightedness: Another Reason to Advise Breastfeeding?

YS CHONG<sup>1</sup>, Y LIANG<sup>2</sup>, G GAZZARD<sup>3</sup>, RA STONE<sup>4</sup>, D TAN<sup>5</sup>, SM SAW<sup>6</sup>

<sup>1</sup>Obstetrics & Gynaecology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Singapore Eye Research Institute, Singapore, <sup>3</sup>Institute of Ophthalmology, UK, <sup>4</sup>Department of Ophthalmology, Scheie Eye Institute, University of Pennsylvania School of Medicine, USA, <sup>5</sup>Ophthalmology, <sup>6</sup>COFM, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** The high prevalence of myopia, especially among urban Asian children, suggests that early nutrition may be a factor in childhood myopia. Breastfeeding is the main variable in early nutrition and we studied its association with myopia in school children.

**Methods:** We performed cycloplegic autorefraction in school children to diagnose myopia. Among parameters determined by questionnaire, we asked parents if their child had ever been breastfed and for what duration, and to describe their breastfeeding practice.

**Results:** 82.9% of the children (405 boys, 392 girls, aged 10-12 years) participated. The prevalence rate of myopia was 65.4%. 52.4% were breastfed (8.5% exclusively, 7.8% mostly, 36.1% partly). 37.4% were breastfed for 3 months or less and 15.0% were breastfed longer. Children who were breastfed had lower myopia rates (62.0%) than children who were not breastfed (69.1%) ( $P = 0.020$ ). A history of being breastfed was significantly protective against myopia (OR 0.73, 95% CI 0.54-0.98). After controlling for known risk factors for myopia, the adjusted odds ratio of myopia was 0.63 (95% CI 0.43-0.91). Breastfed children (-1.6 D) were less myopic than that of non-breastfed children (-2.1 D) ( $P < 0.001$ ). Duration and type of breastfeeding were not significantly associated with myopia.

**Conclusion:** Breastfeeding was an independent protective factor against myopia after controlling for known risk factors. The biologic mechanism for myopia protection may involve nutritional factors in breast milk that improve visual development in infants, leading to more ordered eye growth. If a protective association is confirmed in further studies, healthcare professionals will have another important reason to advise breastfeeding.

### P16

#### PLC Gamma 1 Antisense Oligonucleotide Blocks T Cell Activation in Murine EL4 Cells

HH CHOO<sup>1</sup>, JHP CHAN<sup>1</sup>, FWS WONG<sup>1</sup>

<sup>1</sup>Pharmacology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** Interaction of antigen with TCR/CD3 complex results in activation of multiple protein kinases, which are in turn, linked to phospholipase C $\gamma$ 1 (PLC $\gamma$ 1) activation and ultimately led to interleukin 2 (IL-2) production and T cell activation. In this study, we hypothesised that antisense oligonucleotide (ASO) targeting at PLC $\gamma$ 1 can interrupt T cell activation.

**Methods:** Several ASOs targeted at different single-stranded regions on the PLC $\gamma$ 1 mRNA were designed and screened for their ability to inhibit PLC $\gamma$ 1 expression in murine EL4 T cells after electroporation. mRNA expression was analysed using RT-PCR and protein expression was determined by immunoblotting. The ASO effects were further investigated by measuring TCR activation-induced intracellular free-calcium concentration changes using fura-2 dye and IL-2 production using ELISA.

**Results:** One of the ASOs demonstrated significant reduction in PLC $\gamma$ 1 mRNA expression in a concentration-dependent manner with no effect on closely related member of the PLC family. This inhibition was further confirmed at the protein level by immunoblotting. Time-course study demonstrated maximum mRNA down-regulation at 6 h after electroporation. Maximum protein down-regulation was observed at 24 h after electroporation. Measurement of intracellular free-calcium in PLC $\gamma$ 1 ASO-treated murine EL4 T cells demonstrated a significant decrease in calcium mobilisation. Further study showed that pretreatment of murine EL4 T cells with PLC $\gamma$ 1 ASO before anti-CD3/CD28 stimulation significantly reduced IL-2 production.

**Conclusion:** These findings indicate that PLC $\gamma$ 1 plays an important role in T cell activation. Thus, selective inhibition of PLC $\gamma$ 1 by ASO may have therapeutic potential for T cell-dependent disorders.

## P17

### A Systematic Review of Chemotherapeutic-related Outcomes in Asian and Caucasian Patients with Colorectal Cancer

**DHL CHUA<sup>1</sup>, R SOONG<sup>2</sup>**

<sup>1</sup>Pathology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Pathology, Oncology Research Institute, Singapore

**Aim:** Historically, the implementation of colorectal cancer (CRC) chemotherapy in Asia has been based on findings from trials on Caucasian populations. Genotypic differences are well-known between these populations and recently, numerous genotypes have been linked to differential treatment responses. This suggests that the 2 populations differ in responses to different treatments. However, this has only been observed anecdotally.

**Methods:** To systematically document the frequency of treatment outcome-endpoints between Asians and Caucasians, Phase II/III trials on CRC were reviewed for response rate (RR), survival rates, toxicity frequencies and samples sizes. Differences were assessed by standard statistical analysis.

**Results:** Overall, we found significant differences in the sample-size adjusted average RR in 1/5 regimens and survival rates in 0/5. In UFT trials, the average RR in Asians was 35% and Caucasians 15% (95% CI, 10-30). Numerous notable differences were also seen in the frequency of toxicity according to regimen and toxicity types. Across all regimens, Asians had lower frequency of grade 3/4 diarrhoea than Caucasians: 3% and 8% for capecitabine (95% CI, 1-9); 10% and 20% for UFT (95% CI, 2-18); 2% and 35% for S1 (95% CI, 25-41); 12% to 32% for 5FU/LV/CPT-11 (95% CI, 10-30). Alternatively, in patients receiving 5-FU/leucovorin/irinotecan, Asians had a higher frequency of neutropenia (40%) than Caucasians (29%).

**Conclusion:** Our ad-hoc comparison of separate trials has documented differences in the response and toxicity rates between Asians and Caucasians. These results emphasise the need for more combined trials on Asians and Caucasians. The validity of these observations will be further investigated by meta-analysis.

## P18

### Liposome Mediated Gene Delivery System Using Human Skeletal Myoblasts

**W ESA<sup>1</sup>, D WEP<sup>2</sup>, KHH HUSNAIN<sup>3</sup>, R MAHENDRAN<sup>2</sup>, PK LAW<sup>4</sup>, TL YEAN<sup>5</sup>, EKW SIM<sup>6</sup>**

<sup>1</sup>National University Medical Institute, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Surgery, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>3</sup>Department of Pathology and Laboratory Medicine, University of Cincinnati, Ohio, USA, <sup>4</sup>Cell Transplants Singapore Pte Ltd, Singapore, <sup>5</sup>Medicine, National University of Singapore – Yong Loo Lin School of Medicine,

Singapore, <sup>6</sup>Gleneagles JPMC Cardiac Center, Gleneagles JPMC Cardiac Center, Brunei

**Aim:** This study aims to optimise cationic liposomes-based transfection of human skeletal myoblasts (HSM) with plasmid-carrying enhanced green fluorescent protein (pEGFP).

**Methods:** HSM were isolated from human male donors. The purity of the cells was assessed by desmin immunostaining. Transfection efficiency of HSM with pEGFP were characterised with the use of the following 3 liposomes: (i) N-[1-(2,3-Dioleoyloxy)propyl]-N, N, N-trimethylammonium methylsulfate (DOTAP) reagent, (ii) Cholesterol:DOTAP (CD liposome) at 1:4 (w/w), and (iii) Lipofectamine 2000<sup>TM</sup> (Invitrogen). Lipoplexes were incubated at 37°C for 30 minutes with DNA:lipid ratio from 1:1 up to 1:16. Transfection was conducted on adherent HSM, trypsinised HSM and trypsinised, followed by shaking for 20 minutes, and followed by incubation with 2% DMEM containing lipoplexes for 18 hours. Additional steps for the 2 commercial lipids were performed according to the manufacturer's instructions. Expression of pEGFP was observed under fluorescent microscope and calculated as a percentage of expression cell number/total cell number.

**Results:** Purity of HSM was >98%, as revealed by desmin immunostaining. Adherent cells exhibited lower transfection efficiency for DOTAP, CD liposome, and Lipofectamine 2000<sup>TM</sup>: 0.16%, 0.2% and 1.42% respectively, while suspended cells were 3.65%, 6.6% and 50% respectively. Shaking further improved the transfection efficiency. CD liposome and Lipofectamine 2000<sup>TM</sup> expressed green fluorescent protein for up to 13 days while DOTAP reagent expression was 8 days only on adherent cells. For suspended HSM with/without shaking, CD liposome and Lipofectamine 2000<sup>TM</sup> expressed GFP for 24 days while DOTAP reagent expressed GFP for only 3 days.

**Conclusion:** Transfection of homogenously suspended HSM significantly increased transfection efficiency with a prolonged expression period.

## P19

### A Micro-analysis of Irinotecan (CPT 11) and its Metabolites SN-38 and SN-38G in Human Plasma Using High Performance Liquid Chromatography with Fluorescence Detection for Pharmacokinetics Studies

**L FAN<sup>1</sup>, YM KHOO<sup>1</sup>, R LIM<sup>2</sup>, R SOO<sup>2</sup>, SC LEE<sup>2</sup>, BC GOH<sup>2</sup>, HS LEE<sup>1</sup>**

<sup>1</sup>Pharmacology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Haematology-Oncology, National University Hospital, Singapore

**Aim:** To modify, develop and validate a sensitive HPLC method for quantification of CPT 11 and its major metabolites, SN-38 and SN-38G in human plasma for clinical pharmacokinetics study of CPT 11.

**Methods:** The assay measured CPT11 and SN-38. Acidified deproteinisation of plasma (100  $\mu$ l) sample was performed with acetonitrile-8.5% orthophosphoric acid (90:10). Camptothecin (CPT) was used as internal standard. Chromatography was carried out on a  $\mu$ BondaPak C18 column coupled with fluorescence detection. The excitation and emission wavelengths were set at 375 nm and 566 nm. The mobile phase consisted of acetonitrile-0.1M potassium dihydrogen phosphate containing 3 mM 1-heptanesulfonic acid, pH4 (30:70) flowing at 0.8 mL/min. The SN-38G concentrations were determined as the increase in SN-38 concentration following incubation with  $\beta$ -glucuronidase.

**Results:** The relevant peaks were well separated. The lower limits of quantitation (LLOQ) for CPT 11 and SN-38 in plasma were 10 ng/mL and 1 ng/mL, respectively. The calibration curves were linear from 10 to 10,000 ng/mL for CPT11 and from 1 to 1000ng/mL for SN-38. Precision coefficient of variation (CV%) for CPT11 (intra-day) ranged from 4.0% to 6.2% and for SN-38 (intra-day) ranged from 2.7% to 5.6%; those for CPT11 (inter-day) ranged from 2.1% to 3.5% and for SN-38 (inter-day) ranged from 0.7% to 3.3%. Intra-day accuracy for CPT 11 and SN38 were 93.1% to 100.2% and 97.8% to 102.0% respectively and inter-day accuracy for CPT 11 and SN38 were 89.2% to 101.0% and 95.7% to 102.5%, respectively.

**Conclusion:** The validated HPLC method is rapid, accurate and reproducible and its use to study CPT 11 clinical pharmacokinetics in cancer patients will be illustrated.



P20

**Factors Contributing to Neuronal Degeneration in the Retina of Experimental Glaucomatous Rats**

**LT GAN<sup>1</sup>, X WANG<sup>2</sup>, YK NG<sup>1</sup>, SSW TAY<sup>1</sup>**

<sup>1</sup>Anatomy, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Retina and Optic Nerve Research Laboratory, Sir Charles Tupper Building, Dalhousie University, Halifax, NS, Canada

**Aim:** The present study tried to understand the possible mechanisms underlying neuronal degeneration in the glaucomatous retina.

**Methods:** We investigated the alteration of expression of immediate early genes (IEGs), glutamate receptors (GluRs), as well as calcium-binding proteins (CaBPs) in the glaucomatous retina using immunohistochemistry and/or reverse transcription-polymerase chain reaction (RT-PCR) techniques.

**Results:** IEGs such as c-fos and c-jun were induced in the retina of the glaucomatous rat as early as 2 hours after the onset of glaucoma, and lasted up to 2 weeks. Expressions of GluRs and CaBPs were observed to be increased in the retinal ganglion cell layer (GCL) and inner nuclear layer (INL) at 3 days and 1 week after the onset of glaucoma. The increase occurred well before and during the phase where significant neuronal death was observed in the GCL and INL of the glaucomatous retinae. Induction of 8-hydroxy-deoxyguanosine was present in both the GCL and INL of the glaucomatous retina 3 days after the onset of glaucoma before significant neuronal death was observed. Furthermore, confocal microscopy study showed the complete colocalisation of immunohistochemical expression of caspase 3 with GFAP, but not with neuronal nuclei. It indicated that astrocytes and Müller cells are involved in the pathological processes of neuronal death.

**Conclusion:** In summary, the present and our earlier studies (Wang et al, 2000 and 2002) indicate that increased IOP in the glaucomatous eye could trigger a series of biochemical and patho-physiological changes in the microenvironment of the retina.

P21

**Alterations in Spatial Learning and Memory after Exercise?**

**LT GAN<sup>1</sup>, ET ANG<sup>2</sup>, GSDAWE<sup>3</sup>, PTH WONG<sup>3</sup>, SMOOCHHALA<sup>4</sup>, YK NG<sup>1</sup>**

<sup>1</sup>Anatomy, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Department of Medicine, Institute of Histology and General Embryology, University of Fribourg, Switzerland, <sup>3</sup>Pharmacology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>4</sup>Centre for Biomedical Sciences, Defence Medical & Environmental Research Institute, DSO National Laboratories (Kent Ridge), Singapore

**Aim:** Exercise has long been implicated to influence one's learning and memory. While experiments based on the voluntary paradigm have been the preferred approach, less is known about the forced paradigm. The present study was designed to examine the effects of 12 weeks of forced running on learning and memory performance in rodents.

**Methods:** The 1-day version of the Morris water maze (MWM) test was used to evaluate spatial learning and memory after the exercise period.

**Results:** Our data showed that runners displayed improved spatial learning and memory when compared to non-runners. This was shown by a reduction in the time required for spatial acquisition ( $P < 0.001$ ) and superior probe trial performance by the runners ( $P < 0.001$ ). A shorter distance swam in reaching the platform by the runners compared to the non-runners was suggestive of improved learning ( $P < 0.001$ ). Improved performance in the MWM test coincided with increased number of cholinergic neurons in the horizontal diagonal band of Broca (HDB) in the septum.

**Conclusion:** Exercise, particularly a 12-week forced running regime, improved learning and memory performance in rats probably by increasing cholinergic mechanisms involving the septal-hippocampal pathway.

P22

**Distinct Roles of Oxidative Stress and Antioxidants in the Nucleus Dorsalis and Red Nucleus Following Spinal Cord Hemisection**

**LT GAN<sup>1</sup>, M XU<sup>2</sup>, YK NG<sup>1</sup>**

<sup>1</sup>Anatomy, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Department of Biology, Georgia State University, Atlanta, USA

**Aim:** Oxidative stress plays an important role in the pathogenesis of neurodegeneration after the acute central nervous system injury. We reported previously that increased nitric oxide (NO) production following spinal cord hemisection tends to lead to neurodegeneration in neurons of the nucleus dorsalis (ND), which normally lack expression of neuronal NO synthase (nNOS) in opposition to those in the red nucleus (RN) that constitutively express nNOS. We wondered whether oxidative stress could be a mechanism underlying this NO-involved neurodegeneration.

**Methods:** In the present study, we examined oxidative damage evaluated by the presence of 4-hydroxynonenal (HNE) and iron accumulation and expression of putative antioxidant enzymes heme oxygenase-1 (HO-1) and superoxide dismutase (SOD) in neurons of the ND and RN after spinal cord hemisection.

**Results:** We found that HNE expression was induced in neurons of the ipsilateral ND from 1 to 14 days following spinal cord hemisection. Concomitantly, iron staining was seen 7 to 14 days after lesion. HO-1, however, was only transiently induced in ipsilateral ND neurons between 3 and 7 days after lesion. In contrast to the ND neurons, HNE was undetectable and iron level was unaltered in the RN neurons after spinal cord hemisection. HO-1, SOD-Cu/Zn and SOD-Mn were constitutively expressed in RN neurons, and lesion to the spinal cord did not change their expression.

**Conclusion:** These results suggest that oxidative stress is involved in the degeneration of the lesioned ND neurons; whereas constitutive antioxidant enzymes may protect the RN neurons from oxidative damage.

P23

**Hyperhomocysteinaemia as a Cause of Non-arteritic Anterior Ischaemic Optic Neuropathy (NAION) in a Patient on Haemodialysis with Renal Failure**

**NYA GAN<sup>1</sup>, S TOW<sup>2</sup>**

<sup>1</sup>Ophthalmology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Neuro-Ophthalmology Service, Singapore National Eye Centre, Singapore

**Aim:** To report a case of bilateral NAION in a patient on haemodialysis with hyperhomocysteinaemia as a likely cause.

**Methods:** A 49-year-old Malay gentleman with a 3.5-year history of end-stage renal failure (ESRF) and haemodialysis treatment presented with sudden painless right inferior visual field blurring. Ophthalmic examination revealed right relative afferent pupillary defect and optic disc oedema. Clinical diagnosis of right NAION was made. One year later, he was diagnosed with left NAION.

**Results:** At the time of diagnosis of right NAION, the patient was found to have a markedly raised fasting plasma homocysteine level of 71.1  $\mu\text{mol/L}$ . He was started on vitamin B6 and B12 supplements and folate daily. Homocysteine levels subsequently decreased but failed to normalise. Other risk factors for NAION in this patient were hypertension and mild anaemia, which were under control with atenolol, nifedipine and iron tablets.

**Conclusion:** Hyperhomocysteinaemia has been independently associated with increased odds for occlusive vascular disease. Hence, we feel that hyperhomocysteinaemia played a major role in the development of bilateral NAION in our patient. We are unaware of previous reports relating NAION to hyperhomocysteinaemia in patients with ESRF on haemodialysis. As such this report highlights the importance of diagnosing and aggressively managing hyperhomocysteinaemia in this group of patients in order to reduce the risk of NAION.

## P24

**Caries Risk Assessment in Chinese Adolescents**

**XL GAO<sup>1</sup>, CK Ong<sup>1</sup>, SG SOK<sup>1</sup>, JL OOI<sup>1</sup>, LY TAN<sup>1</sup>, DZW NG<sup>1</sup>, SCY HSU<sup>1</sup>**

<sup>1</sup>Preventative Dentistry, National University of Singapore - Faculty of Dentistry, Singapore

**Aim:** To identify the caries risk factors for Chinese adolescents.

**Methods:** Two hundred and fifty students aged 11 to 16 (mean 13.4) years were surveyed through a questionnaire and oral examination assessing demographic background, diet frequency/content, fluoride applications, systemic diseases, plaque amount, caries status, saliva flow rate, and buffering capacity. After 12 months, the caries status of 144 subjects was followed up. Factors significantly correlated with caries increment over 1 year were identified as caries risk factors. The accuracy of Cariogram was evaluated by comparing the prediction with actual caries increment over 1 year.

**Results:** At baseline, 37% subjects were affected by caries. The mean DMFT and DMFS were  $1.02 \pm 0.12$  and  $1.44 \pm 0.17$ , respectively. Within 12 months, new caries lesions occurred in 48% subjects. The mean new decayed teeth and surfaces over one year were  $1.10 \pm 0.14$  and  $1.44 \pm 0.19$  in the entire cohort, and  $2.58 \pm 0.22$  and  $3.34$  (0.321) among those developing new lesions. "Plaque amount" ( $P = 0.028$ ), "saliva flow rate" ( $P = 0.030$ ) and "past caries" ( $P = 0.003$ ) were identified as risk factors. Cariogram did not accurately predict the caries increment of the subjects.

**Conclusion:** The caries risk factors identified in this study may be considered for caries control in this population. An accurate caries risk assessment/prediction model for oriental populations remains to be established.

## P25

**Asian Men and Women Age Differently**

**VHH GOH<sup>1</sup>, TYY TONG<sup>2</sup>, HPP MOK<sup>3</sup>, B SAID<sup>4</sup>**

<sup>1</sup>Obstetrics & Gynaecology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** To profile the major determinants of the ageing process and evaluate the differences in men and women aged 50 to 70 years.

**Methods:** More than 1700 healthy men and women were recruited and various investigations were carried out on them including the following: 1) survey on lifestyles issues – diet, exercise, smoking, drinking, sleep, stress, sexual activities, etc; 2) lipid and lipoprotein profiles; 3) bone and body composition scans (DEXA); 4) short term memory, visual perception tests, handgrip strength, fatigue studies; 5) hormone levels (insulin, bioavailable T, IGF-1, IGFBP3, LH, AS, cortisol, free T3, T4, TSH, CRP); 6) anthropometric parameters; and 7) general physical examination parameters.

**Results:** Many of the parameters change with age and several showed a gender difference. These included the level of cholesterol, percentage body fat and IGF-1 levels.

**Conclusion:** Men and women age difference in different areas and different management modalities must therefore be established to manage problems in ageing in men and women.

## P26

**Combining C-terminus N304R and R306L Mutations in Streptomyces clavuligerus Deacetoxycephalosporin C Synthase Improves its Substrate Binding Affinity Leading to Higher Catalytic Efficiency**

**KS GOO<sup>1</sup>, TS SIM<sup>1</sup>**

<sup>1</sup>Microbiology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** *Streptomyces clavuligerus* deacetoxycephalosporin C synthase (scDAOCS) catalyses the ring expansion of penicillin to cephalosporin in the  $\beta$ -lactam biosynthetic pathway. Two C-terminal mutants, N304R and R306L

of scDAOCS, were previously shown to exhibit some improvement in penicillin analogue conversions compared to that of the wild type enzyme (187% to 901% and 122% to 280%, respectively). This prompted the construction of the double mutant N304R/R306L to investigate whether this could have an additive effect on enzyme activity.

**Methods:** The enzymatic reaction condition was adopted from Sim and Sim (2001). Hole-plate bioassays using *E. coli* ESS strain as the test organism was employed to determine the conversion activities of the wild type and mutant scDAOCSs. The penicillin substrates tested were penicillin G, ampicillin, amoxicillin, metampicillin, penicillin V, phenethicillin and carbenicillin. Kinetic studies were also performed on these enzymes to determine the changes in their kinetic parameters for ampicillin conversion.

**Results:** The bioassay results showed that the combined mutations in scDAOCS substantially enhanced the conversion of various penicillin analogues (240% to 3267%). The double mutant N304R/R306L exhibited a lower  $K_m$  (0.15 mM) when compared to that of the wild-type (6.62 mM). R306L (1.99 mM) and N304R (0.67 mM) mutant enzymes, indicating a significant increase in substrate binding affinity (45-fold over that of wild type enzyme).

**Conclusion:** These results demonstrated that the combination of N304R and R306L mutations in DAOCS has resulted in an additive effect on the enzyme's substrate binding affinity and thus, higher cephalosporin production based on bioassays.

## P27

**Human Myoblasts are Immunoprivileged and Enhanced by Cyclosporine Treatment with Improvement of Heart Function after Xenogenic Transplantation for Cardiac Repair**

**CF GUO<sup>1</sup>, KH HAIDER<sup>2</sup>, L YE<sup>3</sup>, PK LAW<sup>4</sup>, P WONG<sup>5</sup>, W SHIM<sup>6</sup>, EKW SIM<sup>1</sup>**

<sup>1</sup>Surgery, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Department of Pathology and Laboratory Medicine, University of Cincinnati, USA, <sup>3</sup>National University Medical Institute, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>4</sup>CTS, Cell Transplants Singapore, Pte. Ltd, Singapore, <sup>5</sup>Cardiology, <sup>6</sup>Research Lab, National Heart Centre, Singapore

**Aim:** To investigate the immunoprivileged nature of human myoblast (HM) based on cellular immune response and evaluate effects of cyclosporine following xeno-HM transplantation in a rat myocardial infarction model.

**Methods:** Infarction model of female Wistar rats was randomised into medium-injected group 1 (n = 10), HM-transplanted group 2 (n = 30) and HM-transplanted group 3 (n = 30) with cyclosporine treatment. One week later, 150  $\mu$ L DMEM alone or containing  $3 \times 10^6$  HM labeled with DAPI was injected into the infarct. The hearts were harvested at 10 minutes, 1, 4, 7 and 28 days and immunostained to detect HM, human leukocyte antigen class I & II (HLA I & II) and infiltration of macrophages, CD4+ and CD8+ lymphocytes. Real-time-PCR was applied to quantify the surviving HM. One day before and 28 days after HM transplantation, heart function was measured by echocardiography.

**Results:** In group 2 and group 3, HM survived at day 28; macrophages infiltrated from day 1; CD4+, CD8+ lymphocytes infiltrated from day 4; they all peaked at day 7 and subsided by day 28. HLA I & II were down-regulated at day 28. By real-time PCR, HM in group 3 at days 1, 7 and 28 were  $6.58\% \pm 1.87\%$ ,  $31.36\% \pm 2.79\%$  and  $54.70\% \pm 7.88\%$ , much more than those in group 2 ( $1.77\% \pm 0.32\%$ ,  $12.72\% \pm 5.05\%$  and  $28.97\% \pm 7.60\%$ , cell number at 10 minutes as baseline,  $P < 0.01$ ). The ejection fraction of 4 weeks significantly improved in group 2 (from  $43.50 \pm 2.6\%$  to  $49.00 \pm 3.2\%$ ,  $P < 0.01$ ) and in group 3 (from  $43.00 \pm 1.8\%$  to  $52.50 \pm 1.3\%$ ,  $P < 0.01$ ).

**Conclusion:** HM were immunoprivileged and survived in the rat infarcted heart with down-regulation of HLA I & II without cyclosporine. Cyclosporine enhanced the survival of xeno-HM and improved heart performance by suppressing immune response.

P28

**Putative Role of Hydrogen Sulfide in the Posterior Hypothalamus in Cardioregulation**

**SP HAN<sup>1</sup>, PK MOORE<sup>1</sup>, JS BIAN<sup>1</sup>, GS DAWE<sup>1</sup>**

<sup>1</sup>Pharmacology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** To investigate whether microinjection of hydrogen sulfide (H<sub>2</sub>S) into the posterior hypothalamus of conscious, freely moving rats affects cardiac function.

**Methods:** Guide cannulae were implanted into the posterior hypothalami of male Sprague-Dawley rats (230 g to 330 g), and their left femoral arteries were cannulated. After recovery, the mean arterial pressure (MAP) was monitored by attaching the femoral arterial cannula to a PowerLab system while the rats were conscious and freely moving. Drugs [saline, 5'-(N-cyclopropyl)-carboxamidoadenosine (CPCA), sodium hydrogen sulfide (NaHS), gliclazide, S-adenosyl-L-methionine (SAM), amino-oxyacetate (AOA) and hydroxylamine (HA)] were administered to the posterior hypothalami via the implanted cannulae. The animals were then sacrificed by an overdose of anaesthetic, and their brains cryosectioned in order to verify the injection site.

**Results:** Microinjection of NaHS, a H<sub>2</sub>S donor, and CPCA, an A<sub>2</sub> receptor agonist, both caused a decrease in MAP. When gliclazide, a K<sub>ATP</sub> channel blocker, was microinjected prior to an infusion of NaHS, the MAP-lowering effect of NaHS was reduced. Microinjection of SAM, an activator of endogenous H<sub>2</sub>S production, caused MAP to decrease, while AOA and HA, inhibitors of endogenous H<sub>2</sub>S production, caused MAP to increase.

**Conclusion:** These results suggest that H<sub>2</sub>S may act as a signaling molecule in the brain and regulate cardiac function via a K<sub>ATP</sub> channel-dependent pathway.

P29

**The Effect of Pentoxifylline on the Malaria Parasite, *Plasmodium falciparum***

**A HASSANBHAI<sup>1</sup>, EH ZHOU<sup>2</sup>, CT LIM<sup>2</sup>, S SURESH<sup>3</sup>, KSW TAN<sup>1</sup>**

<sup>1</sup>Microbiology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Division of Bioengineering, National University of Singapore, Singapore, <sup>3</sup>Division of Biological Engineering and Affiliated Faculty of the Harvard-MIT Division of Health Sciences and Technology, Massachusetts Institute of Technology, USA

**Aim:** Pentoxifylline (PTX) is a haemorheological agent that increases red blood cell (RBC) deformability, reduces blood viscosity and modulates cytokine response. There have been controversial reports on the role of PTX in the treatment of cerebral malaria. Improved prognosis has been correlated to the suppression of TNF- $\alpha$  by PTX. However, there is no information on the effect of PTX on the deformability of malaria-infected RBCs. The aims of our study were to determine the effects of PTX on normal RBCs and those infected with the malarial parasite, *Plasmodium falciparum* (pRBCs).

**Methods:** The methods employed include micropipette aspiration (MA) and drug sensitivity tests to assay for biomechanical and anti-malarial properties respectively. Malarial in vitro cultures were incubated with PTX and their rigidity mechanically quantified by MA.

**Results:** The membrane shear modulus of healthy RBCs was  $7.6 \pm 1.5$  pN/ $\mu$ m and that of PTX-treated RBCs  $6.8 \pm 1.1$  pN/ $\mu$ m. The bulk elastic modulus of schizont-infected pRBCs was  $27.4 \pm 11.0$  N/m<sup>2</sup> and that of PTX-treated S-pRBCs was  $30.8 \pm 13.5$  N/m<sup>2</sup>. Interestingly, PTX was observed to inhibit merozoite invasion and in vitro growth.

**Conclusion:** Our MA results showed that PTX did not significantly improve the deformability of infected RBC in vitro. Our results suggest that in cases where PTX improved the prognosis of cerebral malaria, the beneficial effect of the drug is not mediated by improved cell deformability but by other factors. These may include a direct antimalarial effect of the drug.

P30

**Engineering Novel Compounds to Inhibit Sphingosine Kinase – A Novel Target for Drug Discovery**

**XL HE<sup>1</sup>, A MELENDEZ<sup>2</sup>**

<sup>1</sup>Medicine, <sup>2</sup>Physiology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** Sphingolipids have currently emerged as the sources of many important signalling molecules and have potentially powerful anticancer properties. Sphingosine kinase (SPHK) and sphingosine-1-phosphate (S1P) play important roles in different cellular processes, such as in the regulation of intracellular calcium signals, in angiogenesis and control of cell adhesion molecule expression, in apoptosis, and chemotaxis. Particularly, in immune cells, SPHK and S1P are tightly related to the main stages of immune cell activation and differentiation, and involved in the physiological responses. Understanding sphingolipid signal transduction pathways has helped to provide potential new targets for the treatment of inflammatory conditions, and it showed that SPHK1 and S1P play a role not only in inflammation, but also in the interface with tumour immunology. Thus, the inhibition of SPHK could potentially be used as a novel therapeutic treatment not only in the case of inflammatory disorders, but also in cancers.

**Methods:** We designed the inhibitors for SPHK as the analogues of D-erythro-sphingosine, which is the natural substrate for SPHK, by 1) changing the fatty acid carbon chain length; 2) converting the existing double bond to either a single or triple bond; or 3) changing the hydroxy group to other functionalities. The potential inhibitors were synthesised and tested in intact cells treatment assay and in vitro sphingosine kinase activity testing assay.

**Results:** The results showed that some of the synthetic inhibitors demonstrated inhibitory functions to SPHK activity.

**Conclusion:** This provides novel inhibitors for SPHK, and the possibilities of the potential drugs detection for some diseases treatment.

P31

**Tumour Necrosis Factor (TNF) $\alpha$ -mediated Translocation of Raf-1 is Mediated by Phospholipase-D**

**SC H'NG<sup>1</sup>, AJ MELENDEZ<sup>1</sup>**

<sup>1</sup>Physiology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** TNF $\alpha$  is a proinflammatory cytokine that is commonly secreted by immune cells. It plays a key role in the cytokine network that contributes to the pathogenesis of many infectious and inflammatory diseases. However, the intracellular signaling pathway triggered by TNF $\alpha$  in immune-effector cells is still unclear. Our team was interested in dissecting the signaling cascades triggered by TNF $\alpha$  by investigating the activation of Raf-1. Raf-1 is a serine-threonine kinase that is recruited by Ras. Recruitment of Raf-1 can lead to the activation of mitogen activated protein kinase (MAPK), regulating gene transcription.

**Methods:** Immunofluorescence microscopy is used for translocation studies. IFN $\alpha$ -primed U937 cells were triggered with 10 ng/mL of TNF $\alpha$  and warmed up at 37°C. Cells were fixed with 3.7% formaldehyde, followed by permeabilisation with 0.2% Triton X-100. Using the Cytospin machine, cells were mounted onto slides and probed with anti-Raf-1 antibody and secondary FITC-conjugated antibodies. Slides were viewed under Leica microscope and images were taken. In another set of experiment, cells were pretreated with 0.5% Butan-1-ol before triggering with TNF $\alpha$ . In the presence of Butan-1-ol, phosphatidic acid is not formed by phospholipase D (PLD).

**Results:** Microscopy results showed that TNF $\alpha$  triggered the translocation of Raf-1 from cytosol to plasma membrane by 5 minutes. Pretreatment with butan-1-ol inhibited the translocation of Raf-1.

**Conclusion:** We showed that TNF $\alpha$  signalling leads to recruitment of Raf-1 to the plasma membrane. Using butan-1-ol, we demonstrated that Raf-1 translocation is mediated by PLD. PLD could play a potential role in regulating Raf-1 recruitment in TNF $\alpha$  signaling.

## P32

**Perspectives on Nipple-Areola Complex Reconstruction among Breast Cancer Patients Following Skin-Sparing Mastectomy with Immediate Reconstruction****DCS HO<sup>1</sup>, R WIJAYA<sup>1</sup>, WS YONG<sup>2</sup>**<sup>1</sup>*Surgery, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Clinical Departments - Surgical Oncology, National Cancer Centre, Singapore*

**Aim:** Nipple-areola complex reconstruction is the final component of a complete breast restorative procedure, but clinicians find it uncommonly chosen among patients. This study aims to find out the perspective on nipple-areola complex reconstruction among breast cancer patients following skin-sparing mastectomy with immediate reconstruction.

**Methods:** We conducted this study at the Singapore General Hospital/ National Cancer Centre, Singapore. A total of 42 patients who each went through a skin-sparing mastectomy with immediate breast reconstruction were selected. We devised a 20-item questionnaire for this study, including standard demographic items and questions to assess awareness of nipple-areola complex reconstruction and possible reasons for not going for it. Questionnaires were administered via telephone by 2 trained interviewers.

**Results:** Twenty-two patients, aged between 30 and 62 years, participated. All participants were aware of nipple-areola complex reconstruction before they underwent mastectomy. Eventually, 3 participants [13.6%, 95% confidence interval (CI), 2.9% to 34.9%] went for nipple-areola complex reconstruction. Among all participants, 17 of them (77.3%, 95% CI, 54.6% to 92.2%) said that a feeling of irrelevance was an influencing factor. An equal number of participants expressed fear of a second operation.

**Conclusion:** Nipple-areola complex reconstruction is not a widely opted procedure among breast cancer patients in Singapore. The major obstacles to this procedure are the feeling of irrelevance and the fear of undergoing a second operation. Surgeons will need to address the obstacles accordingly in order to promote complete breast restoration.

## P33

**Uncorrected Refractive Error in Singapore Teenagers****DCS HO<sup>1</sup>, C NG<sup>2</sup>, E CHAN<sup>1</sup>, R WIJAYA<sup>1</sup>, A VENKATARAMAN<sup>1</sup>, A NGEOW<sup>1</sup>, SM SAW<sup>1</sup>**<sup>1</sup>*COFM, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Optometry, Singapore Polytechnic, Singapore*

**Aim:** To study the prevalence rate of uncorrected refractive error and associated risk factors amongst secondary one Singapore school children.

**Methods:** A cross-sectional study, with 628 participants, was conducted in 2 secondary schools in Singapore. An interviewer-led questionnaire, containing items on sociodemographic variables and risk factors, was administered en masse in the 2 schools. All participants had their habitual visual acuity (VA) measured. Refractive errors were measured using autorefraction. Participants with habitual VA of 0.2 logMAR or worse underwent subjective refraction. Uncorrected refractive error was defined as improvement of at least 0.2 logMAR in best-corrected visual acuity after subjective refraction.

**Results:** The prevalence rate of uncorrected refractive error of our study population was 22.3% [95% confidence interval (CI), 19.0% to 25.5%]. Of these, 52.9% (95% CI, 44.6% to 61.1%) had bilateral uncorrected refractive error. The multivariate adjusted odds ratio of uncorrected refractive error in students with the lowest academic ability was 2.24 (95% CI, 1.34 to 3.73). Increasing time interval since the last visit to an eye care provider increased the risk of uncorrected refractive error (trend  $P = 0.001$ ). The adjusted odds ratios of uncorrected refractive error for students with myopia and mixed refractive error were 5.54 (95% CI, 2.71 to 11.29) and 7.40 (95% CI, 3.43 to 15.96), respectively.

**Conclusion:** Uncorrected refractive error was a significant problem among Secondary One Singapore students. Uncorrected refractive error was more common among students with low academic ability, those who had not visited any eye care provider for a long time, and those who had myopia or mixed refractive error.

## P34

**Expression of Aminoterminal Sonic Hedgehog in the Adult Rodent Brain****NE HO<sup>1</sup>, GS DAWE<sup>1</sup>**<sup>1</sup>*Pharmacology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore*

**Aim:** The Sonic Hedgehog (Shh) protein is involved in critical aspects of brain development, and has been shown to regulate stem cell lineages in the adult brain. The Shh protein undergoes autoprocesing and cholesterol modification to give rise to an active amino-terminal signalling peptide. Previous groups have reported Shh mRNA transcripts in the adult rat brain. Here we aim to assess its protein expression in the adult rodent brains using immunohistochemistry.

**Methods:** Both Swiss Albino mice and Sprague-Dawley rats were used to investigate the possibility of species difference. Colchicine, a microtubule inhibitor, was stereotaxically injected into the lateral ventricles of the animals to examine the effect of axonal transport disruption. We used an antibody to the amino-terminal fragment of Sonic Hedgehog (Shh-N) in our immunostainings. To establish the identity of Shh-N positive cells, we used various neuronal markers for co-labeling. Imaging was done using a confocal microscope.

**Results:** Colocalisation of Shh-N cell bodies with ChAT, GAD and mostly VGLUT2 in the medial septum/diagonal band of Broca (MSDB) and globus pallidus was observed. We also identified novel populations of Shh-N positive cells in the hilus and molecular layer of the dentate gyrus. Shh-N immunoreactivity in the MSDB increased with colchicine treatment, but was abrogated in the hippocampus.

**Conclusion:** To our knowledge, this is the first time Shh-N staining has been demonstrated in the basal forebrain and hippocampus. There may be 2 populations of Shh secreting cells in the hippocampus – septohippocampal afferents, or local neurons within the hippocampus itself.

## P35

**Feasibility of Developing *Saccharomyces* spp. and *Pichia* spp. as Vaccine Delivery Vehicle Against Coronaviruses****PS HO<sup>1</sup>, YK LEE<sup>1</sup>**<sup>1</sup>*Microbiology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore*

**Aim:** For many viruses, the initial infection occurs at the mucosa of the lungs and intestines. It is important to develop vaccines that neutralise the pathogen at its point of infection. As yeast has been conventionally used in a variety of processes in the food industry, the objective of this study is to determine the potential of using yeast as an oral vaccine carrier against coronaviruses.

**Methods:** Adhesion capabilities of yeasts were assessed using flow cytometry and scanning electron microscopy. Recombinant yeast that secretes a coronavirus spike protein fragment was constructed and orally administered to BALB/c mice. Immunological responses were analysed using ELISA, plaque neutralisation assay and multiplex cytokine system.

**Results:** Adhesion studies demonstrated the ability of *Saccharomyces boulardii*, *Saccharomyces cerevisiae* and *Pichia pastoris* to adhere to various portions of murine intestinal tract in vivo and to human intestinal cell lines in vitro. In particular, *P. pastoris* being an excellent protein expression host fits the criteria of vaccine carrier candidate. Oral administration of recombinant *P. pastoris* elicited specific mucosal and systemic immune responses. The induced antibodies conferred protective effect against viral infection. In addition, oral feeding of recombinant *P. pastoris* also induced a Th1/Th2-like cellular immune response in the Peyer's patches.

**Conclusion:** The in vivo and in vitro adhesive capabilities of *S. boulardii*, *S. cerevisiae* and *P. pastoris* were illustrated in the present study. *P. pastoris*, which constitutively expresses and secretes heterologous protein, induced specific immune responses against the antigen within the murine intestinal milieu. This study has defined for the first time that *P. pastoris* can potentially be used as an oral vaccine vehicle against coronaviruses.

**P36**

**Airway Function of Children with Sports-related Symptoms**

**TF HO<sup>1</sup>, WX WU<sup>2</sup>, TE NGIAM<sup>2</sup>, WCL YIP<sup>3</sup>**

<sup>1</sup>Physiology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Singapore Baby & Child Clinic, Gleneagles Medical Centre, Singapore, <sup>3</sup>Paediatrics, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** Children with sports-related symptoms may have exercise-induced asthma (EIA). We assessed the prevalence of EIA and airway function of a cohort of children with such symptoms.

**Methods:** One hundred and three children (male: 62; females: 41; median age: 10.9 years) who presented with sports-related symptoms underwent a protocol using free running or cycle ergometer for diagnosis of EIA. Baseline and post-exercise spirometry (over 25 minutes) were performed. Diagnosis of EIA was based on established criteria. Inhaled Ventolin was administered when indicated.

**Results:** All children had difficulty during exercise performance. Other symptoms included cough (7.8%), breathlessness (19.4%) or chest pain (9.7%) during sports. 34% of these children had a known history of asthma. All subjects had no respiratory signs and symptoms at baseline. Sixty-nine children (67%) were diagnosed to have EIA. EIA children showed a maximum decline in FEV<sub>1</sub> at a median time of 5 minutes (range, 1 to 25 minutes). EIA and non-EIA children were significantly different in their airway response after exercise. EIA children had a maximum decline of FEV<sub>1</sub> by a mean of 14.5% (non-EIA 4.5%, *P* < 0.0001); FEF 25-75 by a mean of 31.1% (non-EIA 9.3%, *P* < 0.0001); FEF 50 by a mean of 29.3% (non-EIA 9.9%, *P* < 0.0001). 59% of EIA children required bronchodilation therapy (Ventolin) after exercise while the rest achieved full recovery of airway function by 25 minutes.

**Conclusion:** EIA is common in children with sports-related respiratory symptoms. After exercise, children with EIA showed a significant fall in airway function and more than half of these children required bronchodilation to restore normal airway function.

**P37**

**Assessment Criteria for Compliance with Oral Hygiene – Application of ROC Analysis**

**HM HTOON<sup>1</sup>, LP LIM<sup>1</sup>, YH CHAN<sup>2</sup>**

<sup>1</sup>Preventative Dentistry, National University of Singapore - Faculty of Dentistry, Singapore, <sup>2</sup>National University Medical Institute, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** Diabetes is an established risk factor for periodontal disease. Management of periodontal disease is highly dependent upon effective oral hygiene. Assessment of plaque and gingivitis has been commonly used and arbitrarily set in clinical practice to evaluate patients' adherence with oral hygiene recommendations. This study aims to determine an objective cut-off criterion for assessing oral hygiene compliance utilising a combination of plaque and bleeding scores.

**Methods:** One hundred and sixty-nine patients with diabetes from a prospective clinical trial provided the clinical periodontal parameters at baseline to be used to determine oral hygiene compliance criteria in relation to a composite score of number of pockets, pocket depth, subgingival calculus and supragingival calculus. A sequence of different combinations of plaque and gingival bleeding scores were used. ROC curve assessment, sensitivity, specificity, predictive values were utilised for the determination of the criterion.

**Results:** The combination of 25% plaque scores and 15% gingival bleeding scores obtained the highest ROC (using a probability cutoff of 0.5) of 0.958 with sensitivity 98.7%, specificity 92.9%, positive predictive value 99.4% and negative predictive value 86.7%. According to this criteria, amongst the cohort of subjects examined, 155 were categorised as non-compliant (91.7%, 95% CI, 87.5% to 95.9%) and only 14 (8.3%, 95% CI, 4.1% to 12.5%) were considered compliant with oral hygiene at baseline.

**Conclusion:** Based upon the clinical periodontal parameters of subjects from

this study, a combination of 25% plaque score and 15% bleeding score appears to be a valid target for determining compliance with oral hygiene.

**P38**

**Hydrogen Sulphide Regulates Calcium Homeostasis in BV-2 Microglial Cells**

**YS HU<sup>1</sup>, SW LEE<sup>1</sup>, JS BIAN<sup>1</sup>**

<sup>1</sup>Pharmacology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** Hydrogen sulphide (H<sub>2</sub>S), which is produced endogenously from L-cysteine in mammalian tissues, has been suggested to function as a neuromodulator in the brain. However, the role of H<sub>2</sub>S in microglial cells is unclear. In this study, we investigated the effect of exogenous and endogenous H<sub>2</sub>S on intracellular calcium homeostasis using BV-2 microglial cells.

**Methods:** RT-PCR method was applied to examine the expression levels of H<sub>2</sub>S generating enzymes, cystathionine β-synthase (CBS) and cystathionine γ-lyase (CSE). Intracellular calcium concentration ([Ca<sup>2+</sup>]<sub>i</sub>) was used as an indicator of cellular response to H<sub>2</sub>S.

**Results:** Sodium hydrosulphide (NaHS), a H<sub>2</sub>S donor, caused a concentration-dependent (0.1 to 0.5 mM) increase in [Ca<sup>2+</sup>]<sub>i</sub>. This effect was significantly attenuated in the presence of a calcium free extracellular solution, Gd<sup>3+</sup> (100 μM), a non-selective Ca<sup>2+</sup> channel blocker or thapsigargin (1 μM), an inhibitor of the sarcoplasmic/endoplasmic reticulum Ca<sup>2+</sup> ATPase. These observations suggest that the increase in [Ca<sup>2+</sup>]<sub>i</sub> in response to H<sub>2</sub>S involves both calcium influx across the plasma membrane and calcium release from intracellular stores. Using RT-PCR showed both CBS and CSE were expressed in BV-2 microglial cells. Inhibition of either enzyme with amino-oxyacetate (a CBS inhibitor), β-cyano-L-alanine, D,L-propargylglycine (2 CSE inhibitors) significantly decreased [Ca<sup>2+</sup>]<sub>i</sub>, suggesting that endogenous H<sub>2</sub>S may have a positive tonic influence on [Ca<sup>2+</sup>]<sub>i</sub> homeostasis in BV-2 microglial cells.

**Conclusion:** These findings support the possibility that H<sub>2</sub>S may serve as a neuromodulator to facilitate signalling between neurons and microglial cells.

**P39**

**Detection of a Novel Protein, Proline-rich Acidic Protein, in Patients with Systemic Lupus Erythematosus**

**BH HUANG<sup>1</sup>, HS HOWE<sup>2</sup>, KO KONG<sup>2</sup>, BPL LEUNG<sup>1</sup>, SC HOOI<sup>1</sup>**

<sup>1</sup>Physiology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Rheumatology, Allergy & Immunology, Tan Tock Seng Hospital, Singapore

**Aim:** Systemic lupus erythematosus (SLE) is an autoimmune disease characterised by extensive defects of the immune system and apoptosis. Proline-rich acidic protein (PRAP) is a novel protein that was recently found to regulate cell growth. We examined the levels of PRAP and antibodies against PRAP in the serum as well as its expression level in peripheral blood mononuclear cells (PBMC) of patients with SLE.

**Methods:** PRAP protein and anti-PRAP antibody levels were evaluated in the serum of SLE patients (n = 65 and 85, respectively) and 15 healthy donors by enzyme-linked immunosorbent assay (ELISA). Specificity and titre of anti-PRAP antibodies were verified by Western blot. Expression of PRAP at mRNA level in PBMC was determined in 40 SLE patients and 15 healthy donors by real-time PCR.

**Results:** Elevated serum levels of PRAP (mean ± 2SD) were found in 19/65 (29.2%) of SLE patients. Serum anti-PRAP antibodies were detected in 9/85 SLE patients (10.6%). Western blot results confirmed the specificity of the PRAP antibodies present in the patients' serum. PRAP mRNA expression in PBMC was significantly reduced in SLE patients (*P* < 0.05).

**Conclusion:** We report for the first time the detection of PRAP protein and anti-PRAP antibodies in the serum of SLE patients. The biological functions of PRAP in SLE and the disease manifestations are currently unclear and merit further investigations.

P40

### Inhibitory Effect of Emodin on Tumour Cell Migration through Suppression of the Phosphatidylinositol 3-kinase-cdc42/Rac1 Pathway

Q HUANG<sup>1</sup>, HM SHEN<sup>1</sup>, CN ONG<sup>1</sup>

<sup>1</sup>COFM, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** Inhibition of cell migration is considered to be an effective strategy for prevention of cancer metastasis. In this study, we evaluated the molecular mechanisms involved in the anti-metastasis activity of emodin by focusing on its inhibitory effect on cell migration.

**Methods:** Migration assay was conducted using 8.0- $\mu$ m cell culture inserts. Morphological change was determined using FITC-conjugated phalloidin. cdc42 and Rac1 activation were analysed using an activation assay kit.

**Results:** We found that emodin significantly inhibited epidermal growth factor (EGF)-induced in vitro migration in various human cancer cells, including MDA-MB-231, HSC5, and HepG2. In the search of the molecular mechanisms involved, we demonstrated that phosphatidylinositol 3-kinase (PI3K) serves as the molecular target for emodin. First, emodin blocked EGF-induced PI3K-Akt activation. Second, a specific PI3K inhibitor LY294002 and overexpression of dominant-negative PI3K suppressed EGF-mediated cell migration. Third, expression of wild-type PI3K promoted cell migration which was also suppressed by emodin. We further demonstrated that emodin markedly suppressed EGF-induced activation of cdc42 and Rac1, 2 Rho GTPases activated downstream of PI3K, and the corresponding cytoskeleton changes. Moreover, emodin inhibited complex formation between these small G proteins and p21-activated kinase (PAK). Emodin was able to block enhanced cell migration in cells transfected with constitutively active (CA)-cdc42 and CA-Rac1.

**Conclusion:** Taken together, data from this study suggest that emodin inhibits human cancer cell migration by suppressing the PI3K signaling pathway, in particular, its downstream cdc42, Rac1 and PAK.

P41

### Identification of Mature Form of Nocistatin and Nociceptin in Human Brain and Cerebrospinal Fluid by Mass Spectrometry, Affinity Chromatography and HPLC

T JOSEPH<sup>1</sup>, TL LEE<sup>1</sup>, S TACHIBANA<sup>1</sup>, C NING<sup>2</sup>, H JIKUYA<sup>3</sup>

<sup>1</sup>Anaesthesia, <sup>2</sup>Surgery, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>3</sup>Shimadzu Asia Pacific Pte Ltd, Singapore

**Aim:** Nocistatin (NST) and nociceptin/orphanin FQ (NCP) are 2 bio-peptides involved in several central nervous system (CNS) functions including pain transmission. Evidence show that NST acts as a functional antagonist of NCP in a dose-dependent manner. Since the actual form of human NST in CNS is not fully characterised, we studied the structure of NST and NCP from human brain tissue and cerebrospinal fluid (CSF) samples.

**Methods:** NST and NCP were isolated from human brain and CSF samples by affinity chromatography combined with high-performance liquid chromatography (HPLC). The HPLC purified samples were subjected to radioimmunoassay (RIA) for the quantitative analysis. Purified peptides were identified and characterised by matrix-assisted laser desorption/ionisation time-of-flight mass spectrometry (MALDI-TOF MS).

**Results:** Affinity chromatography and HPLC techniques facilitated the isolation of NST and NCP from the very complex biological mixtures. The total NST immunoreactivity was detected as  $11.5 \pm 2.3$  pmol/g tissue in the brain and 0.44 pmol/mL in the pooled CSF sample. The presence of 2 different forms of mature nocistatin (NST-17 and NST-30), a possible N-terminal methionine cleaved NST-29 and NCP were confirmed by MALDI-TOF MS.

**Conclusion:** The purification and mass spectrometry methods used in this study are highly sensitive and suitable for identification of actual chemical structures of very small amounts of peptides in biological samples. These findings may help in the development of new pharmacological tools for the treatment of neuropathic pain, by designing non-peptide agonists/antagonists

for the receptor with less or no side effects compared to opioid drugs.

P42

### Antibody-conjugated Gold Nanoparticles and Its Interaction with Epithelial Carcinoma Cells for Optical Molecular Imaging

JCY KAH<sup>1</sup>, MC OLIVO<sup>2</sup>, CGL LEE<sup>2</sup>, CJR SHEPPARD<sup>3</sup>

<sup>1</sup>Bioengineering programme, National University of Singapore - Staff & Student - Office of Life Sciences, Singapore, <sup>2</sup>Research Divisions - Medical Sciences, National Cancer Centre, Singapore, <sup>3</sup>Diagnostic Radiology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** While being able to image stromal morphology, advanced optical technologies for in vivo imaging, such as optical coherence tomography and confocal reflectance endomicroscopy, are unable to image biomolecular changes associated with carcinogenesis. Furthermore, the contrast between neoplastic and normal tissues from such advanced optical technologies is often too low to be of any clinical value. We aimed to develop gold nanoparticles as optically active contrast agents in performing non-invasive combination of structural and biomolecular imaging of cancerous signatures of tissues for early diagnosis of epithelial carcinoma when coupled with existing optical imaging systems.

**Methods:** In this study, 20-nm gold nanoparticles were synthesised and conjugated with anti-EGFR via passive absorption. EGFR is a cell surface receptor biomarker that is highly expressed in majority of epithelial cancer but not in normal cells. The resulting anti-EGFR gold bioconjugates were allowed to interact with the nasopharyngeal carcinoma CNE2 cells in vitro.

**Results:** The specific binding of the gold bioconjugates to the cells was assessed using absorption spectroscopy and FACS analysis to indicate the presence of gold bioconjugate on the cells. The exact localisation of the gold bioconjugates on the cell surface EGFR receptors was also investigated using confocal immunofluorescence microscopy. We demonstrated that the binding and localisation of the gold bioconjugates of the cell surface increased the reflectance and scattering properties of the CNE2 cells and provide good optical contrast for the cancer cells under confocal reflectance microscopy.

**Conclusion:** Our study demonstrated the potential of gold nanoparticles to target and illuminate cancer cells for bioimaging.

P43

### Primary Percutaneous Coronary Intervention for ST Segment Elevation Myocardial Infarction in an Asian General Hospital without On-site Cardiothoracic Surgery

K KALIYAPERUMAL<sup>1</sup>, J LINGAMAMAICKER<sup>2</sup>, TT OOI<sup>2</sup>, V SRIDHAR<sup>1</sup>

<sup>1</sup>Medicine, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Cardiology, Changi General Hospital, Singapore

**Aim:** Primary percutaneous coronary intervention (PCI) is increasingly seen as superior reperfusion therapy for acute ST-elevation myocardial infarction (STEMI) over fibrinolytic therapy. With improved PCI techniques, requirement for emergent coronary artery bypass surgery (CABG) has decreased significantly. We present our experience in a hospital with no on-site cardiothoracic surgery facilities.

**Methods:** This is a two-year registry of 132 patients from January 2003 till December 2004 who presented with STEMI and subsequently underwent acute PCI. The primary outcome measures were, in-hospital major adverse cardiac events (MACE), MACE at 30 and 180 days, and door-to-balloon time.

**Results:** One hundred and thirty-two patients underwent cardiac catheterisation (100%) for acute myocardial infarction. Stenting was performed in 129 patients (97.73%), distal protection device used in 64 (48.48%) and glycoprotein IIb/IIIa inhibitors used in 32 (24.24%). There were no peri-procedural complications in 97.67% of patients. Two patients had dissection of the coronary artery, 1 had stent dislodgment and 2 had subacute stent thrombosis. Mean door-to-balloon time was 96.26 minutes. There were no in-hospital MACE in 127 patients (98.44%). At 6 months follow-up, survival



from all cause mortality was seen in 126 patients (97.67%), 124 patients (96.12%) were MACE-free, and 16 (12.12%) were lost to follow-up.

**Conclusion:** The lack of cardiac surgery backup, per se, need not limit the safety or efficacy of acute PCI in a district hospital. Rigorous standards for operators, staffing, equipment, laboratories, case selection and outcomes must be adopted to be safe and successful.

#### P44

##### **Dynamics of Mitotic Exit, Cytokinesis and Septum Formation in *Saccharomyces cerevisiae***

**R KASHMISHETTY<sup>1</sup>, G ZHANG<sup>1</sup>, CL SOO<sup>1</sup>, KE NG<sup>1</sup>, FM YEONG<sup>1</sup>**

<sup>1</sup>*Biochemistry, National University of Singapore – Yong Loo Lin School of Medicine, Singapore*

**Aim:** Cytokinesis and septum formation in *Saccharomyces cerevisiae* are important for the partitioning of the mother and daughter cells. Exit from mitosis, defined biochemically as the destruction of mitotic kinase activity at the end of mitosis, is temporally correlated to cytokinesis and septum formation. However, direct evidence linking exit from mitosis and cytokinesis, and septum formation remains to be established. Our aim is to understand the regulation of cytokinesis and septum formation with respect to mitosis.

**Methods:** To understand the regulation of cytokinesis and septum formation with respect to mitosis, time-lapsed microscopy was used to study the temporal and spatial localisation of the major mitotic cyclin, Clb2p, and components involved in cytokinesis and septum formation, such as myosin II (Myo1p) and chitin synthase 2, (Chs2p) respectively. To this end we generated strains in which these components were tagged to GFP variants.

**Results:** We found that Myo1p ring constriction occurred only after Chs2p localised to the neck. Also, Chs2p localisation to the neck depended directly on Clb2p destruction, both in the nuclei and at the neck. Although Myo1p ring constriction occurred subsequent to Clb2p disappearance from the neck, its contraction is not dependent directly on Clb2p destruction.

**Conclusion:** Our work provides the basis for further studies on the regulation of acto-myosin ring contraction and chitin deposition during cytokinesis and septum formation.

#### P45

#### P46

##### **The Potential Role of Uncoupling Proteins in Ageing: A Comparative Study of Canary Birds versus Mice**

**CH KUA<sup>1</sup>, ZA ALMSHERQI<sup>1</sup>, OLL TAN<sup>1</sup>, Y DENG<sup>1</sup>**

<sup>1</sup>*Physiology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore*

**Aim:** The differential longevity between species has been correlated with the level of reactive oxygen species (ROS) production, which may be responsible for the ageing process. In mitochondrial ROS generation, the mitochondrial membrane potential plays an important role and is mediated by uncoupling proteins (UCPs). To explore the relationship between UCPs and longevity, we compared UCP activity between canaries and mice under starvation stress, an UCP up-regulating factor. Although of similar body size, canaries have a maximum lifespan of 7 times greater than that of mice.

**Methods:** Heart tissues from canaries and mice under normal physiological and starvation conditions were collected, and their mitochondria were isolated for bioenergetics, Western blot, and H<sub>2</sub>O<sub>2</sub> assays.

**Results:** Our results showed that palmitic acid (PA), a stimulator of UCP activity, decreased the efficiency of ATP synthesis in both species. Under starvation conditions, no change in endogenous proton leak was observed in mice. In contrast, there was a significant increase in endogenous proton leak when canaries were starved. Furthermore, in state 4 respiration, GTP inhibition (on PA-induced stimulation) increased more prominently after 48 hours of starvation in canaries (0% to 14.3%) compared to mice (20.3% to 31.1%). H<sub>2</sub>O<sub>2</sub> production measurements in state 4 suggested that PA had greater influences on H<sub>2</sub>O<sub>2</sub> production in fed canaries (94.4% decrease) than mice (76.6% decrease). Additionally, Western blot data witnessed greater UCP presence in canaries.

**Conclusion:** The uncoupling flexibility of canary heart mitochondria and the fact that they demonstrated an over-expression of UCPs under starvation condition may have important implications in their low H<sub>2</sub>O<sub>2</sub> production and longer lifespan.

#### P47

##### **Analysis of the Mitochondrial Proteome of Butyrate-treated HCT-116 Colorectal Cancer Cells**

**LF KUAH<sup>1</sup>, S TAN<sup>1</sup>, MCM CHUNG<sup>1</sup>**

<sup>1</sup>*Biochemistry, National University of Singapore – Yong Loo Lin School of Medicine, Singapore*

**Aim:** Colorectal cancer (CRC) is the most common malignancy in Western countries, and is associated with considerable mortality and morbidity. Butyrate, a short-chain fatty acid product of colonic fibre fermentation, protects against CRC by inducing growth arrest, differentiation and apoptosis of transformed cells. The precise molecular pathways through which butyrate effects these changes are still unknown. Among the many known butyrate-mediated activities, 2 prominent ones are the inhibition of histone deacetylases and the mitochondrial  $\beta$ -oxidation of butyrate. To determine the direct biochemical effects of butyrate on mitochondria, we used a subproteomics approach to study the differential expression of mitochondrial proteins upon butyrate treatment of HCT-116 colorectal cancer cells.

**Methods:** Mitochondrial fractions of untreated and butyrate-treated samples were enriched and analysed by 2-dimensional difference gel electrophoresis (2-D DIGE). DeCyder image analysis software detected 92 differentially regulated protein spots. Subsequent tandem mass spectrometry (MS/MS) identified 28 butyrate-regulated proteins, out of which 14 were confirmed as mitochondrial proteins through database searches.

**Results:** Firstly, it was noted that butyrate was found to upregulate certain metabolic enzymes, like short/branched chain specific acyl-CoA dehydrogenase and ornithine aminotransferase; but downregulate others, such as medium-chain specific acyl-CoA dehydrogenase and coproporphyrinogen III oxidase. Secondly, the regulators of protein import,

WITHDRAWN

folding and stabilisation in the mitochondria, including prohibitin and mortalin, were affected by butyrate treatment. Lastly, the subunits of respiratory complex I and IV were also differentially expressed by this treatment.

**Conclusion:** These results supported the association between the anticancer properties of butyrate and its biochemical effects on mitochondria.

#### P48

### Identification of Vaccine Candidate Antigens of an ESBL-producing *Klebsiella pneumoniae* Clinical Strain by Immunoproteome Analysis

**P. KURUPATI<sup>1</sup>, CL POH<sup>1</sup>**

<sup>1</sup>Microbiology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** *Klebsiella pneumoniae* is an opportunistic pathogen which causes pneumoniae, urinary tract infections and septicaemia in immunocompromised patients. Hospital outbreaks of multidrug-resistant *K. pneumoniae*, especially those in neonatal wards, are often caused by strains producing the extended-spectrum  $\beta$ -lactamases (ESBLs). An immunoproteome based approach was developed to identify candidate antigens of *K. pneumoniae* for vaccine development.

**Methods:** Sera from patients with acute *K. pneumoniae* infections (n = 55) and a control group of sera from healthy individuals (n = 15) were analysed for reactivity by Western blot against ESBL *K. pneumoniae* outer membrane proteins separated by 2-dimensional electrophoresis.

**Results:** Twenty highly immunogenic protein spots were identified by immunoproteomic analysis. The immunogenic proteins most frequently recognised by positive *K. pneumoniae* sera were OmpA, OmpK36, FepA, OmpK17, OmpW, colicin I receptor protein and 3 novel proteins. Two of the vaccine candidate genes, OmpA (Struve et al. Microbiology 2003;149:167-76) and FepA (Lai YC et al. Infect Immun 2001;69:7140-5), have recently been shown to be essential in colonisation and infection in an in vivo mouse model. Hence, these 2 immunogenic proteins could serve as potential vaccine candidates.

**Conclusion:** Development of *K. pneumoniae* candidate vaccine antigens to be administered either as a DNA or subunit vaccine will need to be pursued in the near future. Either a single antigen or a combination of antigens could serve as the potential vaccine against *K. pneumoniae*. The most promising vaccine candidates will have to be selected based on their surface accessibility to bactericidal antibodies, their frequency of occurrence in clinical isolates and their protection efficacy upon challenge with *K. pneumoniae* in animal models.

#### P49

### Inhibition of *Klebsiella pneumoniae* Gene Expression and Growth Using Antisense Peptide Nucleic Acids

**P. KURUPATI<sup>1</sup>, CL POH<sup>1</sup>**

<sup>1</sup>Microbiology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** *Klebsiella pneumoniae* causes common and severe hospital and community-acquired infections with a high incidence of drug resistance. The emergence and spread of *K. pneumoniae* extended-spectrum  $\beta$ -lactamase (ESBL) strains highlight the need to develop new therapeutic strategies. The ability of antisense technology to selectively disrupt gene function remains a critical element in elucidating information regarding genes that are essential for bacterial growth and pathogenesis. Peptide nucleic acid (PNAs) possesses many properties of a good antisense agent for developing gene therapeutic drugs.

**Methods:** Unfortunately, bacteria lack RNAi mechanisms and conventional oligonucleotides are not taken up efficiently. However, in *Escherichia coli*, efficient and gene-specific antisense knock down is possible using antisense PNAs attached to carrier peptides (KFFKFFKFFK). Carrier peptides can enter a range of microbial species, and in this study we asked whether peptide-PNAs could mediate antisense effects in *K. pneumoniae*.

**Results:** Using low micromolar concentrations we observed dose- and sequence-dependent inhibition of the reporter genes  $\beta$ -galactosidase and green fluorescence protein. Also, antisense peptide-PNAs targeted to the essential gene, *gyrA* and *ompA* were growth-inhibitory. Control peptide-PNAs were much less effective, and sequence alterations within the PNA and target mRNA sequences reduced or eliminated inhibition.

**Conclusion:** Further development is needed to raise the antibacterial potential of PNAs, but the present results show that the approach can be used to study gene function and requirement in this important pathogen. However, judging from the very promising results published within the past year and from our work, there is every reason to believe that PNAs will quickly enter the fields of antisense, anti-gene technology and drug development.

#### P50

### Mitochondrial D-loop Sequence Variations in Childhood Acute Lymphoblastic Leukaemia Differ from Healthy Controls and Between Prognostic Subgroups

**C KWOK<sup>1</sup>, CY SHEE<sup>2</sup>, SKH TAY<sup>1</sup>, AEJ YEOH<sup>1</sup>**

<sup>1</sup>Paediatrics, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Natural Sciences and Science Education, Nanyang Technological University, Singapore

**Aim:** The polymorphic D-loop control region of mitochondrial DNA has been extensively studied in adult cancers but not in childhood malignancies. As acute lymphoblastic leukaemia (ALL) is the most common childhood cancer, we studied D-loop polymorphisms in children with different subgroups of ALL compared to normal controls to explore their significance.

**Methods:** The D-loop was sequenced at positions 30-407 and 16025-16350 in 60 healthy children and 60 childhood ALL patients, then aligned against the revised Cambridge sequence (rCs). Phylogenetic analysis was performed with MEGA 3.0.

**Results:** ALL patients exhibited fewer polymorphisms ( $7.70 \pm 2.6$  vs  $8.65 \pm 2.7$ ,  $P = 0.05$ ) than healthy controls, and as a group had more conserved nucleotides (623/735 vs 595/735,  $P = 0.06$ ). HR patients (with 3.2 times increased risk of relapse,  $P = 0.04$ ) had fewer polymorphisms ( $7.53 \pm 3.0$  vs  $9.13 \pm 2.2$ ,  $P = 0.03$ ) than those with lower risk. Interestingly T-ALL patients were significantly more likely than either precursor-B ALL or controls to have the T16189C polymorphism ( $P = 0.0004$ , OR = 9.43), whereas precursor-B ALL patients were more likely to have nucleotide A249 deleted ( $P = 0.03$ , OR = 8.2).

**Conclusion:** This is the first study of mitochondrial polymorphisms in childhood ALL, showing that ALL patients differ from healthy children in number and type of D-loop polymorphisms. We identified 2 polymorphisms that are highly predictive of ALL lineage, which could be used as a diagnostic aid. Interestingly, fewer deviations from the rCs were found in high-risk ALL patients. Our study suggests that in childhood ALL, unlike solid tumours, fewer polymorphisms in the regulatory D-loop may be linked to inhibition of apoptosis and resistance to chemotherapy.

#### P51

### A Rat Model of Minimal Change Nephropathy Induced by Interleukin-13 Gene Overexpression

**KWLAI<sup>1</sup>, CL WEI<sup>1</sup>, LK TAN<sup>1</sup>, PH TAN<sup>2</sup>, GSC CHIANG<sup>2</sup>, SC JORDAN<sup>1</sup>, HK YAP<sup>1</sup>**

<sup>1</sup>Paediatrics, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Pathology, Singapore General Hospital, Singapore

**Aim:** IL-13 has been implicated in the pathogenesis of minimal change nephrotic syndrome. This study aimed to investigate the role of IL-13 on the development of proteinuria and expression of podocyte-specific genes associated with nephrotic syndrome.

**Methods:** IL-13 was overexpressed in Wistar rats through transfection of a mammalian expression vector cloned with the IL-13 gene, into the quadriceps by in vivo electroporation. Serum IL-13, albumin, cholesterol, creatinine and urine albumin were measured serially. Kidneys were harvested after day 70

for histology and electron microscopy (EM). Glomerular gene expression of nephrin, podocin, dystroglycan, B7-1 and IL-13 receptor subunits were examined using real-time PCR with hybridisation probes. Protein expression of these molecules was determined by immunofluorescence staining.

**Results:** The IL-13-transfected rats (n = 41) showed significant albuminuria ( $0.36 \pm 0.37$  vs  $3.45 \pm 0.89$  mg/24 hours,  $P < 0.001$ ), hypoalbuminaemia and hypercholesterolaemia ( $1.72 \pm 0.05$  vs  $3.39 \pm 0.34$  mmol/L,  $P < 0.001$ ) when compared to control rats (n = 17). No significant histological changes were seen in glomeruli of test rats. However, EM showed up to 80% of podocyte foot process fusion. Glomerular gene expression (mean  $\pm$  SEM) was significantly upregulated for IL-4R $\alpha$  ( $0.007 \pm 0.001$  vs  $0.010 \pm 0.001$ ,  $P < 0.05$ ), IL-13R $\alpha$ 2 ( $0.015 \pm 0.008$  vs  $0.075 \pm 0.035$ ,  $P < 0.05$ ) and B7-1 ( $0.005 \pm 0.001$  vs  $0.011 \pm 0.001$ ,  $P < 0.05$ ), but downregulated for nephrin ( $0.163 \pm 0.025$  vs  $0.090 \pm 0.013$ ,  $P < 0.05$ ), podocin ( $0.254 \pm 0.045$  vs  $0.141 \pm 0.022$ ,  $P < 0.05$ ) and dystroglycan ( $0.020 \pm 0.003$  vs  $0.010 \pm 0.001$ ,  $P < 0.05$ ). Immunofluorescence staining intensity was reduced for nephrin and podocin but increased for B7-1 and IL-4R $\alpha$  in IL-13-transfected rats compared to controls.

**Conclusion:** These results suggest that IL-13 over-expression could lead to podocyte injury with downregulation of nephrin, podocin and dystroglycan genes, and a concurrent upregulation of B7-1 in the glomeruli, inducing a nephropathy characterised by increased proteinuria, hypoalbuminaemia and hypercholesterolaemia.

## P52

### Preparation of Tissue Culture Media for Accurate Colorimetric Quantitation of Collagen Type I and II

**R LAREU<sup>1</sup>, M RAGHUNATH<sup>2</sup>, S JOSHI<sup>3</sup>**

<sup>1</sup>Orthopaedic Surgery, <sup>2</sup>Biochemistry, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>3</sup>Bioengineering, National University of Singapore, Singapore

**Aim:** Quantitation of different collagens in tissue and cell culture is important for the assessment of engineered tissue (chondrocyte transplants, tendon constructs) and monitoring fibrotic processes. Employing the popular Sircol Collagen Assay (SCA), we realised that the recommended and widely used assay conditions are flawed by interference from non-collagenous proteins resulting in the dramatic overestimation of collagen. We developed a simple purification procedure that removes interfering non-collagenous proteins from culture medium and tissue samples prior to quantitation by SCA.

**Methods:** Culture medium containing 2.5% to 10% fetal calf serum (FCS) was spiked with collagen I and collagen II standards (125 to 500  $\mu$ g/mL). Step 1: Non-collagenous proteins were broken down using limited pepsin digestion. Step 2: Fragmented non-collagenous proteins were separated from intact collagen by ultrafiltration using Microcon YM100 units in a microcentrifuge. Step 3: The retentate was diluted twice with 0.05 M acetic acid and subjected to subsequent spinning steps. The final retentate was analysed using a standard protocol for the SCA and by quantitative SDS-PAGE to assess recovery rates for collagen standards.

**Results:** FCS and its major constituent, serum albumin, interferes severely with SCA, even at 2.5% and even after pepsin digest. We initially purified collagen from the samples with a recovery rate of 70% but recent data suggest that a 90% recovery can be achieved.

**Conclusion:** SCA, the easiest quantitative collagen assay available, is more vulnerable to interfering proteins than hitherto known. Our method overcomes these obstacles and allows us to obtain meaningful results with SCA.

## P53

### LuxS/autoinducer-2 (AI-2) Quorum Sensing Molecule Regulate Transcriptional Virulence Genes Expression in *Clostridium difficile*

**ASY LEE<sup>1</sup>, KP SONG<sup>1</sup>**

<sup>1</sup>Microbiology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** Quorum sensing is the cell density-dependent regulation of gene expression involving signalling molecules termed autoinducers (AIs). Coordinated regulation of diverse phenotypes, such as bioluminescence, virulence and biofilm formation by AIs in different bacterial populations is crucial for survival and colonisation. *Clostridium difficile* causes antibiotic-associated diarrhoea, and the more severe, pseudomembranous colitis (PMC) as a result of cell density-dependent production of toxins. It produces a "universal" luxS-dependent signaling molecule called autoinducer-2 (AI-2) in a growth phase-dependent manner. It is of interest to determine the functional roles of AI-2 in *C. difficile*.

**Methods:** *Escherichia coli* transformants carrying pGEM-T-luxScd or pGEM-T were created. AI-2+ and AI-2- cell-free supernatants prepared from the respective transformants were monitored for AI-2 activity using the *V. harveyi* BB170 bioluminescence assay. Early-log phase *C. difficile* cells which do not produce AI-2 were exposed to the cell-free supernatants for 1 hour. DNA-free total RNA extracted from the cells was used for quantitative real-time RT-PCR to determine the relative mRNA abundance of virulence genes. Toxin A levels in the supernatant was measured using the *C. difficile* TOX-A ELISA kit.

**Results:** AI-2+ cell-free supernatant from *E. coli* expressing luxScd upregulated the transcript levels of tcdA (7- to 10-fold), tcdB (4- to 6-fold), tcdE (2- to 3-fold) and fbp68 (4-fold) in early-log *C. difficile*. In contrast, no induction occurred when cells were exposed to sterile medium or to AI-2- cell-free supernatant. AI-2 did not significantly increase the level of toxin A production in early-log *C. difficile*.

**Conclusion:** LuxS/AI-2-signaling in *C. difficile* controls virulence gene expression at the transcriptional level.

## P54

### Herbs Used in Traditional Chinese Medicine Caused Cancer Cell Death

**HC LEE<sup>1</sup>, YK LEE<sup>1</sup>**

<sup>1</sup>Microbiology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** Besides being a complementary medicinal drug, traditional chinese medicine (TCM) has been widely used in the prevention and treatment of cancer. Colon cancer, one of the top-ranking cancers in the world, has caused many deaths in the past years. With an increased incidence of colon cancer, we were interested to find out the effects of and mechanisms by which TCM worked at different stages of colon cancer.

**Methods:** Cell culture, flow cytometry, Annexin-PI staining, and lactate dehydrogenase cytotoxicity assay.

**Results:** HCT116, Caco-2, HT-29 and CRL-1790 colon cells were treated with a combination of 10 herbs as well as individual herbs. Enhanced cell death was observed in all cells when treated with combined herbs. Elevated level of cell death was measured in HCT116, a colorectal carcinoma cell line, when treated with combined herbs as well as *Radix Actinidae Chinensis* and *Herba Sarandrae*. Synergistic effect was observed in HCT116 when treated with combination of *Radix Actinidae Chinensis* and *Herba Sarandrae*. Combinatorial effects exerted by individual herbs on Caco-2 correspond to cell death observed when treated with combined drugs. CRL-1790 and HT-29 showed little or no effect when treated with individual herbs, which could indicate that the herbs could only exert their effects via some chemical interactions between the herbs.

**Conclusion:** In conclusion, individual and herbal concoctions showed different effects on normal and cancer cells. Cells at different phases in colon cancer had differing responses to various herbs tested giving an indication of the potential therapeutic effects exerted by the herbs.

## P55

**To Determine if Mycophenolic Acid can Improve Renal Function in Liver Transplant Recipients with Calcineurin Inhibitor (CNI) Induced Renal Impairment**YM LEE<sup>1</sup>, M DA COSTA<sup>2</sup>, MO AUNG<sup>1</sup>, K MAK<sup>3</sup>, J ISAAC<sup>4</sup>, SG LIM<sup>1</sup>, KH LEE<sup>1</sup><sup>1</sup>Medicine, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Medicine, National University Hospital, Singapore, <sup>3</sup>Surgery, Alexandra Hospital, Singapore, <sup>4</sup>Surgery, National University of Singapore – Yong Loo Lin School of Medicine, Singapore**Aim:** To determine if mycophenolic acid can improve renal function in liver transplant recipients with calcineurin inhibitor (CNI)-induced renal impairment.**Methods:** Adult liver transplant recipients with post-transplant renal impairment due to CNI were studied. Inclusion criteria included creatinine clearance test (CCT) of less than 75 mL/min, stable graft function and no acute rejection in the last 3 months. Patients with other renal diseases or serious gastrointestinal problems were excluded. They received either mycophenolate sodium 720 mg or 1000 mg mycophenolate mofetil orally BID with 50% reduction or discontinuation of CNI. Primary endpoint was an increase in CCT at 6 months. Secondary endpoints included side effects, rejection episodes and reduction in serum creatinine. Statistical tests used included Wilcoxon signed rank test and Fisher's exact test. *P* values of <0.05 were considered significant**Results:** There were 8 patients with a mean age of 62 years. Median period of treatment was 13 (range, 10 to 57) months. Three received monotherapy and 5 a combination of MPA with a reduced dose of CNI. There was no improvement in mean CCT (34 versus 33.1 mL/min, *P* = 0.7) or mean serum creatinine at the end of 6 months (165 mmol/L versus 173 umol/L, *P* = 0.44). Acute rejection occurred in 1 patient who responded to steroid treatment. Six patients (75%) experienced gastrointestinal side effects. One patient had anaemia requiring epoetin alfa.**Conclusion:** Mycophenolic acid does not improve renal function and is poorly tolerated in Asian liver transplant recipients with CNI-induced renal impairment.

## P56

**Model End-stage Liver Disease (MELD) may be the Better System for Organ Allocation in Liver Transplantation Patients in Singapore**YM LEE<sup>1</sup>, M FERNANDES<sup>2</sup>, M DA COSTA<sup>2</sup>, KH LEE<sup>1</sup>, DS SUTEDJA<sup>2</sup>, J ISAAC<sup>3</sup>, SG LIM<sup>1</sup><sup>1</sup>Medicine, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Medicine, National University Hospital, Singapore, <sup>3</sup>Surgery, National University of Singapore – Yong Loo Lin School of Medicine, Singapore**Aim:** The MELD score is a good predictor of mortality on the liver transplant waiting list and is the current system of organ allocation in USA. However, a higher MELD may be associated with poorer outcome post liver transplantation. The aim was to determine if MELD should be implemented as the system for organ allocation for liver transplantation in Singapore.**Methods:** There were 46 adult patients who underwent primary liver transplantation at the National University Hospital, Singapore from January 1996 to December 2002. We applied the MELD to patients who were transplanted and looked for a correlation with survival post transplant. Patients were followed up to the most recent visit or death. Survival analysis was performed using Cox regression and Kaplan-Meier method**Results:** The mean age at transplant was 52.7 (SD 2.34). The majority of the patients transplanted had Hepatitis B (43%). The median MELD score at transplantation was 17 (range, 7-42) and the median Child's score was 11 (range, 6-15). There was a significant correlation between pre-transplant MELD and survival at 6 months (*P* = 0.037, 95% CI 1.004-1.13) but not at 1 year (*P* = 0.065, 95% CI 0.99-1.12). There were no differences in the pre-transplant MELD (OR 1, 95% CI 0.9-1) as well as survival for patients with and without hepatitis B (HR 0.72, 95% CI 0.22-2.35).**Conclusion:** MELD allows livers to be allocated to the patients with the greatest medical urgency but its influence on post-transplant survival should be further clarified so that post transplant survival is not compromised.

## P57

**Tamoxifen, Oestrogens and Anti-oestrogens Regulation of a Uterine- and Ovarian-specific Protein, UO-44, that is Overexpressed in Ovarian Tumours**C LEONG<sup>1</sup>, CK ONG<sup>1</sup>, HT NGUYEN<sup>2</sup>, SK TAY<sup>3</sup>, H HUYNH<sup>2</sup><sup>1</sup>Pharmacology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Research Divisions - Cellular & Molecular Research, National Cancer Centre, Singapore, <sup>3</sup>Obstetrics & Gynaecology, Singapore General Hospital, Singapore**Aim:** Ovarian cancer is the sixth most common cause of cancer death in Singapore. We recently isolated a uterine and ovarian specific gene UO-44, which was highly expressed in ovarian tumours. The objective of this study was to determine the role of UO-44 in the initiation and progression of ovarian and uterine cancers.**Methods:** Cellular proliferation assays were performed using NIH-OVCAR3 ovarian cancer cells cultured in the presence of polyclonal HuUO-44 antiserum. One-step RT-PCR was performed on the uteri collected from ovariectomised rats treated with tamoxifen, estrogen ( $\beta$ -oestradiol) and pure anti-oestrogen (ICI182780).**Results:** UO-44 transcript was found highly expressed in the majority of ovarian tumours examined (80%, 12 out of 14). More importantly, a marked loss in cell attachment and proliferation was observed in NIH-OVCAR3 cells cultured in the presence of a polyclonal human UO-44 antiserum. Real-time PCR of rat UO-44 demonstrated that the expression of the gene was inducible by oestrogen and tamoxifen, but suppressed by pure anti-oestrogens. Real-time and 1-step RT-PCR determined that this induction and suppression of UO-44 expression was the result of a differential expression of 4 novel UO-44 variants.**Conclusion:** The human UO-44 antiserum was shown to inhibit ovarian cancer cell attachment and proliferation, which suggested that UO-44 is involved in cell motility. Importantly, we have discovered that the regulation of UO-44 expression was due to the differential expression of the 4 alternatively spliced variants. This controlled switching to specific splicing alternatives may occur during tumour progression and could play an important role in ovarian and uterine carcinogenesis.

## P58

**Elucidation on the Influence of Sec3p Protein on West Nile Virus Replication**J LI<sup>1</sup>, B RAGHAVAN<sup>1</sup>, TTT TAN<sup>2</sup>, ML NG<sup>1</sup><sup>1</sup>Microbiology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Students - Faculty of Science, National University of Singapore - Staff & Student - Office of Life Sciences, Singapore**Aim:** The objective of this study was to investigate the significance of the interaction between the West Nile virus (WNV) capsid protein and the host exocyst component, sec3p. The study includes elucidation on the importance of this interaction in terms of infectious virus replication cycle.**Methods:** Yeast Two-hybrid (Y2H) library screening using human brain cDNA library was used to screen for host proteins that interacted with WNV capsid. Lentivirus-based gene knock-down technique was employed to generate Sec3p knock-down A172 and 293FT cell lines. Real-time PCR was used to confirm the knock-down of Sec3p. Infection of Sec3p knock-down cells with WNV was carried out and virus infectivity was evaluated by plaque assay, growth kinetics and immunofluorescence.**Results:** No intrinsic or non-specific activation for Sec3p was observed. This confirms that the interaction is authentic in yeast system. Stable Sec3p knock-down 293FT and A172 cell lines have been successfully established and no observable effects of sec3p deletion on the cell viability were observed. Confirmation of Sec3p knock-down was carried out by real-time PCR. Preliminary infection of Sec3p knock-down cells with West Nile virus

indicated that deletion of Sec3p brings about an earlier onset of cytopathic effects (CPE) in the cells and the progeny virus particles are still infectious.

**Conclusion:** Sec3p forms part of the exocyst complex that plays an important role in regulating the docking of exocystic vesicles. This may implicate Sec3p as the host protein that aids the recruitment of virus nucleocapsid to the plasma membrane for virus assembly.

## P59

### Identification of a Novel Protein Responsible for TNF- $\alpha$ -induced Cell Signalling Cascade by 2-Dimensional Gel Electrophoresis

WP LIAO<sup>1</sup>, FWS WONG<sup>1</sup>

<sup>1</sup>Pharmacology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** The inflammatory and remodeling processes that underlie asthma result from a highly complex interaction between various cell types and cytokines. Apart from inflammatory cells, resident cells such as fibroblasts are also proposed to play critical roles in inflammation and tissue repair. The present study investigated differential protein profiling in TNF- $\alpha$ -stimulated lung fibroblasts.

**Methods:** Total proteins from both cell lysates and supernatants of normal human lung fibroblasts (NHLFs) and of TNF- $\alpha$ -stimulated NHLFs were separated by 2-dimensional gel electrophoresis (2-DE), and proteins with significant changes in expression levels were identified by MALDI-TOF mass spectrometry and MS/MS. RT-PCR was further applied to confirm the proteomics findings.

**Results:** Several proteins were consistently upregulated by TNF- $\alpha$ . These included cell protective proteins: antiviral MxA GTPase, ubiquitin-like protein ISG-15, serine proteinase inhibitor PAI-2 and anti-oxidant protein MnSOD; and potential airway remodeling proteins: prolyl hydroxylase (PH) a subunit, lysyl hydroxylase 2, isoform A (LH2a) and matrix metalloproteinase 1 (MMP-1). A novel protein (NP) was found to be induced in fibroblasts by TNF- $\alpha$ , which could be blocked by interferon regulatory factor 1 (IRF-1) antisense oligodeoxynucleotide (ASO), suggesting its induction is dependent on IRF-1. Using ASO targeting at the NP resulted in significant inhibition of TNF- $\alpha$ -induced downstream inflammatory targets VCAM-1, ICAM-1, MCP-1 and IL-6, indicating that NP may be important in TNF- $\alpha$ -stimulated inflammatory response.

**Conclusion:** These results reveal that Th1 cytokine TNF- $\alpha$ , which is increased in asthmatic airway, can induce major alterations in global protein expression in lung fibroblasts, leading to airway inflammation and remodeling.

## P60

### Modulation of In Vivo Hippocampal-medial Prefrontal Cortex Long-term Potentiation by Locus Coeruleus Stimulation and Noradrenergic Drugs

A LIM<sup>1</sup>, CH TAN<sup>1</sup>, G DAWE<sup>1</sup>

<sup>1</sup>Pharmacology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** Projections from the hippocampus to medial prefrontal cortex (mPFC) are involved in many cognitive functions including working memory. The mPFC is innervated by the locus coeruleus (LC). Noradrenaline from the LC has been suggested to play a role in working memory. This study was conducted to examine the effects of electrical stimulation of the LC and systemic noradrenergic agents on synaptic plasticity in the rat hippocampal-medial prefrontal cortical (HPC-mPFC) pathway in vivo.

**Methods:** Field potentials evoked by stimulation of the CA1/subicular region of the hippocampus were recorded in the mPFC of chloral hydrate-anaesthetised rats. In the LC stimulation study, electrodes were implanted to stimulate the LC at a frequency shown to evoke noradrenaline release in the mPFC. In the pharmacological study, the animals were given clonidine (1 mg/kg) (an  $\alpha_2$ -adrenoceptor agonist), nisoxetine (1 mg/kg) (a noradrenaline re-uptake inhibitor) or saline via intraperitoneal injection 20 minutes prior to induction of long-term potentiation (LTP).

**Results:** A single burst of stimulation to the LC increased the amplitude of

HPC-mPFC field potentials ( $119 \pm 4\%$ ) for up to 30 min. When LC was stimulated prior to a single tetanus of the hippocampus, LTP was enhanced ( $166 \pm 7\%$ ) when compared to that obtained without prior stimulation ( $138 \pm 4\%$ ). In the pharmacological study, 2 series of tetanus applied to the hippocampus induced LTP in the saline-injected group ( $174 \pm 6\%$ ). Nisoxetine resulted in the enhancement of LTP ( $241 \pm 13\%$ ). LTP was disrupted in the clonidine-treated group ( $111 \pm 4\%$ ).

**Conclusion:** These results suggest that the LC may modulate synaptic plasticity at the HPC-mPFC synapse in vivo.

## P61

### The Role of CD38 in Thioacetamide-induced Damage in Murine Liver

CS LIM<sup>1</sup>, CF CHANG<sup>1</sup>

<sup>1</sup>Biochemistry, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** CD38 synthesises cyclic ADP-ribose (cADPR) that induces Ca<sup>2+</sup> release from intracellular stores and is known to partake in the production of pro-inflammatory and regulatory cytokines. In the current study, we aim to understand the role of CD38 in liver damage. TNF- $\alpha$ , which was previously shown to enhance CD38 expression in airway smooth muscle cells in order to regulate the expression of inflammatory genes, was also examined.

**Methods:** Thioacetamide-induced hepatotoxicity will be used as the disease model for liver damage. CD38<sup>+/+</sup> and CD38<sup>-/-</sup> male mice were injected with 6.6 mmol/kg body weight. Blood and liver were collected at 0, 24, 48 and 72 h. Semi-quantitative RT-PCR was done to examine the level of expression of CD38 and TNF- $\alpha$ . ALT and AST as well as histopathological examination of the liver were also assessed to ascertain the extent of damage in both mice. DNA microarray and RT-PCR analyses were done at 48 h to examine the possible involvement of other genes in thioacetamide-induced liver damage.

**Results:** In CD38<sup>+/+</sup> mice, CD38 expression was upregulated at 48 and 72 h while TNF- transcript expression also increased in both CD38<sup>+/+</sup> and CD38<sup>-/-</sup> mice. Preliminary result showed a higher level of ALT and AST in CD38<sup>+/+</sup> than CD38<sup>-/-</sup> mice, which will be further confirmed with histopathology. At the later stage of induction, both levels of the markers decreased, which indicated liver regeneration. Microarray analysis also showed altered transcript expression in both mice.

**Conclusion:** These studies suggest that CD38 plays a role in liver damage, in particular to the regeneration process.

## P62

### Trends in Sales of Inhaled Corticosteroids and Asthma Outcomes – Data from Singapore

DL LIM<sup>1</sup>, XS WANG<sup>2</sup>, S MA<sup>3</sup>, SK CHEW<sup>3</sup>, J CUTTER<sup>3</sup>, TK LIM<sup>4</sup>, BW LEE<sup>2</sup>

<sup>1</sup>The Children's Medical Institute, National University Hospital, Singapore, <sup>2</sup>Paediatrics, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>3</sup>Ministry of Health, Singapore, <sup>4</sup>Medicine, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** Asthma has become a major health problem in Singapore. The use of inhaled corticosteroids (ICS) has been shown to be associated with decreased rates of both hospitalisations and deaths. Conversely, increased use of short-acting  $\beta_2$  agonists (SABA) have been associated with increased morbidity and mortality. This study assessed the possible relationship between the changes in the use of ICS and SABA with asthma hospitalisations and mortality in Singapore.

**Methods:** We performed an ecological population-based study from 1994 to 2002 amongst patients aged 5 to 64 years in Singapore. Figures on asthma-related mortality and hospitalisations were obtained from the Ministry of Health, Singapore. Data on the sales of inhaled corticosteroids and short-acting  $\beta_2$  agonists were obtained from IMS Health, Singapore. A Poisson regression analysis was carried out for estimation and significance testing.

**Results:** From 1994 to 2002, asthma-related deaths and rates of hospitalisations both declined. Rising trends for sales of inhaled corticosteroids and short-acting  $\beta_2$  agonists were observed. Poisson regression analysis confirmed the negative correlation between the use of ICS and both asthma mortality and hospitalisation ( $P < 0.05$ ). However, the correlation with the use of SABAs was not significant in the same model.

**Conclusion:** Our study supports current evidence that increase in ICS use has a positive impact on asthma-related morbidity and mortality in our population. This phenomenon is likely to be universal and without exception, and highlights the importance of ICS prophylaxis as the most cost-effective form of asthma therapy available today.

### P63

#### Periodontal Health Status of Adults in Singapore – Findings of 2003 Adult Oral Health Survey

LP LIM<sup>1</sup>, ML WONG<sup>2</sup>, FBK TAY<sup>3</sup>, M ONG<sup>4</sup>, M GUNARATNAM<sup>5</sup>, SP CHAN<sup>6</sup>

<sup>1</sup>Preventive Dentistry, National University of Singapore - Faculty of Dentistry, Singapore, <sup>2</sup>Dental, Health Promotion Board, Singapore, <sup>3</sup>Dental Service, Alexandra Hospital, Singapore, <sup>4</sup>Restorative Dentistry, National Dental Centre, Singapore, <sup>5</sup>Private Practice, General Practice, Singapore, <sup>6</sup>Statistics, Health Promotion Board, Singapore

**Aim:** In 2003, the Health Promotion Board conducted an Adult Oral Health Survey to establish the oral health status of the Singaporean adult population. The findings provided useful insights into measures that could be recommended to improve the oral health status of the adult population. As part of this survey, the periodontal health of the adults was assessed.

**Methods:** 1,474 adults, aged  $\geq 20$  years old, were randomly selected based on a stratified sampling framework to participate in the study. Half-mouth periodontal examinations were carried out using the CPI probe. The severity of periodontal disease was assessed according to the CPI criteria. Teeth were also examined for the presence of dental plaque, bleeding on probing, supra- and subgingival calculus. The data were analysed with Stata 7.0 and all statistical tests were conducted at 5% level of significance.

**Results:** Over 90% of the population presented with some form of periodontal disease (CPI score 1 – CPI score 4). 60.8% of those examined had CPI score 3 and above. 13.8% had at least 1 tooth displaying CPI score 4. Periodontal disease was found to be more severe among males, the older age groups and individuals with lower educational status. The mean percentage of teeth showing presence of plaque, bleeding on probing, supra- and subgingival calculus were 46.3%, 55.0%, 33.0% and 55.5% respectively.

**Conclusion:** The high prevalence of periodontal disease among the adult population highlights a need for oral health programmes to improve the periodontal health status in the community. This study was supported by the Health Promotion Board, Singapore

### P64

#### Outcome of Lamivudine-resistant Hepatitis B Virus is Generally Benign Except in Cirrhotics

SG LIM<sup>1</sup>, CT WAI<sup>1</sup>, YM LEE<sup>2</sup>, DS SUTEDJA<sup>1</sup>, BL SEET<sup>3</sup>, YY DAN<sup>1</sup>  
<sup>1</sup>Medicine, National University Hospital, Singapore, <sup>2</sup>Medicine, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** Factors that predict the clinical outcome of lamivudine resistance in patients with chronic hepatitis B are not well established. We set out to determine factors that determine clinical severity after development of resistance.

**Methods:** Thirty-five Asian patients with genotypic lamivudine resistance were analysed in 3 groups: 13/35 (37%) were non-cirrhotics with normal pre-treatment ALT (Group IA), 12/35 (34%) were non-cirrhotics with elevated pre-treatment ALT (Group IB), and 10/35 (29%) were cirrhotics (Group II). Patients were followed for a median of 98 weeks (range, 26-220) after emergence of genotypic resistance.

**Results:** Group IA patients tended to retain normal ALT. Group IB patients showed initial improvement of ALT with lamivudine but 9/12 patients (75%)

developed abnormal ALT subsequently. On follow-up however, this persisted in only 33%. Group II patients also showed improvement while on treatment, but they deteriorated with emergence of resistance with 30% death from decompensated liver disease. Pretreatment ALT levels and CPT score (in the cirrhotic group) were predictive of clinical resistance and correlated with peak ALT levels and CPT score.

**Conclusion:** The phenotype of lamivudine-resistant hepatitis B virus correlated with the pretreatment phenotype. The clinical course was generally benign in non-cirrhotics.

### P65

#### A Randomised Placebo Controlled Trial of Thymosin Alpha-1 and Lymphoblastoid Interferon for HBeAg+ Chronic Hepatitis B

SG LIM<sup>1</sup>, CT WAI<sup>1</sup>, YM LEE<sup>2</sup>, DS SUTEDJA<sup>1</sup>, CC LIM<sup>3</sup>, KM FOCK<sup>4</sup>, SM ISHAQUE<sup>5</sup>  
<sup>1</sup>Medicine, National University Hospital, Singapore, <sup>2</sup>Medicine, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>3</sup>Medicine, Tan Tock Seng Hospital, Singapore, <sup>4</sup>Medicine, Changi General Hospital, Singapore, <sup>5</sup>Department of Gastrointestinal Liver & Pancreatic Disease, Bangabandhu Sheikh Mujib Medical University, Bangladesh

**Aim:** To determine if combination therapy with interferon and thymosin was superior to interferon alone.

**Methods:** This was a double-blind, randomised, placebo-controlled trial of lymphoblastoid interferon (Wellferon<sup>®</sup>) 5 MIU 3 times per week compared to the addition of thymosin alpha-1, 1.6 $\mu$ g 3 times per week for 24 weeks (combination) with thymosin placebo (monotherapy) for the same period. Entry criteria included positive HBeAg, ALT  $\geq 1.5 \leq 10$  x ULN, positive HBV DNA, absence of cirrhosis, treatment naivety and no co-morbid factors. A total of 98 HBeAg positive patients were recruited, of which 48 were randomised to combination and 50 to monotherapy. The primary endpoint was loss of HBeAg at 72 weeks and secondary endpoints, HBeAg seroconversion, normalisation of ALT, loss of HBV DNA and improvement in histology.

**Results:** The HBeAg loss was 45.8% and 28.0% for combination and monotherapy respectively (difference, 17.8%; 95% CI, -1.2% to 35.3%,  $P = 0.067$ ). There was no statistically significant advantage to Combination with respect to time to HBeAg loss. There were also no statistically significant differences with respect to the secondary endpoints of HBeAg seroconversion, changes in histology, normalisation of ALT or loss of HBV DNA.

**Conclusion:** In conclusion, this trial showed a 17.8% improvement in HBeAg loss rates with combination over interferon monotherapy that could indicate a potential clinically important difference that would need confirmation in subsequent trials.

### P66

#### Referral Patterns and Waiting Time for Liver Transplantation in Singapore

SG LIM<sup>1</sup>, CT WAI<sup>1</sup>, DS SUTEDJA<sup>1</sup>, YM LEE<sup>2</sup>, CK TAN<sup>3</sup>, KC TAN<sup>4</sup>, J ISAAC<sup>5</sup>  
<sup>1</sup>Medicine, National University Hospital, Singapore, <sup>2</sup>Medicine, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>3</sup>Gastroenterology, Singapore General Hospital, Singapore, <sup>4</sup>Asian Liver Centre, Gleneagles Hospital, Singapore, <sup>5</sup>Surgery, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** To review the referral patterns, waiting times, waiting list, and mortality of patients referred to the Singapore National Liver Transplant Programme.

**Methods:** All patients referred to the National Liver Transplant Programme since its inception were captured in an electronic database. Data on waiting times, UNOS status, and outcomes were retrieved and analysed.

**Results:** Five hundred and sixty-two patients were referred for liver transplant evaluation from 1990 to 2004 – 457 adults and 105 children. The main indications for referral were hepatitis B liver disease and hepatocellular carcinoma in adults, and biliary atresia in children. Most patients were of UNOS status 3 or 4, at the time of referral. One hundred and fourteen

(20.28%) patients were transplanted: 66 adults (14.44%) and 48 (45.71%) children. One hundred and thirty-eight adults and 10 children were rejected for transplant, mainly for the reason of being "too early". The median waiting time for adults who were transplanted was 3.26 months whilst adults still on the waiting list had been waiting for 16.15 months. The overall waiting list mortality was 44.3%, being 52.5% in adults and 23.2% in children.

**Conclusion:** The overall transplantation rate is low and waiting list mortality high as a result of low availability of organs, particularly in adults. Paediatric liver transplant appears to have been better at dealing with referred patients but this is probably due to living related liver transplant. Improvement in these may result from the Human Organ Transplant Act.

## P67

### Asthma Deaths in Singapore: Recent Trends and Ethnic Differences

**TK LIM<sup>1</sup>, THE SINGAPORE NATIONAL ASTHMA PROGRAMME<sup>2</sup>**  
<sup>1</sup>Medicine, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Medicine, National University Hospital, Singapore

**Background:** Asthma deaths in Singapore were ranked in the WHO/GINA report on the global burden of asthma (May 2004) as among the highest in the world, but this is based upon data reported in the early 1990s. This report describes the trends in asthma mortality in Singapore in the decade 1994-2004.

**Methods:** The basic data is from vital statistics registered with the Ministry of Health. Trends for age (all ages, 5-34 years and >65 years) and sex specific death rates were compared between Chinese, Malays and Indians.

**Results:** There was an average fall in mortality: -11.8% per year for all ages, -9.4% per year for 5-34 year olds and -13% per year for ≥65 year olds. For the index ages of 5-34 years, the mortalities, in general, fell among all 3 ethnic groups, but there were considerable short-term variations. There was a consistently higher mortality risk in Malay and Indian populations (5x to >10x) than the Chinese. Moreover, there is no sign that the inter-ethnic mortality gap had narrowed recently. In fact, it has increased further in the past 2 years. As a result, the asthma mortality rate among the Chinese ranks among the lowest risk countries in the world while Malays still suffer from the highest risk of asthma death in the world.

**Conclusion:** There has been an overall fall in deaths from asthma in the past decade. However, the mortality rate among Malays remains alarmingly high. This seems to have increased recently. Public education and asthma intervention programmes need to be directed more effectively at high-risk populations.

## P68

### Reduction of Hospital Stay and Cost after Implementation of Clinical Pathway for Radical Gastrectomy for Gastric Cancer

**ZL LIM<sup>1</sup>, HA LIN<sup>1</sup>**  
<sup>1</sup>Surgery, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** To evaluate the effectiveness of a proposed gastrectomy pathway as opposed to traditional perioperative management.

**Methods:** One hundred and fifteen patients presented to the general surgery department of the National University Hospital, Singapore, from the period of January 2000 to April 2005 who had primary gastric cancer and underwent gastrectomy were included in the study. The patients were categorised into pre-pathway or pathway group, which corresponded to the implementation of the gastrectomy pathway in August 2002. The pathway group consisted of 61 participants while the pre-pathway group had 54. Components of the pathway included surgical care, analgesia, physiotherapy and dietary therapy. The pre-pathway group of patients was given conventional management. Statistical analyses were made using chi-square test, student's *t*-test, and ANOVA test where relevant. *P* value of less than 0.05 was considered significant.

**Results:** There was a shorter total and postoperative length of stay in the pathway group as opposed to the pre-pathway group. There was reduced cost

in the pathway group with respect to the pre-pathway group. There was no significant increase in the mortality and morbidity rates with implementation of the pathway.

**Conclusion:** The implementation of a clinical pathway effectively reduces length of stay and cost for radical gastrectomy.

## P69

### Gastric Cancer in Singapore: Results from a Prospective Database at the National University Hospital (NUH) from 2001 to 2004

**HA LIN<sup>1</sup>, ZL LIM<sup>1</sup>, J SO<sup>2</sup>**  
<sup>1</sup>Surgery, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Surgery, National University Hospital, Singapore

**Aim:** To evaluate the epidemiological data of NUH patients prospectively from 2001 to 2004.

**Methods:** One hundred and fifty-one primary gastric cancer patients, who presented to the general surgery department of NUH, from January 2000 to December 2004, were included in the study. Each of the participants, upon presentation, was included in a prospective database. The data were then updated constantly with each subsequent medical management given to the patients. The items included in the prospective database were 1) basic demographics; 2) personal history; 3) clinical presentation; 4) diagnosis and treatment given; 5) operative and pathological findings; and 6) outcome of the patient. Statistical analyses were made using chi-square test, student's *t*-test, Mann-Whitney U test and ANOVA test where relevant. *P* value of less than 0.05 was considered significant.

**Results:** 1) There was significant difference in the presentation of gastric cancer with respect to the location. Proximal tumours had a greater tendency to present as dysphagia and loss of appetite while distal tumours presented more as pain and nausea (*P* < 0.05). 2) There was statistically an increase in incidence of gastric cardia cancer and a decrease in distal gastric cancer as suggested by some studies (*P* < 0.05). 3) There was positive correlation between Borrmann classification and cancer staging. A higher Borrmann classification corresponded to a more advanced stage (*P* < 0.001). 4) There was no significant change in postoperative complication rate over the period of 2001 to 2004.

**Conclusion:** Over the years, there has been a shift of tumour location from distal to proximal stomach, which affects the presenting symptoms. Borrmann classification correlated to cancer staging.

## P70

### Quantitative Proteomics using Cleavable Isotope-coded Affinity Tags for the Discovery of Colorectal Cancer Biomarkers

**QS LIN<sup>1</sup>, TK LIM<sup>1</sup>, T YOU<sup>1</sup>, SL LO<sup>1</sup>, SB JOSHI<sup>1</sup>, CN ONG<sup>2</sup>, CL HEW<sup>1</sup>**  
<sup>1</sup>Structural Biology and Proteomics Programme, National University of Singapore - Staff & Student - Office of Life Sciences, Singapore, <sup>2</sup>COFM, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** Colorectal cancer (CRC) is the second leading killer cancer worldwide. The present study aims to detect changes of protein profiles that could be associated with the process of colorectal tumourigenesis, in order to discover putative biomarkers for diagnosis, and potential therapeutic targets.

**Methods:** Cleavable isotope-coded affinity tag (cICAT) reagents were applied to label the protein extracts from 3 pairs of colorectal cancer and adjacent normal tissues. After trypsin digestion, the labelled peptides were purified by a cation-exchange column followed by an avidin affinity column. The biotin moiety was cleaved off from the labelled peptides and the peptides were further separated by 2-dimensional liquid chromatography and spotted onto MALDI target plates. A MALDI TOF/TOF mass spectrometer (MS) was used to analyse the plates and the proteins showed differences in expression levels were identified by MS/MS sequencing.

**Results:** Twelve proteins were up-regulated and 6 proteins were down-regulated by >50% among all 3 cancer samples. In addition, 44 proteins were up-regulated and 19 proteins were down-regulated in 2 out of the 3 samples. Among the up-regulated proteins were glycolysis pathway proteins, chaperons,



cytoskeleton components, transcription and translation machineries, indicating enhanced metabolism, stress response and cell growth. A large proportion of down-regulated proteins were plasma proteins, indicating deficient blood supply and hypoxia in tumours.

**Conclusion:** cICAT couple to MALDI TOF/TOF MS is an effective platform for protein biomarker discovery. The proteins identified can be potential biomarkers and/or drug targets after further validation.

## P71

### Cloning and Heterologous Expression of NF-Y Subunit A-like Protein from *Plasmodium falciparum*

**WJ LIN<sup>1</sup>, M CHAN<sup>1</sup>, D TAN<sup>1</sup>, TS SIM<sup>1</sup>**

<sup>1</sup>Microbiology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** Nuclear factor-Y (NF-Y) is a transcription factor that recognises and binds specifically to the CAT-box found in the promoter regions of genes. As a preliminary study to understand the fundamental gene regulation of malaria-causing parasite, PF13\_0043 encoding a putative NF-Y subunit A-like protein from *Plasmodium falciparum* was cloned and heterologously expressed.

**Methods:** Bioinformatics analysis was employed to identify a gene, possibly encoding for the A-subunit of NF-Y transcription factor in *P. falciparum*. Polymerase chain reaction was carried out to obtain amplified fragments of PF13\_0043. The fragment was cloned into the glutathione S-transferase (GST) expression vector pGEX-6P-1 and inserts were verified by cycle sequencing. IPTG induction of the *Escherichia coli* host containing the recombinant plasmid was carried out. Affinity chromatography method was employed to obtain purified fusion proteins.

**Results:** Conserved domain profile analysis of PF13\_0043 revealed the presence of a transcription factor CBF (CAT-box binding factor)/NF-Y domain. This domain is found mainly in histone-like transcription factors and postulated to be involved in protein-protein or protein-DNA interaction. The 459bp gene from *P. falciparum* was expressed solubly in the cell free extract of the *E. coli* host. The recombinant fusion protein exhibited a molecular weight (Mr) of 44kDa, consistent with the expected Mr of PF13\_0043 ORF (18kDa) together with a 26kDa GST tag.

**Conclusion:** Soluble expression of PF13\_0043 will facilitate examination of this protein using non-radiolabeled electro-mobility shift assay (EMSA) to determine its possible DNA binding ability.

## P72

### An Integrated Informatics Approach for Biomarker Discovery

**SL LO<sup>1</sup>, T YOU<sup>1</sup>, QS LIN<sup>1</sup>, S JOSHI<sup>1</sup>, MCM CHUNG<sup>2</sup>, CL HEW<sup>1</sup>**

<sup>1</sup>Structural Biology and Proteomics Programme, National University of Singapore - Staff & Student - Office of Life Sciences, Singapore, <sup>2</sup>Biochemistry, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** Onco-proteomics studies in search of human disease biomarkers generate high volume of data from the differential expression studies of diseased versus normal tissues. This poses a grand challenge to screening for useful targets with potential diagnostic and therapeutic functions. We present an integrated approach for biomarker discovery and validation based on the SPLASH system.

**Methods:** The integrated method includes gene ontology (GO) analyses, KEGG biochemical pathway analyses, plasma protein identification and statistical analyses for sample sets. GO provides systematic functional and localisation annotations while the statistical value from 2-sided Fisher's exact test is indicative of over- and under-representation for each category. Together with KEGG annotations, we put the biomarker discovery process in a pathway context. To screen for potential plasma biomarkers, we refer to the human plasma proteome to shortlist the candidate proteins.

**Results:** Application of this method to datasets from ICAT experiments of colorectal cancer has led to identification of a number of potential biomarkers that: 1) show consistent differential expressions in normal and tumorous

tissues; 2) have possible roles in tumorigenesis shown by GO and KEGG annotations; and, 3) are also found in the human plasma proteome.

**Conclusion:** This integrated approach revealed the biological meanings for proteomic datasets and successfully identified some potential biomarkers with a certain confidence. This exhibits the excellent applicability of SPLASH towards development of disease biomarkers.

## P73

### Molecular Analysis of Caudal Neural Tube Defects in Embryos of Diabetic Pregnancies

**WT LOH<sup>1</sup>, SSW TAY<sup>1</sup>, T DHEEN<sup>1</sup>**

<sup>1</sup>Anatomy, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** Congenital malformations in various organs including the neural tube are significantly increased in embryos of diabetic mothers. The present study attempted to understand the molecular mechanisms that contribute to neural tube defects in the caudal region.

**Methods:** Swiss Albino female mice were made diabetic with streptozotocin and mated with normal male mice. Embryos collected at embryonic day 11.5-13.5 were used for morphological and molecular analysis of neural tube malformations.

**Results:** Observations of transverse sections of E13.5 embryos from diabetic mothers revealed an open neural tube and architectural disruption of surrounding tissues. In addition, the development of dorsal root ganglia appeared to be impaired in embryos of diabetic mice. These changes have been characterised with various molecular markers by immunohistochemistry and in situ hybridisation. Differentiation of various cell types in the neural tube has also been observed to be altered. The mRNA expression of Olig2 involved in the development of oligodendrocytes seems to be increased in E11.5 embryos from diabetic mothers. Similarly, a change in the ratio between motor neurons and interneurons is expected from the morphologically disrupted open neural tube. Islet 1, a motor neuron marker, will be co-localised with an interneuron marker such as Pax 2. Cell proliferation index will be assayed using BrdU. Subsequently, expression levels of various genes involved in the development of various cell types in the caudal neural tube will be quantified by real-time RT-PCR.

**Conclusion:** The outcome from these experiments would provide better insights into the mechanisms involved in maternal diabetes-induced changes in spinal neurulation.

## P74

### Role of NER in Arsenite Induced Damage Protection and Telomere-mediated Chromosome Integrity

**G LOW<sup>1</sup>, AK KHAW<sup>1</sup>, P HANDE<sup>1</sup>**

<sup>1</sup>Physiology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** To elucidate the role of nucleotide excision repair (NER) pathway in sodium arsenite-induced damage protection and telomere-mediated chromosome integrity.

**Methods:** To study dose response, we used flow cytometric analysis to study effects of arsenite on the growth kinetics. We also studied genomic integrity following arsenite treatment using cytokinesis-micronuclei assay (CMNA) and fluorescence in-situ hybridisation (FISH). To compare proliferation rates between the treated cells and control cells, and between XPA cells and control cells, we studied the population doublings of the cells over time after arsenite treatment. Western blotting was utilised to check for upregulation of p53 which indicates p53 mediated cell cycle arrest. SuperArray analysis was used to identify differential expressions of certain genes.

**Results:** Our preliminary results show increased arsenite-induced oxidative DNA damage in XPA cells as compared to the control cells in the flow cytometric analysis, CMNA and FISH analysis, as well as the population doubling studies. p53 is upregulated in all cells following arsenite treatment, indicating that the cell cycle arrest noticed is mediated by p53. Certain genes have been identified to be differentially expressed in treated cells.

**Conclusion:** These findings suggest that cells deficient in XPA are hindered from repair induced by oxidative damage, and imply that the NER pathway is at least in part responsible for the repair of oxidative stress-induced DNA damage as well as the regulation of telomere integrity. The imperative need for the NER to impede cancer formation and cellular ageing drives our current motivation to investigate further what components of the NER pathway potentially interact with the telomerase complex, and opens further opportunities to understanding ageing with respect to the telomeres.

**P75**

**Identification of Hepatocellular Carcinoma-associated Autoantibodies by a Proteomics Approach**

**JY LOW<sup>1</sup>, SG LIM<sup>2</sup>, MCM CHUNG<sup>3</sup>**

<sup>1</sup>Students - Faculty of Science, National University of Singapore - Staff & Student - Office of Life Sciences, Singapore, <sup>2</sup>Medicine, <sup>3</sup>Biochemistry, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** Autoantibodies against tumour-associated antigens have been detected in cancer patients' sera. Since the immune response occurs at an early stage of tumorigenesis and autoantibodies are released into the bloodstream before other biomarkers can be detected, such autoantibodies can potentially serve as biomarkers for early cancer detection. This is especially significant for cancers such as hepatocellular carcinoma (HCC), which are asymptomatic and therefore not diagnosed until they have progressed into malignancy when curative treatment is not available. This study aims to identify HCC-induced autoantibodies found in patient sera using a proteomic approach.

**Methods:** This encompassed in-solution isoelectric focusing, SDS-PAGE, Western blot and MALDI-TOF/TOF MS analysis.

**Results:** We found 9 metabolic enzymes which elicited a humoral response in HCC. Of these, 4 proteins (neutral alpha-glucosidase AB, aspartate aminotransferase, phosphoenolpyruvate carboxykinase and the succinate dehydrogenase flavoprotein subunit) induced autoantibodies in HCC patients but not in normal individuals.

**Conclusion:** This panel of antigenic proteins shows promise as potential early diagnostic biomarkers for HCC.

[This following abstract is also shortlisted as F4 (page S220) in the section "NUS Medical Undergraduate Poster Award".]

**P76**

**Prognostic Value of Baseline Glycated Haemoglobin A1C for In-hospital and 1-Year Mortality after Acute Myocardial Infarction in Patients with Type 2 Diabetes Mellitus**

**DAYM LOW<sup>1</sup>, M CHAN<sup>2</sup>, YT LIM<sup>2</sup>, HC TAN<sup>2</sup>, V TAN<sup>3</sup>, TC YEO<sup>2</sup>**

<sup>1</sup>Medicine, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Cardiology, National University Hospital, Singapore, <sup>3</sup>Cardiology, National Heart Centre, Singapore

**Aim:** To determine the prognostic value of baseline glycated haemoglobin A1C (HBA<sub>1C</sub>) for in-hospital and 1-year mortality after acute myocardial infarction in patients with type 2 diabetes mellitus.

**Methods:** We measured HBA<sub>1C</sub> levels in 414 consecutive patients with type 2 diabetes mellitus within 24 hours of admission for AMI, using DCA2000® (Bayer Diagnostics Europe Ltd) and VARIANT™ (BioRAD Laboratories) assays. We then sought to determine the association between their HBA<sub>1C</sub> levels and both in-hospital and 1-year total mortality.

**Results:** Mean age was 62 ± 12 years, with 60% males. The receiver operating characteristic curve for HBA<sub>1C</sub> yielded an area under the curve (AUC) value of 0.473 (*P* = 0.56) for in-hospital mortality. While the AUC was 0.399 (*P* = 0.004) for mortality at 1 year, HBA<sub>1C</sub> was not significantly predictive after adjusting for covariates [odds ratio (OR) 1.59 for HBA<sub>1C</sub> ≥ 7% compared to HBA<sub>1C</sub> < 7%, 95% confidence interval (CI) 0.85-2.98, *P* = 0.15. Each 1% increase in HBA<sub>1C</sub> was associated with an OR of 0.96, 95% CI 0.82-1.13, *P* = 0.63]. Independent predictors of both mortality endpoints were age (*P* < 0.0001) and Killip class (*P* < 0.0001).

**Conclusion:** In our cohort of patients with type 2 diabetes and AMI, baseline HBA<sub>1C</sub> levels were not predictive of both in-hospital and 1-year mortality. Variables other than HBA<sub>1C</sub> appear to be better predictors.

**P77**

**Proteomic Investigation of HepG2 Cells Treated with Aloe-Emodin and Emodin**

**GD LU<sup>1,2</sup>, CN ONG<sup>1</sup>, HM SHEN<sup>1</sup>, MCM CHUNG<sup>2</sup>**

<sup>1</sup>Community, Occupational & Family Medicine, <sup>2</sup>Biochemistry, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** Aloe-emodin and emodin are 2 bioactive compounds of *Rheum palmatum*, a herbal plant that has been used in traditional Chinese medicine. Although both aloe-emodin and emodin could inhibit HepG2 cell proliferation, aloe-emodin was found to be more cytotoxic and effective in inducing apoptosis and cell-cycle arrest. To identify proteins that are involved in the aloe-emodin-induced antiproliferation effect, we analysed and compared the proteome of cells treated with aloe-emodin or emodin.

**Methods:** 2D-differential in-gel electrophoresis (2D-DIGE) and mass spectrometry were utilised to find differentially expressed proteins and Western blot to verify the results.

**Results:** Several peroxiredoxin family proteins were up-regulated upon treatment with aloe-emodin, but not emodin. Significant increase of reactive oxygen species was observed in cells treated with aloe-emodin; however its antiproliferation effect appeared to be ROS-independent, suggesting that oxidative stress is the result, but not the cause, of aloe-emodin-induced cytotoxicity. p16INK4A and stathmin were also up-regulated by aloe-emodin but not emodin. These 2 proteins are known to induce cell cycle arrest. Cleavage of carbamoyl-phosphate synthase was only found in aloe-emodin-treated cells, indicating early caspase activation. On the other hand, the acidic form of cofilin was found to be down-regulated only in emodin-treated cells and its translocation to mitochondria is known to be an early step before mitochondria-mediated apoptosis.

**Conclusion:** This approach, which integrates proteome analysis and cell study, reveals different molecular targets of emodin and aloe-emodin. It also offers a better understanding of the molecular mechanisms of this widely used herbal medicine.

**P78**

**Discovering Molecular Biomarkers of the Susceptibility to Childhood Acute Lymphoblastic Leukaemia (cALL) using a DNA Chip-based Genotyping Strategy**

**Y LU<sup>1</sup>, KY KHAM<sup>1</sup>, TC FOO<sup>1</sup>, H ARIFFIN<sup>2</sup>, TC QUAH<sup>1</sup>, EJ YEOH<sup>1</sup>**

<sup>1</sup>Paediatrics, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Paediatrics, University Malaya Medical Centre, Malaysia

**Aim:** Leukaemia is a highly complex disease with possible multifactorial causes. Defective handling of xenobiotics due to polymorphisms in its metabolising genes is one of suspected reasons for the development of cALL. There have been few studies that have attempted to correlate between genetic variations of xenobiotics-metabolising genes and risk of developing cALL in Asian populations. Therefore, we studied the impact of 14 polymorphisms in 8 genes (TPMT, NQO1, MTHFR, GSTP1, CYP1A1, CYP2D6, MDR1 and RFC) and investigated their impact on the susceptibility to cALL in our local population.

**Methods:** Using a DNA chip-based strategy capable of simultaneously detecting all enrolled mutations in an assay, 207 cALL cases (135 Chinese and 72 Malay) and 233 controls (129 Chinese and 104 Malay) were screened. Genotypes were cross-validated using PCR-RFLP. Statistical analyses were performed to examine the difference of polymorphism frequencies between cases and controls.

**Results:** Validation showed that our self-developed DNA chip could achieve competitive accuracy (>97%) compared with conventional but laborious PCR-RFLP. Chi-square test showed that: 1) both MTHFR-C677T and RFC-

G80A polymorphisms reduced the risk of cALL in Chinese ( $P = 0.049$ , OR = 0.60, 95% CI = 0.37-0.98;  $P = 0.030$ , OR = 0.45, 95% CI = 0.23-0.90) and Malay ( $P = 0.028$ , OR = 0.41, 95% CI = 0.19-0.91;  $P = 0.038$ , OR = 0.47, 95% CI = 0.42-0.92); 2) NQO1-C609T TT homozygosity reduced the risk in Chinese only ( $P = 0.014$ , OR = 0.41, 95% CI = 0.20-0.84).

**Conclusion:** Our new DNA chip is a reliable and rapid platform that greatly simplifies the screening of pharmacogenetic polymorphisms in an at risk population. Our findings suggest that polymorphisms in MTHFR, RFC and NQO1 genes may play protective roles in cALL development.

## P79

### Screen Multiple Polymorphisms Using a Novel DNA Chip-based Genotyping Platform: An Application of Multiplex Single Nucleotide Allele-specific Primer Extension (AsPEX)

**Y LU<sup>1</sup>, KY KHAM<sup>1</sup>, TC FOO<sup>1</sup>, H ARIFFIN<sup>2</sup>, TC QUAH<sup>1</sup>, EJ YEOH<sup>1</sup>**

<sup>1</sup>Paediatrics, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Paediatrics, University Malaya Medical Centre, Malaysia

**Aim:** Polymorphisms in xenobiotics-metabolising genes may cause dysfunctional gene products, which is one of the suspected reasons for the development of childhood acute lymphoblastic leukaemia (cALL). Conventional genotyping techniques to identify those polymorphisms are either low-throughput, time-consuming, or labour-intensive, especially when multiple polymorphic alleles are queried. We hereby developed a chip-based genotyping platform capable of simultaneously detecting 14 polymorphisms in 8 genes (TPMT, NQO1, MTHFR, GSTP1, CYP1A1, CYP2D6, MDR1 and RFC) to simplify the mutation screening.

**Methods:** Our platform was based on the principle of AsPEX. Two homogeneous primers that only differed at their 3' terminals were fully matched to wild-type and mutant sequences respectively. All querying primers for wild-types or mutants were fluorescently labeled by incorporation of particular TAMRA-ddNTPs in a multiplex reaction, and subsequently hybridised with respective complementary oligonucleotide tags on DNA chip. The fluorescent pattern emitted by labeled primers revealed genotypes in the imaging system. DNA samples of 225 cALL cases and 334 controls were screened using this new methodology. The genotypes were cross-validated by PCR-RFLP in randomly selected samples to evaluate the accuracy.

**Results:** Over 97% of genotypes were concordant in the cross-validation. Analyses on the fluorescent intensity demonstrated clear distinctions among the negative control, wild-type, heterozygosity and homozygosity at all tested loci. Cut-off values of fluorescent intensity were given empirically for each locus to standardise the assignment of genotypes.

**Conclusion:** Our DNA chip is a reliable platform for multiplex genotyping, and can be readily applied to study other pharmacogenetic polymorphisms.

## P80

### Distinct Pattern of Commensal Gut Microbiota in Toddlers with Eczema

**KW MAH<sup>1</sup>, B BJÖRKSTÉN<sup>2</sup>, BW LEE<sup>3</sup>, HPV BEVER<sup>3</sup>, LPC SHEK<sup>3</sup>, TN TAN<sup>3</sup>, KY CHUA<sup>1,4</sup>**

<sup>1</sup>Paediatrics, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Institute of Environmental Medicine, Karolinska Institutet, Sweden, <sup>3</sup>Geriatric Psychiatry, National University Hospital, Singapore, <sup>4</sup>Immunology Programme, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** Recent studies have demonstrated differences in the composition of gut microbiota in infants with and without allergic diseases, particularly eczema. Hence, gut microbiota in toddlers with and without eczema was compared.

**Methods:** A case-controlled study involving 21 toddlers (age  $3.0 \pm 0.5$  years) with and 28 age-matched toddlers without eczema was conducted. Four groups of aerobic gut microbiota were identified and quantitated in stool samples grown on selective media. Three groups of anaerobes were enumerated

by fluorescent in-situ hybridisation followed by quantitative flow-cytometry. We also performed molecular typing of lactic acid bacteria (LAB) and enterococcal isolates to facilitate detailed analysis at species level by bacterial 16S rDNA sequencing.

**Results:** Toddlers with eczema harbored significantly lower count of *Bifidobacterium* [(median 0.14 (25th and 75th percentile 0.04, 0.47) vs 0.71 (0.16, 1.79) % of cells acquired,  $P = 0.003$ )] and *Clostridium* [(0.28 (0.09, 0.78) vs 0.83 (0.35, 1.82) % of cells acquired,  $P = 0.012$ )] but higher counts of LAB [7.3 (6.1, 8.5) vs 5.7 (4.4, 7.3) logCFU/g,  $P = 0.006$ ], in particular *Enterococci* [6.3 (4.8, 7.4) vs 5.0 (3.4, 6.4) logCFU/g,  $P = 0.018$ ]. There was no significant correlation between eczema severity score (TIS) and bifidobacteria counts.

**Conclusion:** The results further confirm and extend beyond infancy previous reports that the gut microecosystem differs between children with and without eczema.

## P81

### Expression and Function of Sphingosine Kinase in Human T Cells

**M MANSOOR<sup>1</sup>, A J MELENDEZ<sup>1</sup>**

<sup>1</sup>Physiology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** Sphingosine kinase (SPHK) is a key enzyme that catalyses the synthesis of sphingosine-1-phosphate (S1P), a bio-active sphingolipid with diverse biological functions. Despite almost ubiquitous expression of SPHK in immune cells, very little is known about its role in T cells. Hence, we aimed to investigate the expression and function of SPHK in T cells.

**Methods:** Jurkat cells (human acute leukaemia cells) were maintained in normal growth medium containing antibiotics. PCR and Western blot were done to see the constitutive expression of SPHK in T cells. Cells were activated using antibody against T cell receptor (TCR). SPHK translocation was observed by fluorescent microscopy. SPHK-assay was done to quantify S1P production. Activation of MAPK signaling pathway was assessed by Western blot.

**Results:** The results showed that both isoforms of the enzyme, SPHK-1 and SPHK-2, are expressed in Jurkat cells. Upon activation, SPHK-1 translocated from the cytoplasm to the cell membrane. Functional assays for SPHK showed an increased production of S1P. Pre-treatment of cells with SPHK inhibitor, DMS, significantly reduced the amount of S1P produced. Finally, DMS pre-treatment caused significant inhibition of MAPK pathway of intracellular signalling.

**Conclusion:** Our results show for the first time the expression of 2 different isoforms of SPHK in human T cells. The key role of SPHK in MAPK pathway highlights its importance in intracellular signaling events triggered by TCR activation. Finally, the finding that the activation and function of SPHK in T cells can be inhibited by DMS, offers novel therapeutic approach for the treatment of autoimmune diseases and transplant immunology.

## P82

### Age-related Mitochondria Function and Antioxidant Enzyme Activities in Fisher-344 Rats

**OY MENG<sup>1</sup>**

<sup>1</sup>Otolaryngology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** Oxidative stress hypothesis is one of the most accepted explanations for ageing, in which the mitochondrion is considered as the main source of reactive oxygen species (ROS). The leakage of oxygen-derived free radicals from mitochondria will cause oxidative damage to the cells and surrounding tissues if most of them are not cleared by antioxidant enzymes. The aim of the study was to explore the mechanism of ageing, especially from the view of mitochondrial function and antioxidant enzyme activities.

**Methods:** In the study, we used Fisher-344 rats of 2 age groups, namely 8 months (young group) and 26 months (old group), where samples were

derived from the liver, brain, kidney and heart. First, auditory brainstem response (ABR) was tested to assess the senescent state of both groups. Then the mitochondrial potential change during ageing was detected by flow cytometry and confocal microscopy using mitochondrial potential dependent dyes – MitoTracker Red and Rho123. In addition, respiration control ratio (RCR) for the mitochondria was also tested as an index of the mitochondrial functional integrity. Acting as ROS scavengers, 3 kinds of antioxidant enzymes' activities were detected by using Cayman chemical kits, which were catalase, superoxidase dismutase (SOD) and glutathione peroxidase (GPx).

**Results:** Results from flow cytometry and confocal microscopy showed that the 26-month-old rats had decreased mitochondrial potential compared to the 8-month-old rats. Mitochondria from the older ones also lose their functional integrity in the process of ageing, which was proved by the RCR test. However, different enzyme activities varied in different organs. There was no consistency.

**Conclusion:** Our preliminary studies gave one possible explanation underlying the ageing mechanism that if the accumulated ROS is not cleared by antioxidant enzymes, it will cause a series of oxidative damage, including the depolarisation of mitochondrial membrane, decreased mitochondrial respiration ability and also dysfunction of the enzymes themselves, which in turn enable the accumulation of even more ROS. In conclusion, this research will contribute a lot to the mechanism of ageing and the consummation of the oxidative stress theory and it also sets an indispensable baseline for future anti-ageing drug delivery study in our lab.

### P83

#### Proteome Analysis of Hepatocellular Carcinoma (HCC) Using the Cleavable Isotope-coded Affinity Tag (cICAT) Approach

Z MOHAMED RAMDZAN<sup>1</sup>, SG LIM<sup>2</sup>, SL LO<sup>3</sup>, GS TAN<sup>3</sup>, TK LIM<sup>3</sup>, QS LIN<sup>3</sup>, MCM CHUNG<sup>1</sup>

<sup>1</sup>Biochemistry, <sup>2</sup>Medicine, National University of Singapore - Yong Loo Lin School of Medicine, Singapore, <sup>3</sup>Biological Sciences, National University of Singapore, Singapore

**Aim:** Hepatocellular carcinoma (HCC) is also known as primary liver cancer. Persistent viral infection by the hepatitis B or C virus is the most common cause of HCC worldwide. Most patients diagnosed with HCC are in advanced stage and thus have poor prognosis. Efforts are currently aimed at understanding the molecular pathogenesis of HCC. A proteomic-based approach allows delineation of global changes in protein profile that could be associated with the progression of HCC.

**Methods:** In our study, a cleavable isotope-coded affinity tag (cICAT) approach is used to detect changes in the protein profile of different stages of HCC. cICAT reagents were used to label the protein extracts from moderately and poorly differentiated liver cancer tissues and the respective adjacent normal tissues. Upon trypsin digestion, the labeled peptides were purified by a cation-exchange column followed by an avidin affinity column. The biotin moiety was then cleaved from the labeled peptides and further separated by a two-dimensional liquid chromatography system and spotted onto MALDI target plates. Proteins that showed differences in expression levels were identified via MALDI TOF/TOF MS. These proteins were categorised using gene ontology.

**Results:** Our preliminary results showed that several metabolic enzymes and cancer-related proteins were found to be differentially regulated in both stages of HCC. These proteins will be compared with the list of proteins identified by 2D difference gel electrophoresis (2D-DIGE) that were reported by our group earlier.

**Conclusion:** The common proteins found in both approaches will be further evaluated as potential biomarkers for HCC.

### P84

#### Knowledge and Beliefs of Singapore Parents Towards Myopia

MT MOHAMED SHAH<sup>1</sup>, A CHENG<sup>2</sup>, M LWIN<sup>3</sup>, SM SAW<sup>1</sup>

<sup>1</sup>COFM, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Singapore Eye Research Institute, Singapore, <sup>3</sup>Department of Marketing, National University of Singapore Business School, Singapore

**Aim:** To determine the attitudes and knowledge of parents towards myopia.

**Methods:** A cross-sectional study was conducted to evaluate attitudes and knowledge of myopia among Chinese parents of primary five children from 3 primary schools in Singapore. A self-administered questionnaire for parents (n = 493) was used to evaluate their attitudes and knowledge of myopia.

**Results:** The response rate for the study was 63.0%. Generally, parents knew that myopia is a public health problem (85.3%), that genetic factors may play a role in myopia development (52.2%) and that taking vision breaks would help prevent myopia progression (84.9%). However the majority did not know that myopia could not be reduced by taking dietary supplements (46.9%) and that true myopia could not be reversed (43.6%). Parents are willing to spend money (58.6%) and time (72.2%) on protecting their children's eyesight. They intended to ensure that their children practice good eye care habits (81.5%), to ask their children regularly to check that they can see clearly (80.2%), to bring their children for regular eye screening at the optician 6 monthly (62.3%) and to find out more about how they can protect their children's eyesight (74.3%). Parents also agreed that practising good eye care habits will help prevent their children's myopia from worsening (85.3%) and lead to their children's good eye health (85.8%).

**Conclusion:** In general, parents have knowledge of myopia and exhibit positive attitudes in terms of their willingness to spend time and money, behavioural intentions and coping appraisals with regards to their children's myopia.

### P85

#### Phospholipase D Mediates Anaphylatoxin-triggered Effector Functions in Macrophages

MI FARAZEELA<sup>1</sup>, AJ MELENDEZ<sup>1</sup>

<sup>1</sup>Physiology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** The aim of our study was to investigate the roles played by phospholipase D (PLD) in the anaphylatoxin C5a-triggered responses in macrophage-differentiated U937 cells.

**Methods:** PLD activity was measured by the transphosphatidylation assay. Cytosolic calcium release was measured using fura 2-AM. NADPH oxidase activity was assayed using an enhanced luminol-based substrate. Chemotaxis was assayed using a cell migration assay kit. NFκB activity was analysed by western blot and cytokine release was measured by ELISA.

**Results:** We report that PLD potentially plays a significant role in signalling through the C5a receptor to trigger various physiological functions in differentiated U937 cells. We demonstrated that C5a rapidly stimulates PLD activity and membrane translocation of PLD1. To study the role of PLD, we used butan-1-ol as an inhibitor. In the presence of butan-1-ol, the production of phosphatidic acid (PA) by the PLD pathway is diverted towards the production of non-hydrolysable phosphatidylbutanol (PtdBut). Using butan-1-ol, we showed that inhibition of PLD abolishes the intracellular calcium release from internal stores, activation of the NADPH oxidase and chemotaxis triggered by C5a in differentiated U937 cells. We also observed an inhibition of C5a-triggered nuclear translocation of NFκB, as well as a reduction in the generation of proinflammatory cytokines such as IL6 and IL8, when butan-1-ol was used.

**Conclusion:** Taken together, our study provides preliminary evidence of the role of PLD in intracellular signaling pathways triggered by anaphylatoxin C5a in macrophages and points out PLD as a potential therapeutic target for the treatment of inflammatory and autoimmune diseases.

P86

### Change in the Referral Patterns Following the Initiation of the Early Psychosis Intervention Programme

BR MOK<sup>1</sup>, SA CHONG<sup>2</sup>

<sup>1</sup>Psychological Medicine, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Early Psychosis Intervention, Institute of Mental Health/Woodbridge Hospital, Singapore

**Aim:** To examine the change in referral patterns following the initiation of the Early Psychosis Intervention Programme (EPIP) which include public education campaigns and collaboration with the primary health care sector.

**Methods:** The pathway to care of patients with first-episode psychosis and who were accepted into the EPIP were examined for 3 consecutive years (2001 to 2003), and this was compared to a matched group of patients who presented to IMH in the year 2000, i.e., before the inception of this programme. This information was obtained from interviews with the patients and family as well as from the medical records.

**Results:** After the introduction of EPIP, the proportion of referrals from law enforcement agencies dropped from 27.9% cases to an average of 14.8% per year from 2001 to 2004. Cases referred from the primary health care sector increased from 25% cases to an average of 32.7% cases per year, while cases brought in by friends and relatives also increased from 30.9% to an average of 36.9%. However, the number of self-referrals dropped from 8.8% to an average of 6.5% cases.

**Conclusion:** The findings underscore the impact of public education and working with the primary health care sector in changing the pathways of care for patients with first-episode psychosis.

P87

### Clinical Evaluation of Risperidone in the Treatment of First-episode Psychosis

BR MOK<sup>1</sup>, V SWAPNA<sup>2</sup>, SA CHONG<sup>2</sup>, A WANG<sup>3</sup>

<sup>1</sup>Psychological Medicine, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Early Psychosis Intervention Programme, <sup>3</sup>General Psychiatry, Institute of Mental Health/Woodbridge Hospital, Singapore

**Aim:** To evaluate the effectiveness and safety of risperidone in patients with first episode psychosis in a 6-month prospective study.

**Methods:** Patients with first-episode psychosis referred to Early Psychosis Intervention Programme (EPIP) and who were treated with risperidone for the first 6 months were recruited. Diagnosis was established with the Structured Clinical Interview for DSM-Axis I Disorder (SCID-I). Effectiveness was assessed using the Positive and Negative Syndrome Score (PANSS) and the Global Assessment of Functioning Scales (GAF Scale). Simpson-Angus Rating Scale (SARS) and Abnormal Involuntary Movement Scale (AIMS) were used to assess for side effects. PANSS, SARS and AIMS were administered at baseline, 3 months and 6 months, and GAF was assessed at baseline and 6 months.

**Results:** Sixty-one patients with a mean (SD) age of 27.3 (6.4) years and a mean (SD) duration of untreated illness of 9.6 (12.6) months (median 3.5 months) were included. The mean (SD) daily dose of risperidone was 1.3 (0.48) mg/day at baseline and 1.6 (0.75) mg/day at 6 months. Mean (SD) PANSS total scores reduced from 65.1 (15.7) at baseline to 37.7 (10.8) at endpoint ( $P < 0.05$ ); 84.3% of the patients were responders (defined as  $\geq 20\%$  reduction in total PANSS score). The mean (SD) GAF total score improved from 40.7 (14.7) at baseline to 71.5 (13.4) at 6 months ( $P < 0.05$ ). Eight patients (13.1%) experienced extrapyramidal side effects and none developed tardive dyskinesia.

**Conclusion:** Risperidone was effective and safe in the treatment of first-episode psychosis and the majority responded to a relatively low dose.

P88

### Histone Deacetylase (HDAC) Inhibitors Inhibit Zebrafish Embryonic Angiogenesis and Liver/Pancreas Formation and HDAC-3 Plays a Specific Role in Zebrafish Liver/Pancreas Development

MFAROOQ<sup>1</sup>, KN SULOCHANA<sup>1</sup>, XF PAN<sup>1</sup>, DL SHENG<sup>1</sup>, ZY GONG<sup>1</sup>, RW GE<sup>1</sup>

<sup>1</sup>Cardiovascular Biology/Angiogenesis Programme, National University of Singapore - Staff & Student - Office of Life Sciences, Singapore

**Aim:** To study the roles of HDACs in vertebrate embryonic development using zebrafish as the model organism.

**Methods:** Embryos from wild type or transgenic zebrafishes in which fluorescent proteins are specifically expressed in liver, pancreas or blood vessels were incubated with valproic acid (VPA) and trichostatin A (HDACs inhibitors). The effects were analysed using morphological observation, marker gene in situ hybridisation, as well as antibody staining. Morpholino antisense RNA oligo was used to knock-down individual HDAC gene expression. Synthetic angiogenesis inhibitors as well as antisense morpholino knock-down of vascular endothelial growth factor (VEGF) gene expression were used to study the role of angiogenesis in liver differentiation and growth.

**Results:** HDAC inhibitors resulted in defects in zebrafish embryonic angiogenesis, cardiac hypertrophy, delay in liver and pancreas organogenesis, and subsequent growth arrest in liver and pancreas, with minimal effects on overall development of embryo. These defects were linked with HDAC enzymatic activity as well as mRNA downregulation. Inhibiting angiogenesis did not affect liver development in zebrafish. Gene knock-down experiments indicated that only HDAC-3 specifically interfered with liver formation similar to VPA treatment. Furthermore, the phenotypes of VPA treated embryos could be rescued by HDAC-3 overexpression.

**Conclusion:** HDAC-3 is specifically required for liver development in zebrafish. This is the first report of a specific function of an individual HDAC gene. Vascularisation is not required for liver development in zebrafish.

P89

### Herpes Simplex Virus Type-specific Serology Test (HSVTSST) Results at a Genitourinary Medicine Clinic in Singapore

A NG<sup>1</sup>, R CHAN<sup>2</sup>, HH TAN<sup>2</sup>, ML WONG<sup>3</sup>

<sup>1</sup>Medicine, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Dermatology, National Skin Centre, Singapore, <sup>3</sup>COFM, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** To audit the newly introduced HSVTSST at the Department of Sexually Transmitted Infections Control (DSC) Clinic.

**Methods:** A descriptive cross-sectional study of the first 500 individuals who took the HSVTSST was conducted. Electronic case records were examined to obtain details on demographics, clinical history, physical examination and laboratory findings.

**Results:** The mean age was 31 (range, 15-90) years; 85.6% were male, 81.2% Chinese, 68% singles and 80.6% heterosexual. 58% of the study population was positive for HSV. HSV-1 was present in 46.6% of the study population and HSV-2 in 22.8%. A positive correlation exists in males between HSV prevalence and age. History suggestive of genital herpes and herpes-like genital lesions on examination were predictive of HSV-2 seropositivity in males only. There may be an association between HSV-2 and syphilis. Only 22% of tests were doctor-initiated.

**Conclusion:** The sex ratio in this study was comparable with that of the DSC clinic attendance over the same period. A large proportion of asymptomatic individuals had requested for the HSVTSST as part of their routine STI screening to address their concerns over genital herpes. However, only 9.63% of all DSC patients took the HSVTSST: genital herpes might not be a major concern among DSC attendees. HSV-2 was the main aetiological factor for genital herpes. Three confirmed cases of genital HSV-1 infection were found only in males; probably because males receive oral intercourse more frequently than females. As HSV prevalence will likely rise, type-specific serological studies based on the general population should be conducted to support effective prevention strategies.

**P90**

**Therapeutic Effect of Genistein, a Soy Iso-flavonoid, on Acute Promyelocytic Leukaemia Cell**

**APPNG<sup>1</sup>, D VENKATARAMAN<sup>1</sup>, S JING<sup>2</sup>, JL HIRPARA<sup>3</sup>, CS CHEN<sup>2</sup>, S PERVAIZ<sup>3</sup>, M KHAN<sup>1</sup>**

<sup>1</sup>National University Medical Institute, <sup>2</sup>Medicine, <sup>3</sup>Physiology, National University of Singapore – Yong Loo Lin School of Medicine

**Aim:** Acute promyelocytic leukaemia (APL), caused by fusion protein PML-RAR, is characterised by the accumulation of immature pro-myeloid cells in the blood and bone marrow. We have reported that PML-RAR mediated accumulation of mis-folded N-CoR in the endoplasmic reticulum (ER) induces ER stress and unfolded protein response (UPR) that contributes to the blockage of differentiation of promyelocytics. These findings suggest that targeting the mis-folding of N-CoR protein and the ER stress could represent an attractive therapeutic strategy for APL.

**Methods:** We tested several known inhibitors of protein aggregation and ER stress, on APL tumour cell NB4 and identified genistein as a potent inhibitor of growth of both retinoic acid (RA)-sensitive and RA-resistant APL cells.

**Results:** Genistein promoted apoptosis of NB4 cells, which was mediated by the activation of caspase-3 and -9, and was associated with a decrease of mitochondrial transmembrane potential and cytosolic release of cytochrome C. Genistein induced differentiation of RA-sensitive as well as RA-resistant NB4 cells as marked by appearance of cell surface differentiation marker CD11b. Genistein promoted cell cycle arrest by inducing accumulation of cells at G2-M phase. Genistein unregulated and stabilised the level of PML and N-CoR protein in NB4 cells while promoting degradation of PML-RAR and enhanced the solubility of N-CoR.

**Conclusion:** These findings, for the first time, have identified therapeutic potential of genistein in both RA-sensitive and RA-resistant APL cells. Genistein, being a component of natural dietary protein, has the potential to become the drug of choice for the treatment of APL patients.

**P91**

**The Use of Complementary and Alternative Medicine (CAM) in Head and Neck Cancer Patients**

**A NG<sup>1</sup>, T LOH<sup>2</sup>**

<sup>1</sup>Medicine, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Otolaryngology - Head and Neck Surgery, National University Hospital, Singapore

**Aim:** CAM is increasingly used locally. The use of CAM is believed to be prevalent in Singapore; this study aimed to determine its prevalence and patterns in a population of head and neck cancer patients.

**Methods:** CAM is defined as diagnosis, treatment and prevention which complements or totally replaces mainstream medicine. Ninety-three consecutive head and neck cancer patients on follow-up at the Department of Otolaryngology, Head and Neck Surgery were surveyed using an interviewer-administered questionnaire.

**Results:** Our patients consisted of 74% males and 26% females. The mean age was 54 years; majority of patients were Buddhists and had received primary or secondary school education. There were 66.7% of the patients who had used CAM at some point of time. Most of the patients who used CAM (80.8%) had used it concurrently with mainstream western medicine. Recommendation by family and friends was the most common reason why the patients tried CAM and 79.4% of CAM users felt it to be effective. Patients did not regret using CAM even if they did not experience any positive effects. Patients spent a monthly average of \$200 on CAM, with a range between \$10 and \$5000. Of the patients who had not used any form of CAM, 67% of them did not regret their decision to not use CAM. Fear of interaction of CAM and western mainstream medicine was the most commonly cited reason.

**Conclusion:** The use of CAM in head and neck cancer patients is common regardless of efficacy or costs. Evidence of efficacy of CAM needs to be established.

**P92**

**Viability of Saliva as an Alternative Source of Genomic DNA for Genetic Epidemiological Studies**

**DPK NG<sup>1</sup>, D KOH<sup>1</sup>, S CHOO<sup>1</sup>, KS CHIA<sup>1</sup>**

<sup>1</sup>COFM, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** Saliva is a potentially useful but untapped source of genomic DNA for genetic epidemiological studies. However, current commercial methods are mainly concerned with DNA extraction and do not address important issues concerning saliva preservation and storage. As such, we evaluated how various saliva storage conditions affected DNA yield and quality obtained using a new available Oragene method that proposes to integrate these aspects in a single kit.

**Methods:** The conditions involved the extraction of the DNA immediately after saliva collection (condition 1) or when stored at air-conditioned room temperature (20°C) for 1 month (condition 2) and 6 months (condition 3) as well as at -80°C for 6 months (condition 4). The effect of incorporating an additional incubation of saliva samples at 30°C for 2 weeks was also examined. DNA yield and purity was measured by spectrophotometry. Real-time PCR was performed with Taqman chemistry and genotypes were determined for polymorphisms in *GLUT1* and *eNOS*. Data was analysed using ANOVA.

**Results:** Overall average DNA yield from 2 mL of saliva was 35.5 µg (8.5 to 85.2 µg). DNA yield was unaffected by incubation of saliva at 30°C but DNA yield under condition 3 was significantly higher compared to conditions 1 and 2. OD<sub>260/280</sub> values were acceptable and comparable across all conditions. Differences in storage conditions did not impact DNA quality in real time PCR experiments and genotyping fidelity remained undiminished.

**Conclusion:** We conclude that saliva is a viable alternative source of genomic DNA for genetic epidemiological studies and that this new commercial method and possibly other related techniques can be effective means towards this end.

**P93**

**Significant Variability in the Distribution of Genotypes of Candidate Gemcitabine Genetic Determinants between Caucasians and Asians**

**SS NG<sup>1</sup>, R SOO<sup>2</sup>, PY CHONG<sup>1</sup>, SC LEE<sup>2</sup>, R SOONG<sup>1</sup>, BC GOH<sup>2</sup>**

<sup>1</sup>National University Medical Institute, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Haematology-Oncology, National University Hospital, Singapore

**Aim:** Numerous studies have shown that the variability in genotypes of genes involved in drug transport, metabolism and activity can influence drug response. Inter-individual variability in gemcitabine response presents a significant difficulty in the administration of the drug. Recently, the distribution of genotypes in Caucasians of many candidate gemcitabine response genes was reported. The aim of the study was to compare the distribution of genotypes of candidate gemcitabine response genes between Caucasians and Asian populations to gauge whether Asians may differ from Caucasians in their response to gemcitabine.

**Methods:** Genomic DNA was extracted from the blood of 54 lung cancer patients in Singapore receiving gemcitabine treatment and 14 gene loci were genotyped using pyrosequencing.

**Results:** Our results showed significant differences in the distribution between Caucasians and Asian populations in 9 of the 14 loci examined. In the SLC28A1 gene at nucleotide 1543, the frequency of GG variants was 50% in Asians, compared to 96% in Caucasians, while at nucleotide 1576, the frequency of TT variants was 91% in Asians, compared to 27% in Caucasians.

**Conclusion:** Our results have shown that there exist significant differences in the distribution of genotypes of candidate gemcitabine response genes between Caucasians and Asians, potentially providing a basis for differential response to gemcitabine between Asians and Caucasians. Future studies examining the correlation of these genotypes with gemcitabine pharmacokinetics and clinical response will help define the functional significance of these findings.

## P94

**Is there a Gender Difference in Stress Perception and Coping Strategies among Dental Undergraduates?**V NG<sup>1</sup>, D KOH<sup>1</sup>, B MOK<sup>2</sup>, LP LIM<sup>2</sup>, SE CHIA<sup>1</sup><sup>1</sup>COFM, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Preventative Dentistry, National University of Singapore – Faculty of Dentistry, Singapore**Aim:** We compared stressors, perceived stress and coping strategies between male and female dental undergraduates.**Methods:** Eighty-five males and 51 females (years 1 to 4) answered these questionnaires at the beginning of the academic year. Dental Environmental Questionnaire (DES) assessed stress from academic work, clinical, faculty/administration and personal factors. Perceived Stress Scale (PSS) assessed self-perceived stress level. COPE examined use of various coping strategies.**Results:** There was no significant difference in the scores of DES between males and females, for whom academic work was the primary stressor (mean score: 2.8). Overall mean score of PSS for all students was 19.9. Males reported slightly lower PSS scores (19.1) than females (21.4) ( $P = 0.02$ ). Females had a significantly higher score on the following COPE's subscales compared to males: seeking social support for instrumental reasons (females: 11.4, males: 10.5,  $P = 0.027$ ); seeking social support for emotional reasons (females: 11.5, males: 8.2,  $P < 0.001$ ); focus on and venting of emotions (females: 10.2, males: 7.6,  $P < 0.001$ ). PSS was negatively associated with positive coping strategies (PSS vs "active coping",  $r = -0.32$ ) and positively associated with negative coping strategies (e.g. PSS vs "focus on and venting of emotions",  $r = 0.36$ ,  $P < 0.01$ ). There was no gender difference in association between COPE subscales and PSS.**Conclusion:** Academic work was the main stressor for dental undergraduates. While there was no difference in the various stressors between the sexes, females perceived higher stress level than males. Generally, females were more likely to adopt negative coping strategies. Adoption of positive coping strategies was associated with lower perception of stress.

## P95

**Parental Knowledge, Attitudes and Practices Regarding Diarrhoea and Oral Rehydration Therapy (ORT) in Singapore Children**JZ NGIAM<sup>1</sup>, SX LEE<sup>1</sup>, L SHEK<sup>1</sup><sup>1</sup>Paediatrics, National University of Singapore – Yong Loo Lin School of Medicine, Singapore**Aim:** In children, diarrhoeal dehydration causes significant morbidity and mortality. This study aimed to assess parental knowledge, attitudes and practices regarding diarrhoea and oral rehydration therapy (ORT) in Singapore children, so as to facilitate the development of educational programmes for parents.**Methods:** A questionnaire was administered by 2 interviewers to 100 parents of children visiting the children's specialist outpatient clinics, the children's emergency department and in the paediatric wards of the National University Hospital.**Results:** 73.0% of the parents knew the correct definition of diarrhoea. 62.0% thought that the most likely cause of diarrhoea in their children was poor hygiene. 88.0% knew that diarrhoea could lead to dehydration, but only 30.0% were aware that diarrhoea could lead to death. Dehydration was the biggest concern amongst parents when their children had diarrhoea. 57.0% sought medical help initially when their children had diarrhoea. Only 21.0% had heard of ORT. In this group, 57.1% had used ORT previously, 38.1% used or would use commercial oral rehydration salts and 33.3% thought that ORT would stop diarrhoea.**Conclusion:** Our study results reflect good parental knowledge about diarrhoea but limited knowledge about ORT. These findings highlight a need to maintain and improve parental knowledge regarding diarrhoea and to raise parental awareness about ORT as an important form of treatment for diarrhoeal dehydration.

## P96

**Cultural Adaptation and Validation of Hepatitis Quality of Life Questionnaire for Hepatitis B Patients in Singapore**SC ONG<sup>1</sup>, SG LIM<sup>2,3</sup>, SC LI<sup>3</sup><sup>1</sup>Pharmacy, National University of Singapore - Staff & Student - Office of Life Sciences, Singapore, <sup>2</sup>Gastroenterology, National University Hospital, Singapore, <sup>3</sup>National University of Singapore, Yong Loo Lin School of Medicine, Singapore**Aim:** 1) To validate an existing disease-specific health-related quality of life (HRQoL) instrument culturally adapted for use in English speaking hepatitis B patients in Singapore. 2) To evaluate the HRQoL in a cross section of hepatitis B patients ranging from asymptomatic carriers to those who had undergone liver transplantation.**Methods:** A disease-targeted, multi-item scales HRQoL questionnaire (HRQoLQ), which covers hepatitis specifically was validated in a sample of hepatitis B patients recruited from National University Hospital (NUH), a tertiary referral hospital in Singapore. The cultural adaptation of the instrument was performed by conducting several focus groups. The questionnaire was then used to assess the HRQoL in different stages of hepatitis B patients. One-way analysis of variance (ANOVA) was employed to test for the statistical significant difference in all scale scores among different categories of hepatitis B patients. Internal consistency reliability and construct validity were also evaluated.**Results:** The culturally adapted questionnaire has been tested for its validity and reliability in 170 patients who attended the Unit Digestive Centre in NUH. For the validation study of the culturally adapted instrument, reliability coefficients (Cronbach alpha) were excellent with all the scales,  $> 0.7$ . In the HRQoL evaluation study for hepatitis B patients, a comparison of mean scale scores at different stages of the disease showed significantly lower HRQoL in cases at more advanced stages of disease in most domains.**Conclusion:** The questionnaire has good cross-sectional validity, making it a potentially useful outcome measure in the evaluation of hepatitis B patients in Singapore.

## P97

**Continuous Expression of Vector-based siRNA Targeting against West Nile Virus Genome Inhibits Virus Replication: a Useful and Effective Strategy to Prevent Flavivirus Infections**SP ONG<sup>1</sup>, J CHU<sup>1</sup>, MML NG<sup>1</sup><sup>1</sup>Microbiology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore**Aim:** Studies have shown that siRNA is highly effective in silencing the replication of many pathogenic viruses. However, most of the studies utilised chemically synthesised siRNA that results in transient effects. In this study, a plasmid-based expression of siRNA targeting against West Nile virus (WNV) genome was designed to allow continuous suppression, to facilitate the study of the effectiveness of sustained expression of siRNA targeting against WNV genome in silencing virus replication.**Methods:** Cells transfected with vector were selected using G418 before infection with WNV infection at MOI of 10. Viral protein expressions were assessed using western blot and immunofluorescence microscopy at 12- and 24 h p.i. Plaque assays and real-time PCR were used to quantify the number of infectious virus particles and the number of viral transcripts, respectively.**Results:** At both 12- and 24 h p.i., Western blot showed drastic decrease on viral proteins when compared to wild-type infection. Immunofluorescence images revealed a clear absence of viral proteins in the transfected cells indicating profound silencing in pSilencer-transfected cells. The number of infectious particles was about 1000-folds lower in the vector-carrying cells supporting the notion that there was inhibition of virus replication. In addition, there was a considerable reduction in the number of viral envelope protein transcripts, which correlated well with the data collected.**Conclusion:** Continuous expression of siRNA is a simple and effective way to combat WNV infection.



P98

### Endogenous Hydrogen Sulfide Contributes to the Cardioprotection by Metabolic Inhibition Preconditioning in the Rat Ventricular Myocytes

TT PAN<sup>1</sup>, JS BIAN<sup>1</sup>, ZN FENG<sup>2</sup>, SW LEE<sup>1</sup>, PK MOORE<sup>1</sup>

<sup>1</sup>Pharmacology, <sup>2</sup>Physiology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** To investigate the role of H<sub>2</sub>S in cardioprotection on rat ventricular myocytes and the possible mechanisms.

**Methods:** Isolated rat ventricular myocytes underwent 30-mins NaHS (an H<sub>2</sub>S donor) preconditioning followed by severe metabolic inhibition (MI) at different time points. Controls were not treated with NaHS preconditioning. Cells that had undergone MI preconditioning were used as positive controls. We applied trypan blue exclusion as an index of myocyte viability, lactate dehydrogenase release as cellular injury index and electrically-induced [Ca<sup>2+</sup>]<sub>i</sub> transients as an index of cell function.

**Results:** Pretreatment (30 min) with exogenous NaHS at concentrations of 10<sup>-5</sup> to 10<sup>-4</sup> mol/L caused a concentration-related increase in cell viability and decrease in cellular injury index. A time course study showed that NaHS-induced cardioprotection occurred in 2 time windows (~1 h and 16 to 28 h). These cardioprotective effects of NaHS were significantly attenuated by pretreatment with glibenclamide (a non-selective K<sub>ATP</sub> channel blocker) and HMR-1098 (a sarcolemmal K<sub>ATP</sub> blocker) treatment but not by 5-HD (a mitochondrial K<sub>ATP</sub> blocker). To observe whether endogenous H<sub>2</sub>S is involved in the delayed cardioprotection response of ischaemia preconditioning, DL-propargylglycine (PAG) and b-cyano-L-alanine (BCA; 2 inhibitors of H<sub>2</sub>S biosynthesis) were used. Both drugs remarkably attenuated the cardioprotection produced by metabolic preconditioning.

**Conclusion:** Our findings provide the first evidence that H<sub>2</sub>S may protect the heart most probably by activating sarcolemmal K<sub>ATP</sub> channels and the cardioprotective effects of ischaemic preconditioning is, at least partially, mediated by endogenous H<sub>2</sub>S.

P99

### Tissue Microarray Validation of the Apoptotic and Proliferation Molecular Pathways in Colorectal Carcinoma

BK PEH<sup>1</sup>, HC HAN<sup>1</sup>, N SHAH<sup>1</sup>, M SALTO-TELLEZ<sup>2</sup>

<sup>1</sup>National University Medical Institute, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Pathology, National University Hospital, Singapore

**Aim:** Tissue microarrays (TMA) have been applied to the interrogation of tissues in a variety of clinical and research scenarios such as the validation of diagnostic methods for biomarker detection, categorisation of large archival collections in subgroups with biological and prognostic significance, immunohistochemistry (IHC) correlation with DNA-based disease definers such as microsatellite instability and direct sequencing, or the confirmation of the role of an individual gene/protein in the basic molecular mechanism of a disease. The aim of this study was to evaluate the use of TMA technology in the mapping of molecular disease pathways in clinical samples by analysing the expression of known biomarkers, involved in apoptosis and proliferation, in a colorectal carcinoma (CRC) TMA; and addressing the concordance of our analysis with those results obtained in full CRC sections and available in the literature.

**Methods:** TMA from 230 colorectal cancer cases and corresponding normal colonic mucosa were constructed, and IHC analysis of NF-B, TGF- RII, Ki-67, p53, β-catenin and TUNEL.

**Results:** Our study shows a significant degree of concordance between our results and those published elsewhere in different formats. An exception was identified in the expression of the NF-B protein; however, further analysis of full sections confirmed our TMA results.

**Conclusion:** The study validates the TMA technology platform in investigating multiple biomarkers in molecular disease pathways in clinical samples, allowing for fast, reliable, high-throughput confirmation of disease pathway hypotheses by basic researchers in the future, with substantial savings of time, materials and effort. Specifically, our study redefines the expression of

the NF-B protein in colorectal cancer.

P100

### RUNX3 Protein is Overexpressed in Human Basal Cell Carcinomas

BK PEH<sup>1</sup>, M SALTO-TELLEZ<sup>2</sup>, K ITO<sup>1</sup>, SH TAN<sup>3</sup>, HC HAN<sup>1</sup>, K TADA<sup>1</sup>, Y ITO<sup>1</sup>

<sup>1</sup>National University Medical Institute, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Pathology, National University Hospital, Singapore, <sup>3</sup>Dermatology, National Skin Centre, Singapore

**Aim:** To analyse the RUNX3 protein expression in basal cell carcinoma (BCC), a neoplasm that is specifically linked to the Hedgehog (HH) pathway, and explore interactions between the Runt family and the HH pathway.

**Methods:** Analysis of β-catenin, Indian hedgehog (IHH) and RUNX3 protein expression by immunohistochemistry in a TMA format representing 30 BCC and corresponding normal skin.

**Results:** The expression of β-catenin and IHH mirrored the known expression reported before, confirming the suitability of the TMA platform. RUNX3 protein was expressed in normal skin, showing mild to moderate, distinct nuclear positivity in approximately 75% of all epidermal cells, including those in the hair shaft. Interestingly, there was uniform, strong nuclear expression of the RUNX3 antibody in all 30 BCC cases, irrespective of the histological subtype. This represents RUNX3 protein overexpression in BCC when compared with the normal epidermis. We are confirming this result with further molecular analysis at the DNA, mRNA and proteomic levels.

**Conclusion:** In human epithelial neoplasms, RUNX3 downregulation is significantly associated with gastric cancer, acting as a tumour suppressor gene, and representing one of the few TGF-β downstream transcription factors. Our study shows genuine RUNX3 protein overexpression in BCC, suggesting that RUNX3 is in some way linked to the HH-Wnt pathway, and may represent the first example of a human epithelial neoplasm with universal upregulation of RUNX3. This observation provides further evidence of the complex and lineage-specific role of the RUNX gene family and offers a good opportunity for the future study of HH-Runx interactions.

P101

### Degradation of Human Secretory Immunoglobulin A (SIgA) by the Intestinal Protozoan *Blastocystis*

MK PUTHIA<sup>1</sup>, A VAITHILINGAM<sup>1</sup>, L JIA<sup>2</sup>, KSW TAN<sup>1</sup>

<sup>1</sup>Microbiology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>DSO Laboratories, Singapore, Defence Medical and Environmental Research Institute, Singapore

**Aim:** *Blastocystis* is an enteric protozoan that colonises the large intestine of humans and many other animals. There are many reports associating *Blastocystis* with gastrointestinal and other clinical symptoms including recurrent watery diarrhoea, mucous diarrhoea, constipation, nausea, vomiting, and bloating, but little is known about the virulence factors of this parasite. At gastrointestinal mucosal surfaces, immunoglobulin A (IgA) proteases, which cleave human secretory IgA, are essential for promoting the mucosal adhesion of pathogens. In this study, we aim to investigate if *Blastocystis* proteinases degrade human secretory IgA.

**Methods:** Parasite lysate and conditioned medium from *B. hominis* and *B. ratti* were exposed to human secretory IgA. Western blot was done for the analysis of IgA degradation and the extent of loss of IgA heavy chain was determined by densitometry.

**Results:** Human secretory IgA was cleaved by both cell lysate and conditioned medium with mainly cysteine proteinase activity in *B. hominis* B isolate and aspartic proteinase activity in *B. Ratti* WR1 isolate.

**Conclusion:** Our observation that *Blastocystis* proteinases contributed to the breakdown of IgA suggests that this is one of the mechanisms by which it can persist in the gut. The ability of conditioned medium to cleave IgA suggests active secretion of parasitic IgA proteinases. Inhibition of IgA degradation by *Blastocystis* lysates from *B. hominis* B and *B. ratti* WR1 by cysteine and aspartic-specific inhibitors respectively indicates that inter-species variations exist in these degradative enzymes.

## P102

**Hydrogen Sulfide is the Mediator of Cysteine Neurotoxicity in Cerebral Ischaemia****K OU<sup>1</sup>, CPLH CHEN<sup>2</sup>, B HALLIWELL<sup>3</sup>, PK MOORE<sup>1</sup>, PTH WONG<sup>1</sup>**<sup>1</sup>Pharmacology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Neurology, National Neuroscience Institute, Singapore, <sup>3</sup>Biochemistry, National University of Singapore – Yong Loo Lin School of Medicine, Singapore**Aim:** Cysteine is known to cause neuronal cell death and it has been reported to be elevated in brain ischaemia, but little is known about the effects of cysteine in stroke and the mechanism of its neurotoxicity.**Methods:** Cerebral ischaemia was studied in a rat stroke model created by permanent occlusion of the middle cerebral artery (MCAO). The resultant infarct volume was measured 24 h after occlusion.**Results:** Administration of cysteine (10 mmol/kg) significantly increased the infarct volume after MCAO. This increase was abolished by concomitant administration of either propargylglycine [PAG, an irreversible inhibitor of cystathionine  $\gamma$ -lyase (CSE)] or aminoxyacetic acid [AOAA, an inhibitor of cystathionine  $\beta$ -synthase (CBS)], inhibitors that prevent the formation of H<sub>2</sub>S from cysteine. In addition, administration of sodium hydrosulphide (NaHS, an H<sub>2</sub>S donor) mimicked the effects of cysteine but the NaHS-induced increase in infarct volume was not affected by PAG and AOAA. In contrast, the effects of both cysteine and NaHS were abolished by the administration of MK-801 (an NMDA receptor channel blocker). Administration of PAG alone, but not AOAA, significantly decreased the baseline level of MCAO-induced infarct volume. No changes were observed in the cortical mRNA expression of CBS and CSE after MCAO.**Conclusion:** The present results strongly suggest that the effects of cysteine occurred via the production of H<sub>2</sub>S, which appears to be a mediator that contributes to ischaemic damage after MCAO. Inhibition of H<sub>2</sub>S synthesis may be a novel approach to stroke therapy.

## P103

**Regulation of the Na<sup>+</sup>/H<sup>+</sup> Exchanger, NHE-1 Gene Expression by Activation of PPAR $\gamma$  Receptor in the Human Breast Cancer Cell Line MCF-7****AL OUAKE<sup>1</sup>, AP KUMAR<sup>2</sup>, MV CLEMENT<sup>3</sup>, S PERVAIZ<sup>1</sup>**<sup>1</sup>Physiology, <sup>2</sup>National University Medical Institute, <sup>3</sup>Biochemistry, National University of Singapore – Yong Loo Lin School of Medicine, Singapore**Aim:** As generating intracellular ROS and inducing intracellular acidosis by inhibiting NHE1 activity have recently been shown to be a mechanism involved in peroxisome proliferator-activated receptor gamma (PPAR $\gamma$ )-induced apoptosis, we wanted to determine whether the NHE1 gene might be a PPAR $\gamma$  target gene.**Methods:** Total RNA were isolated from cells by Trizol reagent as specified in manufacturer's instructions with slight modification. mRNA quantification were performed using a pre-developed primer/probe mix from ABI Biosystems in a multiplex system. Protein expressions were determined by Western blot. Propidium iodide staining was done in a time-dependent manner to analyse cell cycle by staining DNA fragments.**Results:** We identified a putative PPAR response element in the human NHE1 promoter. We showed that PPAR $\gamma$  agonist, rosiglitazone, downregulated NHE1 gene expression and induced apoptosis in human MCF-7 breast carcinoma cells in regular serum but had no effect on NHE1 gene expression in charcoal-stripped serum. Replenishing charcoal-stripped serum with 17 $\beta$ -estradiol reinstated the inhibition. A putative oestrogen receptor element in close proximity to the PPRE element was also identified. The selective PPAR $\gamma$  antagonist, GW9662, blocked the inhibitory effects in regular serum. We further confirmed that this regulation is indeed PPAR $\gamma$ -mediated by using several different PPAR $\gamma$  ligands, and correlated with mRNA expression by real-time PCR.**Conclusion:** Taken together, we showed that rosiglitazone, when used at concentrations of 50  $\mu$ M and higher, induced downregulation of NHE1expression via a PPAR $\gamma$ -independent-ROS-dependent manner while at concentrations of 20  $\mu$ M and lower induced downregulation of NHE1 expression via a PPAR $\gamma$ -dependent manner.

## P104

**Atrial Septal Defect — Closure without Surgery****SC QUEK<sup>1</sup>, J YIP<sup>2</sup>, BC TAI<sup>3</sup>, KY CHAN<sup>4</sup>, C HIA<sup>5</sup>, T LIM<sup>6</sup>, W YIP<sup>4</sup>**<sup>1</sup>Paediatrics, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Cardiology, National University Hospital, Singapore, <sup>3</sup>COFM, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>4</sup>Paediatrics, Gleneagles Medical Centre, Singapore, <sup>5</sup>Paediatrics, National University Hospital, Singapore**Aim:** Advances in interventional techniques now allow for closure of atrial septal defect (ASD) via the transcatheter route. We report our experience with this method, representing the largest series in Singapore.**Methods:** A total of 88 patients (males = 33, females = 55) underwent transcatheter ASD closure in 2 institutions from 1997 to 2005. Suitability for device closure and defect sizing were carried out with echocardiography and/or balloon sizing, before the appropriate size Amplatzer septal occluder (ASO) was decided on. Following oximetry and angiography, the ASO was mounted and pulled into a loading sheath. This was then connected with a venous delivery sheath which has traversed the ASD with the prior help of a guidewire. The device was then passed through this delivery sheath into position. Appropriate deployment was guided by TEE or intracardiac echocardiography before release.**Results:** Determination of suitability for device closure is an important prerequisite. A range of ASOs (11-40) were used to close ASDs measuring 6.8 to 32.0 mm (mean = 16.0 mm) on TEE. Two patients had double devices put in for multiple ASDs. Complications included emergent surgery in 1 whose device embolised.**Conclusion:** The results of transcatheter device closure of ASD are comparable to surgery. In addition, it offers the advantages of avoidance of cardiopulmonary bypass/surgical scars, and a shorter hospitalisation. Results of transcatheter closure of ASD are encouraging and should be offered to patients (or parents) as an alternative option to surgery.

## P105

**Expression of Inflammatory Related Genes Following Intravesical BCG Instillations in Mice****JN RAHMAT<sup>1</sup>, K ESUVARANATHAN<sup>1</sup>, R MAHENDRAN<sup>1</sup>**<sup>1</sup>Surgery, National University of Singapore – Yong Loo Lin School of Medicine**Aim:** Intravesical immunotherapy with live *Mycobacterium bovis* bacillus Calmette-Guérin (BCG) has been the gold standard for treatment of superficial bladder carcinomas. The local immune response induced following BCG instillation had been attributed to its anti-tumourigenic activity. The Th1/Th2 paradigm has been an avenue of much clinical studies and a Th1 polarised immune response is thought to be largely implicated in clinical efficacy. We investigated the expression of inflammatory-related genes following BCG instillations in normal mice as it has been previously shown to respond to BCG similarly to tumour-bearing mice.**Methods:** Healthy 4- to 6-weeks-old C57BL/6 female mice (n = 5/group) were given once weekly intravesical instillations of 1 x 10<sup>7</sup> cfu BCG or PBS (control) in the bladder for 4 and 6 consecutive weeks. Mice were sacrificed, the bladders resected 6 hours after the last instillation and immediately frozen in liquid nitrogen. Using SuperArray manufacturer's instructions, biotinylated cRNA was produced and used to probe an inflammatory microarray. Semiquantitative RT-PCR was done confirm the hybridisation results. Bladders, iliac and mesenteric lymph nodes were harvested from another set of BCG- and PBS-instilled mice for flow analysis of immune cell populations.**Results:** Th1 cytokines such as IL1 $\beta$ , TNF $\alpha$ , IL12p35, as well as IL10, a Th2 cytokine were found to be upregulated. Inflammatory chemokines such as Ccl8, Cxcl2, Cxcl9, Cxcl10, Cxcl14 were also expressed along with

inflammation mediating receptors, IL1r2 and Fcεr1γ. Inducible NOS2 (iNOS2), an enzyme important in host immune response, is also involved in BCG-mediated inflammation.

**Conclusion:** The gene expression profile in the bladder after BCG instillation is more dynamic at 6 weeks than at 4 weeks. The RT-PCR expression profiles coincide with the immune cell recruitment data obtained from flow cytometric analysis of bladder tissue.

#### P106

##### Oestrogen Receptor Alpha and Beta Gene Polymorphisms and Genetic Susceptibility to Polycystic Ovary Syndrome

**A RANI<sup>1</sup>, AC ROY<sup>1</sup>, V DRAMUSIC<sup>2</sup>, PC WONG<sup>1</sup>**

<sup>1</sup>Obstetrics & Gynaecology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Obstetrics & Gynaecology, National University Hospital, Singapore

**Aim:** To investigate a possible association of oestrogen receptor gene polymorphisms with occurrence of polycystic ovarian syndrome (PCOS) in Singaporean Chinese population.

**Methods:** Subjects were genotyped with respect to TA repeat of ER-α gene and RsaI, AluI and CA repeat polymorphisms of the ER-β gene. The study population consisted of 111 PCOS patients and 102 women used as control subjects. The RsaI polymorphism is a G-A change at position 1082 in exon 5 and the AluI polymorphism is a G-A change at position 1730 in the 3' UTR of exon 8. They were evaluated using PCR-based RFLP. The (TA)<sub>n</sub> repeat of ER-α situated 1174 base pairs upstream of exon 1 and the (CA)<sub>n</sub> repeat polymorphism of ER-β located in intron 5 were analysed using the Big Dye Terminator Chemistry (Applied Biosystems). Plasma levels of E2, FSH, LH, PRL and T were analysed by radioimmunoassay. A *P* value of <0.05 was considered statistically significant.

**Results:** The (TA)<sub>n</sub> repeat polymorphism has 12 alleles (A-L), 164 (12 repeats)-A to 186(23 repeats)-L. ER-α 14 and 15TA repeats are associated with a higher risk of PCOS. The frequency of RsaI and AluI polymorphisms were similar in the patients and controls (*P* >0.05). The CA dinucleotide repeat polymorphism has 10 alleles in our study population. The PCR amplified product ranged from 148 (17 repeats) to 166 (26 repeats) base pairs in length.

**Conclusion:** Oestrogen receptor alpha gene (TA)<sub>n</sub> repeat polymorphism is associated with the occurrence of PCOS but oestrogen receptor beta polymorphisms are not. (TA)<sub>n</sub> repeat polymorphism could serve as a marker for predicting the occurrence of PCOS in Singapore Chinese women.

#### P107

##### Predictors of Functional Outcome in Stroke Patients During Rehabilitation

**S SAXENA<sup>1</sup>, TP NG<sup>1</sup>, D YONG<sup>2</sup>, G KOH<sup>3</sup>**

<sup>1</sup>Psychological Medicine, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Geriatric Medicine, Changi General Hospital, Singapore, <sup>3</sup>COFM, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** The aim of this study was to identify predictors of functional outcome in stroke patients during their rehabilitation.

**Methods:** An observational cohort study was conducted on 200 stroke patients in 2 community hospitals in Singapore. The patients were examined and information retrieved from case notes on various sociodemographic, neurological and clinical variables upon admission and functional dependence upon discharge from hospitals. Validated tools of assessment were used to measure neurological, functional and psychological impairments, i.e., NIHSS, Barthel Index (BI), AMT and GDS scales.

**Results:** On admission, 54% of the patients were ADL-dependent, and 19% were ADL-dependent on discharge. In univariate analyses, the significant variables associated with ADL dependency at discharge were age ≥81 years [odds ratio (OR) = 4.21], cognitive impairment (OR = 5.50), depression (OR=2.35), severe ADL dependency (BI ≤50) on admission (OR = 18.20), severe neurological impairment (OR = 5.03), post-stroke dysphagia (OR =

3.88), urinary incontinence (OR = 9.07) and recurrent stroke (OR = 2.89). In multivariate analyses, the independent significant predictors were cognitive impairment (OR = 4.11, 95% CI 1.41, 11.95), ADL dependency upon admission (OR = 9.76, 95% CI 1.28, 74.12), severe neurological impairment on admission (OR = 2.70, 95% CI 1.31, 5.53) and recurrence of stroke (OR = 2.89, 95% CI 1.31, 5.53).

**Conclusion:** Functional recovery of stroke patients during their rehabilitation is predicted by various treatable clinical and psychological variables.

#### P108

##### Fungal Immunomodulatory Protein-Fve Induced CD2-dependent T Cell Activation and Proliferation through Protein Kinase C Signalling Pathway

**SV SEOW<sup>1</sup>, LM LIEW<sup>1</sup>, KY CHUA<sup>1</sup>**

<sup>1</sup>Paediatrics, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** A major problem in using therapeutic vaccines is the poor immunogenicity in the absence of adjuvants. Therefore, the development of an effective and safe vaccine adjuvant is the key to achieving good clinical efficacy in the disease protection and treatment by vaccination. We had demonstrated that a fungal immunomodulatory protein from edible mushroom *Flammulina velutipes*, designated as Fve, could induce activation and proliferation of T cells, production of IL-2, IFN-α, TNF-α/β, T-bet, IRF-1, NFκB, granzyme B and preferentially up-regulated OX40 and 4-1BB but not CD40L in CD3+ T cells. The 3-dimensional structure of this protein shows that Fve is a homodimer; each monomer consists of an N-terminal α-helix and β-strand followed by a fibronectin type III-like domain with immunoglobulin (Ig)-like fold structure. The presence of FNIII-like domain [Ig-superfamily (IgSF)-like domain] in Fve indicates that Fve shares structural similarity with human fibronectin domain, which might involve in integrin binding, and also binding with other IgSF molecules with Ig-like β-sandwich domain. We therefore investigate whether Fve may interact with integrin-like proteins or with the proteins of the IgSF, which are involved in cell adhesion, co-stimulation and activation.

**Methods:** To test this hypothesis, a selective panel of integrins and other adhesion molecules that regulate cell adhesion and proliferation were tested.

**Results:** Our preliminary data demonstrate that CD2 functional blocking antibodies could significantly inhibit the production of IFN-γ, TNF-α/β, and the proliferation of T cells induced by Fve stimulation. Furthermore, GF109203X, a specific protein kinase C (PKC) inhibitor can abrogate Fve-induced proliferation of T cells.

**Conclusion:** Our data suggested that Fve may trigger a CD2-dependent T cells activation and proliferation through PKC signaling pathway.

#### P109

##### Immunomodulatory Effects of *Lactobacillus rhamnosus* Strain GG in Healthy Mice

**SW SEOW<sup>1</sup>, YK LEE<sup>2</sup>, BH BAY<sup>3</sup>, R MAHENDRAN<sup>1</sup>**

<sup>1</sup>Surgery, <sup>2</sup>Microbiology, <sup>3</sup>Anatomy, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** *Lactobacillus rhamnosus* strain GG (LGG) is known to stimulate the host immune system following oral ingestion. However, little is known of the immune effects of LGG following instillations into healthy bladders. Our specific aim is to determine gene expression changes and immune cell migration to healthy murine bladders following LGG instillations.

**Methods:** Healthy female C57BL/6 (4–6 weeks old) mice were intravesically instilled for 4 or 6 weeks with viable  $1 \times 10^8$  cfu/100 μl LGG (treatment group) or phosphate buffered saline (control group) (n = 5 per group); mice were sacrificed 6 hours after the last instillation. Their bladders, iliac lymph nodes (ILN) and mesenteric lymph nodes were harvested for CD3+, CD4+, CD8+, macrophage and natural killer cell infiltration analysis using flow cytometry. Murine inflammatory cytokine and receptor mRNA expression in the bladders

were analysed using Oligo GEArray and confirmed using RT-PCR. The persistence of viable LGG in the bladder and surrounding tissues were also enumerated 24 and 48 hours post-instillation.

**Results:** Significantly more ( $P < 0.05$ ) immune cells were recruited to the bladders and ILN following 6 instillations compared to 4. Also, there were significantly more ( $P < 0.05$ ) CD4+ cells attracted to the iliac lymph nodes compared to controls after 6 weeks. However, mRNA expressions of inflammatory cytokines and receptors after 4 instillations were markedly greater than after 6 instillations. Most of the instilled LGG were cleared from the system after 24 hours.

**Conclusion:** Viable instillations of LGG did not result in host morbidity. Though mRNA expression of the inflammatory cytokines and receptors peaked at 4 weeks, the infiltration of immune cells into the bladder was still increasing after 4 instillations.

## P110

### Isoflavones from Traditional Chinese Herbs Function as Potent Dual Activators of Peroxisome Proliferator-activated Receptor Alpha and Gamma

P SHEN<sup>1</sup>, MH LIU<sup>1</sup>, TY NG<sup>1</sup>, EL YONG<sup>1</sup>

<sup>1</sup>Obstetrics & Gynaecology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** Peroxisome proliferator activated receptors (PPARs) are transcription factors that regulate the physiological response to dietary intake of fatty acids. Our study aims to search from traditional Chinese medicine for dual activators of PPARalpha and gamma, which may combine the benefits of insulin sensitisation (PPARgamma activation for type 2 diabetes) and lipid lowering (PPARalpha activation for hypolipidaemia) into a single drug.

**Methods:** A reporter gene assay was successfully established for crude extract screening and bioactivity-guided fractionation, in which an expression vector encoding the chimeric receptor Gal4DBD-PPARalpha/gamma LBD was introduced into HeLa cell together with a second plasmid containing Gal4 responsive elements cloned upstream of a firefly luciferase gene. The pure compounds isolated by using chromatographic techniques were then compared with other structurally similar flavonoids in HepG2 cells for full-length PPAR activities. The adipogenic induction followed by Oil Red O staining assay were then applied to elucidate their PPARgamma activities in 3T3-L1 preadipocytes.

**Results:** Two herbal extracts, *Astragalus membranaceus* (AM) and *Pueraria thomsonii* (PT) were significant activators of PPARalpha and PPARgamma. Comparison of the isoflavones isolated from AM, formononetin and calycosin, with other flavonoids (including genestein, etc., from PT), revealed that biochanin A and formononetin to be potent dual activators of PPARalpha and gamma. The flavones, diosmetin and apigenin, were found to be PPARgamma-selective.

**Conclusion:** Since isoflavones and flavonoids are compounds naturally presenting in herbs, soy, and other botanical foods, our study suggests that consumption of single or mixtures of them may have anti-diabetic and dyslipidaemia effects.

## P111

### *Streptomyces clavuligerus* Nrrl 3585 has Two Start Sites for Translating Isocitrate Lyase

BS SOH<sup>1</sup>, TS SIM<sup>2</sup>

<sup>1</sup>Stem Cell & Developmental Biology, Genome Institute of Singapore, Singapore, <sup>2</sup>Microbiology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** Isocitrate lyase (ICL), the first enzyme in the glyoxylate pathway, encoded by the aceA gene, is widely distributed among different organisms. The aim was to determine ICL existence and molecular arrangement in *Streptomyces clavuligerus*.

**Methods:** Using consensus internal primers based on bacterial isocitrate lyase (aceA) sequences, it was not surprising to find that *S. clavuligerus*

harbours ICL. The sequences of the full-length ICL gene, as well as its flanking regions, were accomplished via genome walking. Interestingly, the DNA sequences obtained revealed 4 putative ATG start sites (designated S1-S4). Four open reading frames of the *S. clavuligerus* aceA gene were cloned and heterologously expressed in *Escherichia coli*.

**Results:** The results showed that only S1 and S2 were read to transcribe ICL. Subsequent purification of the expressed proteins and demonstration of their functionality in biochemical assays confirmed the enzyme's identity. Amino acid alignment of *S. clavuligerus* ICL (S1 and S2) with that of *S. coelicolor* showed 92.9% and 93.4% identity, respectively.

**Conclusion:** Interestingly, the presence of multiple translational start sites was only observed in *S. clavuligerus* but not in *S. coelicolor* (as indicated by data genome searches). This suggests that these start codons might play different roles in the regulation of ICL expression in *S. clavuligerus*.

## P112

### Factors Responsible for Hypoxic Damage to the Developing Choroid Plexus

V SIVAKUMAR<sup>1</sup>, J LU<sup>2</sup>, C KAUR<sup>1</sup>

<sup>1</sup>Anatomy, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Defence Medical and Environmental Research Institute, DSO, National Laboratories, Singapore

**Aim:** Hypoxia/ischaemia in the perinatal period is associated with subependymal and intraventricular haemorrhages as well as ventricular enlargement in the developing brain. We aimed to examine the expression of some factors such as N-methyl-D-aspartate subunit 1 (NMDAR1), alpha-amino-3-hydroxy-5-methyl-4-isoxazole propionic acid (AMPA GluR2 and GluR3) and vascular endothelial growth factor (VEGF) in the choroid plexus (CP) in neonatal rats following hypoxic exposure as alterations in their expression might be involved in the hypoxic damage to the CP and hence an altered production of cerebrospinal fluid (CSF).

**Methods:** One-day-old Wistar rats were exposed to hypobaric hypoxia for 2 h and NMDAR1, GluR2, GluR3 and VEGF expression in CP was investigated by RT-PCR, Western blotting and immunohistochemistry at 3 hours to 14 days.

**Results:** NMDAR1, GluR2 and VEGF mRNA and protein expression showed a significant increase over the control values from 3 hours to 14 days whereas GluR3 expression did not show any significant change. Immunohistochemistry showed increased expression of NMDAR1, GluR2/3 and VEGF in CP epithelial cells after the hypoxic exposure.

**Conclusion:** It is concluded that enhanced VEGF expression may be involved in increased permeability of the blood vessels and vascular leakage after the hypoxic exposure. Increased expression of NMDAR1 and GluR2 may be due to increased levels of glutamate in the CSF in response to hypoxia. The expression of these receptors may be involved in modulating the synthesis/secretion of CSF in hypoxic conditions. NMDAR1 expression may also be damaging to the CP as it may lead to increased production of nitric oxide through neuronal nitric oxide synthase.

## P113

### Mechanical Properties of Novel Nanocomposites Developed for Dental Restorations

MS SOH<sup>1</sup>, A SELLINGER<sup>2</sup>, AUJ YAP<sup>1</sup>

<sup>1</sup>Restorative Dentistry, National University of Singapore - Faculty of Dentistry, Singapore, <sup>2</sup>MPM, Institute of Materials Research and Engineering, Singapore

**Aim:** The objective of this study was to determine and evaluate the mechanical properties of novel POSS-based nanocomposites (MA-POSS) and their effects as copolymers developed for dental applications. The mechanical properties obtained were compared with unfilled 1:1 Bis-GMA/TEGDMA polymeric resins (control). The setting reaction of all the polymeric resins conditioned in distilled water at 37°C was also investigated over a 7-day period.

**Methods:** The hardness and modulus of the control, MA-POSS and its hybrids containing 5, 10, 20 and 50 wt% MA-POSS ( $n = 7$ ) were determined using depth-sensing microindentation testing with the Instron Micro Tester at time intervals of 0, 1 and 7 days. Hardness data were obtained by dividing the peak load over the maximum projected contact area, while the modulus was calculated by analysis of the loading/unloading load-displacement (P-h) curves and the analytical model according to Oliver and Pharr. Results obtained were analysed using one-way ANOVA/Scheffe post-hoc test ( $P < 0.05$ ).

**Results:** Both hardness and modulus of MA-POSS and its hybrids were found to be significantly lower than the control at all time intervals. Modulus and hardness increased on storage for up to 1 day except for MA-POSS, which remained stable over the 7-day period. Both hardness and modulus of control and its hybrids decreased on day 7 after storage.

**Conclusion:** POSS-based dental materials resulted in lower hardness and modulus values when compared to the conventional Bis-GMA/TEGDMA systems. All polymeric resins continued to polymerise for at least 1 day after light activation except for MA-POSS.

#### P114

##### Low-shrinking Novel Poss Based Nanocomposites Developed for Dental Applications

**MS SOH<sup>1</sup>, A SELLINGER<sup>2</sup>, AUJ YAP<sup>1</sup>**

<sup>1</sup>Restorative Dentistry, National University of Singapore — Faculty of Dentistry, Singapore, <sup>2</sup>MPM, Institute of Materials Research and Engineering (IMRE), Singapore

**Aim:** The objective of this study was to design and develop novel low-shrinkage nanocomposites based on polyhedral oligomeric silsesquioxane (POSS) for dental composite applications. Synthesised POSS materials were mixed with control monomers in 5, 10, 20 and 50 wt% of POSS nanocomposite ratios and evaluated for post-gel shrinkage.

**Methods:** POSS-based nanocomposites with methacrylate and/or epoxide functionalities were synthesised. The post-gel polymerisation shrinkage of the synthesised materials was then investigated and compared with unfilled 1:1 (control) Bis-GMA/TEGDMA materials. All samples investigated were polymerised using a dental light-curing unit (BISCO VIP) at 500 mW/cm<sup>2</sup> for 40 seconds. A strain-monitoring device and test configuration was used to measure the linear polymerisation shrinkage of all polymers during and post light polymerisation up to 60 minutes. Three specimens were made for each material. Results obtained were analysed using ANOVA/Scheffe post-hoc test at significance level 0.05.

**Results:** At 1, 10, 30 and 60 minutes post light polymerisation, post-gel shrinkage associated with control polymers was found to be significantly higher than neat POSS nanocomposites and 50% control/nanocomposite mixtures. No significant difference was found between control and hybrid materials of 5 and 10 wt% at all time intervals.

**Conclusion:** POSS-based dental materials resulted in lower post-gel shrinkage when compared to the conventional Bis-GMA/TEGDMA systems. Hence, POSS-based polymers showed potential for use as dental restorations and represent an optimistic approach towards novel low-/non-shrinking dental materials.

#### P115

##### The Impact of the Introduction of a Medication Algorithm on Antipsychotic Prescribing

**KL SOO<sup>1</sup>, LY POON<sup>2</sup>, SA CHONG<sup>2</sup>**

<sup>1</sup>Surgery, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Early Psychosis Intervention, Institute of Mental Health/Woodbridge Hospital, Singapore

**Aim:** Antipsychotic polypharmacy (concurrent use of 2 or more antipsychotics) is a prevalent trend despite the lack of evidence-based data. The Early Psychosis Intervention Programme (EPIP) provides optimal evidence-based treatment to patients with first-episode psychosis, and this includes the

introduction of a medication algorithm which stresses on adequate trials of antipsychotic monotherapy. This study assessed the impact on antipsychotics use following the introduction of this algorithm.

**Methods:** A group of historical controls: 68 matched patients treated in the year 2000 were compared with 3 cohorts of patients admitted into the EPIP in 3 consecutive years. Details of antipsychotics usage were abstracted from the medical records. Psychopathology was assessed using the Positive and Negative Syndrome Scale (PANSS) and side effects were assessed with the Simpson-Angus Scale (SAS) and the Abnormal Involuntary Movement Scale (AIMS).

**Results:** Even at first contact, there was a reduction in antipsychotic polypharmacy in the EPIP patients (39.7% in the historical controls versus 25.0% in year 2001, 17.3% in 2002, and 29.5% in 2003). This trend was even more marked at 3 months: 17.7% in historical controls to 0.0% in both 2001 and 2002, and 2.1% in 2003. There was no significant difference in the PANSS, SAS and AIMS scores at 3 months for the 3 EPIP cohorts and for each cohort, there was a significant reduction of the PANSS scores at 3 months from baseline.

**Conclusion:** The introduction of a medication algorithm has reduced the polypharmacy of antipsychotics while achieving a significant reduction in the severity of the psychosis.

#### P116

##### Maternal Diabetes Increases the Risk of Congenital Heart Malformations by Downregulating BMP4 Gene Expression

**DK SRINIVASAN<sup>1</sup>, SSSY YANG<sup>1</sup>, T DHEEN<sup>1</sup>, SW TAY<sup>1</sup>**

<sup>1</sup>Anatomy, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** Maternal diabetes is well known to be associated with an increased risk of congenital heart malformations in the offspring of affected pregnancies. However, the exact mechanism is yet unclear. The objective of this study was to determine the molecular mechanisms of congenital heart malformations in the embryos of diabetic mice.

**Methods:** We examined the developing hearts of diabetic mice embryos by H&E staining, immunohistochemistry (IHC), Western blotting (WB) and quantitative polymerase chain reaction (qPCR).

**Results:** Histological examination of embryos of diabetic mice revealed that the developing heart showed a partial atrioventricular canal defect. As bone morphogenic protein 4 (BMP4) is known to be involved in the development of atrioventricular canal, we examined BMP4 protein expression by IHC and WB. BMP4 immunoreactivity was distributed to the sinus venosus, cardiomyocytes overlying the inferior endocardial cushion, and common cardinal vein during heart development. Embryos from diabetic mice showed a significant decrease in the number of BMP4 immunoreactive cells approaching the inferior endocardial cushion, and the common cardinal vein. It appeared that differentiation of cardiac neural crest destined to contribute to the cardiac ganglionic cells was affected by the down regulation of BMP4. We further showed that cardiac defects in embryos of diabetic mice were closely associated with enhanced downregulation of BMP4 gene expression by using the qPCR.

**Conclusion:** Our present results showed that embryos of diabetic mice were significantly more prone than embryos of non-diabetic mice to develop heart malformations, which could be due to altered expression of some genes involved in the heart development. This study was supported by a research grant (R181-000-075-112) from the ARF, NUS.

## P117

**Experience of Surgical Treatment for Oesophageal Cancer at the National University Hospital (NUH), Singapore: A Review from 1995 to 2004**DS SWEE<sup>1</sup>, BY SO<sup>2</sup><sup>1</sup>Surgery, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Surgery, National University Hospital, Singapore

**Aim:** Prognosis for patients of oesophageal cancer surgery has traditionally been poor, but there have been advances in both diagnostic and treatment modalities recently. A review of the NUH experience was conducted to demonstrate the pattern of clinicopathological profiles and evolution of treatment and outcomes.

**Methods:** Medical records of 29 patients who underwent curative resection from January 1995 to December 2004 were reviewed. Study period was divided into 2 periods (I: January 1995 to December 1999; II: January 2000 to December 2004) for comparison. Statistical significance was taken at  $P < 0.05$ .

**Results:** Median age was 70 (range, 38-81) years, with a predominance of males (86.2%), Chinese (75.9%), squamous cell carcinoma (72.4%), lower one-third intrathoracic oesophageal tumour (55.2%), advanced cancer presentation (67.9%), smoking history (75.9%) and history of dysphagia (86.2%). Age  $< 70$  years ( $P = 0.045$ ) and adenocarcinoma ( $P = 0.021$ ) were associated with advanced disease presentation. Endoscopic ultrasonography was utilised in 17 (58.6%) patients — 4 (25%) in period I, 13 in period II (100%) ( $P < 0.001$ ); accuracy was 72.7% and 63.6% for tumour and nodal staging respectively. One patient (6.25%) received neoadjuvant therapy during period I, compared with 6 (46.2%) during period II ( $P = 0.01$ ); all tumours were downstaged with 1 complete histological response (14.3%). Overall operative morbidity and mortality rates were 55.2% and 10.3%, respectively. Pneumonia (34.5%), atrial fibrillation (31.0%) and septicemia (27.6%) were the commonest complications. Anastomotic leakage occurred in 2 patients (6.9%). One-year survival rate was 65.0%.

**Conclusion:** The presentation of oesophageal cancer remained late. Younger age group and adenocarcinoma were associated with advanced stage. Endoscopic ultrasonography and neoadjuvant therapy have been increasingly being adopted during the recent period.

## P118

## P119

**Peak Detection of SELDI Measurements for Identifying Protein Biomarkers**CS TAN<sup>1,2</sup>, A PLONER<sup>2</sup>, A QUANDT<sup>2</sup>, J LEHTIÖ<sup>3</sup>, Y PAWITAN<sup>2</sup><sup>1</sup>COFM, Centre for Molecular Epidemiology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Department of Medical Epidemiology and Biostatistics, Karolinska Institutet, Sweden, <sup>3</sup>Cancer Centrum Karolinska, Karolinska Hospital, Sweden

**Aim:** Protein expression profiling data from the surface-enhanced laser desorption and ionisation (SELDI) technology are used to discover biomarkers for clinical diagnosis, prognosis and therapy prediction. The pre-processing of the raw data however is still problematic. We aimed to develop a peak detection method with much better specificity than the standard methods.

**Methods:** Scientists inspect individual spectra visually and laboriously to verify that the peaks identified by the standard method are real. Motivated by this multi-spectral practice, we investigated an analytical approach that reduced the data to a single spectrum of F-statistics, capturing significant variability between spectra. To account for multiple testing, we used a false discovery rate (FDR) criterion to identify potentially interesting proteins. To annotate the peaks, we obtained peak morphology templates from a spectrum, then fit them to the other spectra via least squares.

**Results:** We compared the proposed and standard methods using (1) lung cell line data consisting of 4 spectra from resistant- and sensitive-to-treatment strains and (2) spike in data consisting of duplicates for 7 levels of dilution. For data (1), our method has a lower false discovery rate of 8% versus 25% to 30% for the standard methods at 80% sensitivity. For data (2), the spike in protein was detected but our method had 1 false positive region compared with 30 from the standard method.

**Conclusion:** The proposed method has much better specificity than the standard methods. This will significantly reduce pre-processing time of SELDI spectra, especially for large studies.

## P120

**A User-friendly Text-mining Tool for Streptomyces Biology**D TAN<sup>1</sup>, SL GOH<sup>1</sup>, K RAJARAMAN<sup>2</sup>, S SWARUP<sup>3</sup>, V B BAJIC<sup>2</sup>, TS SIM<sup>1</sup><sup>1</sup>Microbiology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Knowledge Extraction Lab, Institute For Infocomm Research, Singapore, <sup>3</sup>Biological Sciences, National University of Singapore – Faculty of Science, Singapore

**Aim:** *Streptomyces spp.* are important microorganisms capable of producing a plethora of bioactive compounds with chemotherapeutic and pharmacological capabilities. The Dragon Streptomyces Explorer (DSE) system was developed to obtain an integrative picture of the relevant pieces of information from various sources of scientific records as present in PubMed database.

**Methods:** The DSE system provides information about potential association of 7 well-controlled vocabularies (Enzymes; Antibiotic compounds; *Streptomyces* species; Genes; Pathways; Morphology; Development) all specific to *Streptomyces* research in order to help biologists infer unusual functional associations.

**Results:** This user-friendly text-mining tool was able to demonstrate how various combinations of vocabularies can be applied to derive associations connecting the genes involved in secondary metabolic pathways, identifying a regulatory element in *Streptomyces* biology and investigating the prevalence of a specific enzyme involved in antibiotic synthesis leading to the design of experiments.

**Conclusion:** This tool is especially useful for researchers handling knowledge that has to be gained rapidly from data-intensive approaches. In addition, it can be helpful to researchers in summarising an immense amount of biological information in a short time. DSE is freely available for academic and non-profit users at <http://research.i2r.a-star.edu.sg/DRAGON/DSE2/>.

WITHDRAWN

**P121**

**Mycosis Fungoides: A Retrospective Review of 131 Patients at the National Skin Centre, Singapore**

**EST TAN<sup>1</sup>, MBY TANG<sup>2</sup>, SH TAN<sup>2</sup>**

<sup>1</sup>Medicine, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Dermatology, National Skin Centre, Singapore

**Aim:** Mycosis fungoides (MF) is the most common form of primary cutaneous T-cell lymphoma. This study sought to identify significant epidemiological trends and associations that may have an impact on outcome and disease management.

**Methods:** This was a retrospective review of 131 new patients diagnosed with MF at the National Skin Centre over a five-year period from 2000 to 2004. Data were retrieved from the electronic Cutaneous Lymphoma Database, in the NHG Central Clinical Research Database.

**Results:** Our results showed that elderly patients had a longer duration of symptoms and required more biopsies for diagnosis. Patients with early-stage disease (T1/T2) were younger than those with advanced disease (T3/T4). The most common disease variants were classical (46.6%) and hypopigmented (35.9%). Classical MF was characterised by a strong male preponderance, with the male-to-female ratio being 4.5:1; hypopigmented MF had no gender predisposition and was more prevalent in young patients, with a mean age at diagnosis of 21.6 years. Patients who were female, aged below 23 years, or had duration of symptoms of less than 3 years were more likely to have complete remission at 1-year follow-up ( $P \leq 0.05$ ).

**Conclusion:** MF has a longer pre-diagnostic phase in the elderly, so a higher index of suspicion is helpful. The most significant prognostic factors for 1-year outcome were the patient's age, gender and duration of symptoms. While MF is generally an indolent cutaneous lymphoma, early diagnosis and intervention may be associated with better clearance and prevention of further progression of disease.

**P122**

**Proteomic Analysis of Hypochlorous Acid-treated HepG2 Hepatoma Cells**

**GS TAN<sup>1</sup>, MCM CHUNG<sup>1</sup>, M WHITEMAN<sup>1</sup>**

<sup>1</sup>Biochemistry, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** Oxidative damage to tissue proteins has been implicated in the pathogenesis of various inflammatory diseases such as atherosclerosis, respiratory distress, ischaemia-reperfusion injury, and liver cirrhosis. Liver cirrhosis is often preceded by overt signs of hepatitis, including parenchymal cell inflammation and infiltration of polymorphonuclear (PMN) leukocytes. Activated PMNs release both reactive oxygen species and reactive halogen species, including hypochlorous acid (HOCl), which has been shown to participate in the oxidation and chlorination of proteins. Additionally, it is also known to deplete intracellular ATP, reduce glutathione (GSH) and cause necrotic/apoptotic cell death. Thus, it would be of interest to identify protein targets in liver cells that are affected by this oxidant. The identification of these proteins will enable us to understand the underlying basis of chlorination, oxidation and its effect on molecular functions.

**Methods:** In our study, we employed a 2-dimensional difference gel electrophoresis (2D-DIGE) approach to profile the differentially expressed proteins of HepG2, a human hepatoma cell line, after treatment with HOCl. This was followed by Western blotting and mass spectrometry to locate and identify the oxidised and potential chlorinated proteins.

**Results:** A total of 14 differentially expressed proteins following HOCl treatment (4 up-regulated, 10 down-regulated) were identified. Two of these proteins were shown to be oxidised based on the Western blotting results.

**Conclusion:** We have shown that HOCl treatment of HepG2 cells can lead to changes in their protein expression profiles. It is highly significant that many of these differentially expressed/oxidised proteins have known roles in cellular apoptosis and oxidative/chlorinative stress.

**P123**

**Comparative Proteomics of Butyrate-treated HCT-116 Colorectal Cancer Cells via 2-D DIGE Analysis after Enrichment with Heparin Affinity Chromatography**

**HT TAN<sup>1</sup>, ZM RAMDZAN<sup>1</sup>, SBE TAN<sup>1</sup>, MCM CHUNG<sup>1</sup>**

<sup>1</sup>Biochemistry, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** Colorectal cancer is one of the most prevalent malignancies in developed countries, and ranks as the common cancer in Singapore. Butyrate, a fermentation product of fibre, is believed to mediate the protective role of high dietary fibre intake in this disease. To better understand the mechanism of butyrate's chemopreventive role, we performed comparative proteomics of butyrate-treated HCT-116 colorectal cancer cells with 2-dimensional difference gel electrophoresis (2-D DIGE).

**Methods:** In order to delve deeper into the proteome, we pre-fractionated the crude cell extract using heparin affinity chromatography prior to 2-D DIGE.

**Results:** Through a combination of this enrichment step with overlapping narrow range IPGs (pH 4 to 7 and pH 6 to 11) in 2-D DIGE, we detected 22 and 24 differentially expressed spots from the acidic and basic range, respectively. Among these, 24 protein spots were identified by MS analyses. Five were shown to be heterogeneous nuclear ribonucleoprotein A1 (hnRNP A1). Three with Mr ~38 kDa were down-regulated and 2 with Mr ~26 kDa were up-regulated. Using 2-DE and Western blot analysis, we verified that native hnRNP A1 underwent post-translational modifications upon butyrate treatment. In addition, analysis of the subcellular compartment indicates the cleavage of hnRNP A1, which is localised to the cytosol of butyrate-treated HCT-116 cells.

**Conclusion:** Modulations of hnRNP A1 may play a pivotal role in the mediation of growth arrest and apoptosis by butyrate.

**P124**

**Assisted Reproduction System Using Computer-controlled Piezo Manipulator**

**KK TAN<sup>1</sup>, SN HUANG<sup>2</sup>, LG TAN<sup>2</sup>**

<sup>1</sup>Bioengineering Programme, National University of Singapore - Staff & Student - Office of Life Sciences, Singapore, <sup>2</sup>Obstetrics & Gynaecology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** Low fertility rate is a nationwide problem in Singapore. Prime Minister Lee Hsien Loong suggested that the government to provide policy and incentives to encourage and boost the birth rate. Apart from the work of the government, developing an assisted fertility technique will be an important area. The main objective of the proposed piezo manipulator is to directly puncture the zona of the oocyte with minimum undue stress to the oocyte, without requiring the use of mercury to aid the operation as in reported piezo intracytoplasmic sperm injection (ICSI) processes.

**Methods:** We proposed a computer system to assist doctors in doing ICSI. The proposed system uses a highly precise piezoelectric actuator, under a novel computer-controlled sequence, to execute ICSI in an efficient and precise manner.

**Results:** A total of 182 oocytes were collected for the piezo-ICSI. The oocytes were examined between 3 and 5 hours after injection. The average survival rates achieved was 91.21%, which is higher than other reported rates. It is observed that the ability of an injected oocyte to develop into blastocyst is close to that of non-injected oocytes, reflecting that the injection process does not affect the subsequent development of the oocytes in a significant way.

**Conclusion:** The proposed technique offers several advantages: 1) there is no special requirement in the manufacturing of the needle; 2) we do not require the use of toxic mercury in the pipette; 3) an air syringe system is used, while the previous results in piezo-ICSI design are based on oil or water syringe systems. Finally, a high oocyte survival rate can be achieved.



## P125

**Discovery of Protein Markers in Colorectal Cancer under Normoxic and Hypoxic Conditions****WW TAN<sup>1</sup>, QS LIN<sup>1</sup>, TK LIM<sup>1</sup>, SB JOSHI<sup>1</sup>, YC LIOU<sup>1,2</sup>, CL HEW<sup>1</sup>**<sup>1</sup>Biological Sciences, National University of Singapore – Staff & Students – Office of Life Sciences, Singapore, <sup>2</sup>Biochemistry, National University of Singapore – Yong Loo Lin School of Medicine, Office of Life Sciences, Singapore

**Aim:** In many cancers, the blood vascular network is disrupted, and a hypoxic microenvironment is formed within the tumours. This poses a major problem for accurate and efficient cancer therapies and prognosis. By comparing the protein profiles between normoxic and hypoxic colorectal cells (HCT116), we aimed to identify novel biomarkers in colorectal cancer for more effective diagnosis and therapy. Furthermore, to determine the role(s) played by p53 in colorectal cancers and during hypoxia, we compared protein profiles of HCT116 p53<sup>-/-</sup> with its wildtype.

**Methods:** The cells were grown under hypoxic (1% O<sub>2</sub>) and normoxic (20% O<sub>2</sub>) conditions in a CO<sub>2</sub> incubator. Assessment of their global protein profiles was done using iTRAQ, which allowed us to label and compare all 4 samples concurrently, followed by 2-DLC separation and MS/MS protein identification and quantitation.

**Results:** We have identified many up- (>80) and down-regulated (>90) targets in the hypoxia samples and in HCT116 p53<sup>-/-</sup>, with abundance changes greater than 30%. Interestingly, several up- (annexin A2, EIF3S9 and haemoglobin epsilon chain) and down-regulated proteins (methionine adenosyltransferase II and histidine triad nucleotide-binding protein 1) were observed in HCT116, but not in HCT116 p53<sup>-/-</sup>, during hypoxia. This indicates that these proteins might be regulated by p53 during hypoxia. An ontology analysis of these up-regulated proteins in hypoxic HCT116 cells revealed that many were involved in the regulation of transcription, protein synthesis and mitochondrial processes.

**Conclusion:** Our study has revealed many potential biomarkers, some of which are regulated by p53 during hypoxia, which may lead to better diagnosis and therapy.

## P126

**Rapid, Sensitive and Cost-effective Detection of BRAF and KRAS Mutations by Pyrosequencing****YH TAN<sup>1</sup>, WQ LI<sup>2</sup>, B LACOPETTA<sup>3</sup>, R SOONG<sup>1</sup>**<sup>1</sup>National University Medical Institute, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>School of Surgery and Pathology, The University of Western Australia, Australia

**Aim:** Experts have recently advocated the use of microsatellite instability (MSI) analysis for identifying individuals with hereditary non-polyposis colorectal cancer (HNPCC). However, MSI develops in both HNPCC and sporadic colorectal cancers. Recent results have shown BRAF and KRAS mutations distinguish HNPCC from sporadic-derived MSI colorectal cancer (CRC), highlighting a potential diagnostic utility for detecting these mutations. Currently, the most common method for BRAF and KRAS mutation analysis is direct sequencing, which is expensive and time-consuming, while other developed methods provide no sequence confirmation. Pyrosequencing has been proven to be a convenient, cost-effective and rapid method for genotyping with a real-time sequence output. The aim of this study was to develop pyrosequencing assays for BRAF and KRAS mutation detection.

**Methods:** PCR and pyrosequencing primer sets, conditions and dispensation orders were all optimised to determine ideal parameters for identification of BRAF and KRAS mutations. Colorectal and gastric cancer cell lines with known BRAF and KRAS mutation status were used to test the validity of the assay.

**Results:** Our results showed a complete concordance between mutation status detected by pyrosequencing and that determined in previous studies. Pyrosequencing took 10 minutes and cost assessment showed that pyrosequencing could reduce analysis costs by 50% compared to direct sequencing.

**Conclusion:** In conclusion, our results show pyrosequencing to be a sensitive

and specific, rapid, cost-effective alternative for detecting BRAF and KRAS mutations with a sequencing output. Further large-scale studies on clinical samples will help define the potential clinical value of these assays.

## P127

**MalariaCount: An Image Analysis-based Algorithm for the Rapid Determination of Parasitemia Applied to Malaria Drug Sensitivity Assays****KSW TAN<sup>1</sup>, S SIO<sup>1</sup>, WL SUN<sup>1</sup>, SS TAN<sup>1</sup>, S KUMAR<sup>2</sup>, SH ONG<sup>2</sup>, Y OSHIMA<sup>3</sup>**<sup>1</sup>Microbiology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Division of Engineering, National University of Singapore, Singapore, <sup>3</sup>Graduate School of Pharmaceutical Sciences, Tohoku University, Japan

**Aim:** The aims of our study were to develop an image analysis-based software for the rapid and accurate determination of parasitemia from malaria cultures and to apply this software to drug sensitivity assays. Routine culture, drug susceptibility and vaccine efficacy assays often involve determination of the percentage of red blood cells (RBCs) infected with the malaria parasite (parasitemia).

**Methods:** The general approach to determining parasitemia is by manual counting, which is laborious and prone to human error. In this study, we have developed an algorithm (MalariaCount) using the MATLAB platform that automatically generated parasitemias from images of Giemsa-stained blood smears. MalariaCount was tested against 200 digitally captured images (100x oil-immersion field) that had previously been manually characterised and archived.

**Results:** Linear regression analysis revealed good correlation between manual counts and MalariaCount (R = 0.982, P < 0.0001). Blood films negative for parasites generated 0% parasitemia, indicating that the algorithm was specific for infected RBCs. We then investigated the utility of this software in drug sensitivity assays. Linear regression analyses revealed that MalariaCount was able to accurately determine percentage of parasitemias of malaria cultures exposed to varying doses of either chloroquine (R = 0.958, P < 0.0001) or febrifugine (R = 0.928, P < 0.05).

**Conclusion:** This software, used in conjunction with a microscope equipped with a motorised platform, can potentially be used for the rapid, accurate and automated determination of parasitemia in in vitro drug sensitivity assays and from blood samples obtained from clinical samples.

## P128

**Functional Significance of Heterotypic and Homotypic Interacting Domains of Flavivirus PrM Protein****TTT TAN<sup>1</sup>, B RAGHAVAN<sup>1</sup>, J LI<sup>1</sup>, ML NG<sup>1</sup>**<sup>1</sup>Microbiology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** The objective was to elucidate the functional role of heterotypic and homotypic interaction domains of prM protein during flaviviruses assembly.

**Methods:** Yeast-Two Hybrid (Y2H) was used to map the interaction between prM/E and prM/prM. Multiple sequence alignment (MSA) with other flaviviruses was carried out to select residues for mutagenesis work (alanine scanning (ASM) and internal deletion). Plaque and growth kinetics assays were used to examine the effects of the deletions on virus production.

**Results:** The putative domains in West Nile virus prM protein that inter-associates with E protein or self were identified by Y2H analyses. The results confirmed the prM-E interaction and uncovered a novel self-association of prM proteins. N and C terminal truncation study of prM showed that the first 45 amino acids (a.a) and the last 74 a.a. were not required for prM-E dimerization. MSA revealed the presence of 2 highly conserved a.a. clusters (a.a. 46th to 52th and a.a. 61th to 65th) in the putative heterotypic region. Y2H study also delineated the putative self-associating domain of prM at a.a. 76th to 93th. MSA analysis indicates the region to be highly conserved in flaviviruses. Initial functional testing using dengue-2 virus infectious clone

with the prM-E deletions suggested that the 2 postulated clusters are important for virus viability. Similar experiments will be performed to examine the significance of the homo-interacting site of prM protein.

**Conclusion:** Two predicted prM/E clusters are crucial in prM/E interaction. Understanding the critical elements involved in viral protein assembly can pave the way to generating effective antiviral therapeutics.

**P129**

**Stapled Haemorrhoidectomy — A Retrospective Study of its Safety and Efficacy**

**CL TANG<sup>1</sup>, Z WANG<sup>2</sup>, JL YAP<sup>2</sup>**

<sup>1</sup>Colorectal Surgery, Singapore General Hospital, Singapore, <sup>2</sup>Yong Loo Lin School of Medicine, National University of Singapore, Singapore

**Aim:** Stapled haemorrhoidectomy has been performed as a day case procedure as it is associated with less postoperative pain compared to conventional techniques. This study aims to review a prospectively collected database in this setting, assessing the efficacy and complication rates of stapled haemorrhoidectomy.

**Methods:** All patients who underwent stapled haemorrhoidectomy from 1 October 2003 to 31 July 2004 at the Singapore General Hospital were included. Patients were followed for at least 9 months. The duration of admission, number of colorectal specialist outpatient clinic visits, and number and duration of readmissions and/or resurgeries were studied. Patients who fulfilled the screening criteria of a prolonged admission, more than 3 postoperative outpatient visits, readmissions, and/or resurgeries, were chosen for further appraisal. Complications noted were urinary retention, significant haemorrhage, anal/rectal stricture, serious infection, and severe pain.

**Results:** 1129 patients were reviewed. The mean duration of admission was 16.9 hours (SEM0.5). The readmission rate was 7.2% with a mean duration of 3.0 days (SEM0.4). The resurgery rate was 2.8%. The rate of recurrent haemorrhoids was 0.4%. The overall complication rate was 14.5%, with 4.4% urinary retention, 6.3% significant haemorrhage, 2.2% anal/rectal stricture, 0.1% serious infection and 4.4% severe pain.

**Conclusion:** Stapled haemorrhoidectomy is a safe and efficacious procedure with complication rates similar to that of conventional haemorrhoidectomy. Life-threatening complications are rare and there was no noted mortality. The rate of anal/rectal stricture varies among surgeons, and appears to be technique-related. Positive associations were found between pain and urinary retention, and between bleeding and the development of anal/rectal stenosis.

**P130**

**A Comparative Study of the “Custom Control Software” Mode and the Conventional Pulse Mode Phacoemulsification on the Millennium Microsurgical System**

**ZH TANG<sup>1</sup>, CC YIP<sup>2</sup>**

<sup>1</sup>Ophthalmology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Ophthalmology, Tan Tock Seng Hospital, Singapore

**Aim:** To compare the differences in average ultrasound phaco power and absolute ultrasound phaco time and evaluate the clinical outcomes, safety and efficacy with standard pulse and Millenniumä custom control software phacoemulsification.

**Methods:** This retrospective non-randomised study comprises of 81 eyes of 81 patients. The average ultrasound (AUS), elapsed ultrasound time (EUST), absolute ultrasound time [(AUST), an effective phacoemulsification time equivalent]) and the incidence of first-day postoperative corneal edema (POCE) of patients undergoing standard pulse phacoemulsification and that of patients undergoing Bausch & Lomb Millenniumä custom control software phacoemulsification are compared. Patient age, lens density, BCVA (pre- and postoperative visual acuity) and intraocular pressure, POCE, presence of Descemet’s folds and wound burns were assessed.

**Results:** The mean ages were 66.7 ± 9.97 years (pulse mode group) and 66.3

± 10.7 years (CCS mode group). The mean LogMAR vision improvement was 0.216 (pulse mode) and 0.280 (CCS mode), while POCE incidence was 38.5% (pulse mode) and 28.6% (CCS mode). AUS was 12.4% and 15.0 for pulse and CCS mode respectively, but the EUST and AUST were longer in pulse mode group (74.5 ± 35.2 and 9.51 ± 7.58 seconds respectively) than CCS mode group (60.5 ± 18.5 and 9.14 ± 4.62 seconds, respectively).

**Conclusion:** The hyperpulse modulation with CCS is more efficient than the pulse mode on Millenniumä Microsurgical System in terms of EUST and AUST with less POCE. The visual recovery seems faster with the CCS.

**P131**

**Sphingosine Kinase is Involved in Mediating the Effector Functions Triggered by FcεR1**

**HK TAY<sup>1</sup>, AJ MELENDEZ<sup>1</sup>**

<sup>1</sup>Physiology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** Aggregation of high-affinity receptors for immunoglobulin E (IgE) (FcεR1) on mast cells triggers the release of histamine-containing granules, synthesis of eicosanoids, release of matrix metalloproteinases (MMP) and various cytokines. These mediators are responsible for the major symptoms of immediate hypersensitivity reactions such as allergies and rhinitis. As mast cells release these potent biologically active mediators in response to challenge with IgE and specific antigens, they have been long regarded as the key effector cells in IgE-associated immediate hypersensitivity and allergic disorders. We have previously showed that sphingosine kinase mediates calcium mobilisation and mast cell degranulation triggered by FcεR1 is dependent on activation of sphingosine kinase and phospholipase D. Here, we wanted to investigate the role of sphingosine kinase in the effector functions triggered by FcεR1.

**Methods:** Techniques used include Western blotting for mitogen-activated protein kinase (MAPK) activation, enzyme linked immunosorbent assays (ELISA) for measurement of cytokines, MMP activity as well as NFκB activation.

**Results:** We showed that activation of FcεR1 on human cord blood-derived mast cells led to the release of leukotrienes, prostaglandins, MMP-9 and cytokines such as TNFα, MCP-1 and IL-6. Using the SPHK inhibitor N,N-dimethylsphingosine (DMS), inhibition of SPHK abolishes the release of these mediators from the mast cells. Also, FcεR1 triggers activation of MAPK.

**Conclusion:** Our data showed that FcεR1 in human mast cells utilise sphingosine kinase in mediating the downstream effector responses.

**P132**

**Van der Woude Syndrome: A Novel Spontaneous Mutation in IRF6**

**J TAY<sup>1</sup>, EC TAN<sup>2</sup>, VKL YEOW<sup>3</sup>, ST LEE<sup>4</sup>**

<sup>1</sup>Medicine, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Population Genetics, Defence Medical & Environmental Research Institute, Singapore, <sup>3</sup>Craniofacial Unit, KK Women’s & Children’s Hospital, Singapore, <sup>4</sup>Plastic, Reconstructive & Aesthetic Surgery, Singapore General Hospital, Singapore

**Aim:** Van der Woude syndrome (VWS) is an autosomal dominant disorder characterised by cleft lip and/or palate, lip pits, and hypodontia. It is the most common form of syndromic orofacial clefting. Mutations in the interferon regulatory factor 6 (IRF6) on chromosome 1q32-q41 have been found in many VWS families. We would like to report a novel spontaneous mutation responsible for VWS in one of a pair of dizygotic twins.

**Methods:** Venous blood samples were collected from both unaffected parents, the affected child and her unaffected twin. DNA was extracted and haplotype matching was performed. Exons 1 to 10 of the IRF6 gene were amplified by PCR. The amplified products were purified (Qiagen) and direct sequencing was performed with forward and reverse primers separately on a MegaBACE 1000 DNA sequencer. The sequence was then analysed using ChromasPro.

**Results:** Parents and children were found to be genetically related by haplotype matching. A G>C substitution was found in exon 2 of IRF6 of the affected child. This mutation was absent in both parents and the unaffected twin, all of whom are homozygous for the wildtype allele. The site of mutation was 34bp downstream from the start codon, and resulted in a glutamic acid to glutamine substitution.

**Conclusion:** We proposed that this sequence difference between the twins would result in the VWS phenotype found only in the affected twin. Our observations demonstrate that spontaneous mutation in the IRF6 gene can be a cause of VWS and confirm that the disorder is autosomal dominant.

### P133

#### Potent Effects of IC31, a Novel Adjuvant that Induces Strong Humoral Immune Responses against the Receptor-binding Fragment of SARS Coronavirus Spike Protein

**N TELUGUAKULA<sup>1</sup>, NA PEREIRA<sup>1</sup>, FT CHEW<sup>2</sup>, SH WONG<sup>3</sup>, L KAREN<sup>4</sup>, DR KOH<sup>1</sup>, VTK CHOW<sup>3</sup>**

<sup>1</sup>Physiology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Biological Sciences, National University of Singapore – Faculty of Science, Singapore, <sup>3</sup>Microbiology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>4</sup>Intercell Biomedical Research and Development AG, Intercell, Austria

**Aim:** To test the efficacy of a novel adjuvant, IC31, which contains immunostimulatory oligodeoxynucleotide and a cationic peptide, in inducing humoral immune responses against a recombinant fragment of spike protein (designated S6 and spanning amino acids 347-520 containing the receptor-binding region).

**Methods:** Female BALB/c mice were immunised with S6 fragment of Spike protein, mixed in various concentrations of IC31 adjuvant, and compared with Freund's adjuvant. The antibody responses were analysed by ELISA.

**Results:** The antibody titers increased with rising concentrations of IC31 in a dose-dependent manner. Furthermore, high concentrations of IC31 generated higher antibody titres than Freund's adjuvant. No physical or pathological abnormalities were observed in the animals following immunisation with IC31.

**Conclusion:** These results suggest the potential application of IC31 as a potent vaccine adjuvant for immunisation against SARS.

### P134

#### Associations of Home Dampness and Mould with Asthma and Allergies in Young Singapore Children

**KW THAM<sup>1</sup>, MS ZURAIMI<sup>1</sup>, D KOH<sup>2</sup>, FT CHEW<sup>3</sup>, PL OOH<sup>4</sup>**

<sup>1</sup>School of Design and Environment, National University of Singapore, Singapore, <sup>2</sup>COFM, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>3</sup>Structural Biology and Proteomics Programme, National University of Singapore - Staff & Student - Office of Life Sciences, Faculty of Science, Singapore, <sup>4</sup>Disease Control, Ministry of Health, Singapore, Singapore

**Aim:** To identify associations of some asthmatic and allergic symptoms of young children (aged 1 to 6 years) with visible damp stains (VDS) and indoor mould (IM) in children's bedrooms.

**Methods:** A cross-sectional study adopting the ISAAC questionnaire for asthma and allergies was conducted on 7694 children (4759 responded - 70.0%) attending 120 randomly selected daycare centres. Demographic, VDS and IM information was also solicited. Prevalence rate ratios (PRR) and 95% CI were determined by Cox proportional hazard regression model with a constant risk period controlled for age, sex, race, social economic status (SES), ETS exposure, parental atopy and food allergy.

**Results:** VDS is significantly ( $P < 0.05$ ) associated with current rhinoconjunctivitis (PRR 1.81, CI 1.12-2.93), current (PRR 1.71, CI 1.17-2.49) and doctor-diagnosed eczema (PRR 1.52, CI 1.06-2.16). IM is significantly ( $P < 0.05$ ) associated with current wheeze (PRR 1.23, CI 1.01-1.49), cough variant asthma (PRR 1.30, CI 1.10-1.54), current

rhinoconjunctivitis (PRR 1.56, CI 1.20-2.05), current (PRR 1.28, CI 1.09-1.49) and doctor-diagnosed rhinitis (PRR 1.39, CI 1.01-1.89), current (PRR 1.29, CI 1.04-1.61) and doctor-diagnosed (PRR 1.31, CI 1.05-1.62) eczema.

**Conclusion:** Indoor dampness and mould in children's bedroom are important risk factors of asthma and allergic symptoms in young children in Singapore.

### P135

#### Air Temperature Effects on Salivary Cortisol and $\alpha$ -amylase Concentration of Tropically Acclimatised Subjects Performing Office Work

**KW THAM<sup>1</sup>, HC WILLEM<sup>1</sup>, V NG<sup>2</sup>, A WEE<sup>2</sup>, D KOH<sup>2</sup>**

<sup>1</sup>School of Design and Environment, National University of Singapore, Singapore, <sup>2</sup>COFM, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** To determine the effects of moderate thermal stress on selected biomarkers of tropically acclimatised subjects performing office work.

**Methods:** Twenty-four male and 24 female healthy subjects (aged 18 to 23 years) performed simulated office tasks for 4-hour sessions in a field environmental chamber. During each session, subjects were exposed to either 1 of the 3 selected air temperatures, i.e., 20°C, 23°C and 26°C in a counter-balanced experimental design. Passive sampling of saliva samples were conducted before and after each exposure. Collected samples (volume mean/SD: 6.0/8.1 mL) were centrifuged at 1500 rpm at 4°C for 10 minutes, divided into 5 aliquot parts and analysed based on the ELISA method using the cortisol and  $\alpha$ -amylase EIA kits.

**Results:** The effect of air temperature was significant for cortisol and  $\alpha$ -amylase concentrations only for samples collected after exposure. Cortisol concentrations were significantly lower after the 4-hour exposure. Exposures to moderate cold (20°C) and heat stress (26°C) led to a reduced cortisol level of approximately 2.01 and 1.89 times, respectively. Cortisol level was also 1.13 times higher at 26°C compared to 20°C ( $P < 0.005$ ). On the contrary, the levels of  $\alpha$ -amylase were elevated after the 4-hour exposure and the effects were more pronounced at lower air temperatures. Concentration of  $\alpha$ -amylase increased by 1.76, 1.49 and 1.27 times after exposure to air temperatures of 20°C ( $P < 0.005$ ), 23°C ( $P < 0.001$ ) and 26°C ( $P < 0.020$ ), respectively.  $\alpha$ -amylase concentration was 1.70 times higher at 20°C than that of 26°C ( $P < 0.001$ ).

**Conclusion:** Moderate thermal stress reduces salivary cortisol and increases  $\alpha$ -amylase concentrations of subjects performing office tasks after 4-hour exposure.

### P136

#### Urine Analysis of Patients undergoing BCG Immunotherapy using SELDI-TOF-MS

**SM THAM<sup>1</sup>, VB BAJIC<sup>2</sup>, K ESUVARANATHAN<sup>1</sup>, R MAHENDRAN<sup>1</sup>**

<sup>1</sup>Surgery, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Knowledge Extraction Lab, Institute For Infocomm Research, Singapore

**Aim:** Transurethral surgery and intravesical Bacillus Calmette-Guérin (BCG) immunotherapy are the current gold standard in treating high-risk superficial bladder cancer. However, a significant proportion of patients do not respond to BCG therapy and risk disease progression. Our objective is to find a fast and effective method to analyse urinary markers that can predict response to therapy.

**Methods:** Urine samples collected from 39 patients before they received intravesical BCG immunotherapy in a Phase 2 clinical trial were analysed using surface enhanced laser desorption/ionisation-time of flight-mass spectrometry (SELDI-TOF-MS). The sample was applied onto an anion (Q10) and a cation (CM10) chip. The chips were then washed with buffer and the proteins that remained on the surface were identified according to their mass-to-charge ratio.

**Results:** Responders (n = 19) and non-responders (n = 20) were split into training and test groups. From the training group, key protein spectra

components larger than 2 kD were determined and used to generate a linear discriminant model that separated responders and non-responders. Our model used only 4 protein spectral components and was based on 2 responder and 2 non-responder cases in the training set. When applied to the test set that contained the remaining 17 responder and 18 non-responder cases, we were able to correctly predict which patients responded to the treatment.

**Conclusion:** We found some potential biomarkers in the urine of bladder cancer patients receiving intravesical BCG instillation. Identification of these proteins and analysis of more patient samples will determine if these markers could be developed as prognostic indicators of response to BCG therapy.

### P137

#### Quantification of Pulmonary Embolism and Severity Assessment with CT Pulmonary Angiography as Predictors of Patient Outcome

**S VENKATESH<sup>1</sup>, SC WANG<sup>2</sup>**

<sup>1</sup>Diagnostic Radiology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Diagnostic Imaging, National University Hospital, Singapore

**Aim:** To evaluate (a) whether quantification of pulmonary embolus (PE) with CT pulmonary angiography (CTPA) using a standardised index is a predictor of outcome and (b) CT indicators of severe pulmonary embolism (PE).

**Methods:** Multi-detector CT was performed in 100 patients (mean age, 59.43 years; range, 27 to 94 years). PE was identified per vessel till the sub-segmental level. A pulmonary arterial obstruction index (PAOI) was derived for each patient based on embolus size and location using standardised obstruction index. We also evaluated ventricular chamber sizes, chamber ratio and pulmonary artery diameter on CTPA for assessment of severity of PE. A minimum of 6 months follow-up period was done and clinical outcome was compared. Ten patients died of pulmonary embolism, 13 patients due to other causes and 77 were alive at the time of data collection.

**Results:** Patients who died of PE had significantly higher PAOI than patients dying of other causes (65.10 vs 37.83,  $P = 0.03$ ) and are likely to have significantly more central emboli compared to those who die of other causes following PE (5.8 vs 3.07,  $P = 0.047$ ). Patients who survive PE are likely to have lower PAOI (50.59,  $P = 0.09$ ). The mean right ventricle chamber diameter is significantly higher in patients who die of pulmonary embolism as compared to others (58.80 vs 52.98 and 41.12,  $P = 0.016$ ).

**Conclusion:** High PAOI (>65) is an important predictor of adverse outcome in cases of pulmonary embolism. Acute right ventricular dilatation and presence of more central emboli indicates severe pulmonary embolism and the aggressive treatment is indicated.

### P138

#### Utility of Diffusion Weighted Imaging in Focal Liver Lesions

**S VENKATESH<sup>1</sup>, G LAU<sup>2</sup>, C AU<sup>2</sup>, SC WANG<sup>1</sup>**

<sup>1</sup>Diagnostic Radiology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Diagnostic Imaging, National University Hospital, Singapore

**Aim:** To describe the utility of diffusion weighted MR imaging (DWI) in evaluation of focal liver lesions.

**Methods:** DWI was performed in 50 clinical patients and 10 normal volunteers. DWI was performed with single breath-hold sequence. Two sequences were performed for b values 0,200 and 0,500. Apparent diffusion coefficients (ADC) were calculated on a separate work station for normal liver parenchyma, gall bladder, spleen, kidneys, cirrhotic liver (25) and focal lesions of liver including hepatocellular carcinomas (32) metastases (12), pyogenic abscess (2), hepatic adenoma (1), liver cysts (30), post-traumatic collection in liver (1), leiomyoma (1) and haemangioma (4).

**Results:** DWI demonstrated all lesions larger than 2 cm in liver. Most of the focal lesions were better demonstrated on DWI as compared to T2-W images. The signal intensity of normal liver and lesions on DWI was lower with

B = 500 as compared to B = 200. Cirrhotic livers had significantly lower ADC values as compared to normal liver ( $P < 0.05$ ); hepatocellular carcinomas and metastases had significantly lower ADC values than benign lesions ( $P < 0.01$ ) except for abscess which demonstrated the lowest ADC value among focal lesions.

**Conclusion:** DWI of liver is useful in differentiating benign from malignant lesions of liver.

### P139

#### Effect of Co-administration of the Atypical Antipsychotic, Clozapine, and an Alpha-1 Adrenoceptor Antagonist on Pre-pulse Inhibition

**V VERMA<sup>1</sup>, WY ONG<sup>2</sup>, A RATTY<sup>3</sup>, TC HOON<sup>1</sup>, GS DAWE<sup>1</sup>**

<sup>1</sup>Pharmacology, <sup>2</sup>Anatomy, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>3</sup>Chakra Biotech Pte Ltd, Singapore

**Aim:** Pre-pulse inhibition (PPI) is a sensory-motor gating deficit seen in patients with schizophrenia. Transgenic Chakragati (ckr) mice have been shown to have inherent PPI deficits. The aim of this study was to assess the effect of an atypical antipsychotic drug, clozapine, in the absence and presence of an alpha-1 adrenoceptor antagonist, prazosin, on the PPI of acoustic startle in ckr mice.

**Methods:** Ckr mice were given either clozapine (1, 5, or 10 mg/kg) alone or clozapine together with prazosin (1 mg/kg). Using an acoustic startle response system, PPI was tested with pre-pulses at +3, +6 and +12 dB over the background noise.

**Results:** Given alone, all 3 doses of clozapine significantly improved PPI in the ckr mice with the +3 dB pre-pulse, while only the 10 mg/kg dose showed significant improvement with the +6 dB pre-pulse, and none of the doses had any significant effect with the +12 dB pre-pulse. When administered together with the alpha-1 adrenoceptor antagonist, all three doses of clozapine showed significant improvement at +3 dB, while at +6 dB and 12 dB pre-pulses, the medium- and high-dose clozapine combinations showed significant improvements in PPI.

**Conclusion:** Co-administration of clozapine with an alpha-1 adrenoceptor antagonist resulted in greater improvement in sensory-motor gating deficits. The experiment suggests a synergistic relationship between alpha-1 adrenoceptor antagonists and the atypical antipsychotic, clozapine. These findings may contribute to the development of new therapeutic protocols in the treatment of schizophrenia.

### P140

#### Effect of Environmental Calcium/Phosphate and pH on Fluoride Release from Glass-ionomers

**XY WANG<sup>1</sup>, AUJ YAP<sup>1</sup>**

<sup>1</sup>Restorative Dentistry, National University of Singapore - Faculty of Dentistry, Singapore

**Aim:** This study investigated the effect of environmental pH and calcium/phosphate on fluoride release from glass-ionomers.

**Methods:** Disc specimens (10 mm in diameter and 1 mm in height) of capsulated glass-ionomers [Fuji IX Fast (FN) and KetacMolar (KM)] were prepared according to manufacturers' instructions. Specimens were suspended in 200 ml of water and acidic solutions (pH 3) for 4 weeks. The levels of calcium/phosphate in the acidic solutions were varied as follows: Group A – Ca:0 mM, P:0 mM; Group B – Ca:2.4 mM, P:0 mM; Group C – Ca:1.2 mM, P:1.2 mM; Group D – Ca:0 mM, P:2.4 mM. Fluoride release ( $\mu\text{g}/\text{cm}^2$ ) was measured with a fluoride ion selective electrode coupled to an ion meter. Results were analysed using independent-sample *t*-test and ANOVA/Scheffe post-hoc test ( $P < 0.05$ ).

**Results:** Both FN and KM released significantly more fluoride in acidic solutions (range, 240 to 708  $\mu\text{g}/\text{cm}^2$ ) than in water (36  $\mu\text{g}/\text{cm}^2$  for FN and 24  $\mu\text{g}/\text{cm}^2$  for KM). In acidic solutions, fluoride release was the highest on the first day. Fluoride release then fell sharply and reached a plateau from the second day. Environmental phosphate in the acidic solutions suppressed

fluoride release from both FN and KM. The following significant differences were observed: Group A, B > Group C > Group D.

**Conclusion:** The reduced fluoride release from glass-ionomers suggested a dissolution-inhibiting layer is formed when phosphate is present in acidic conditions. The retardation effect may maintain long-term and low-level fluoride release, prolonging the cariostatic potential of glass-ionomer restoratives in vivo.

#### P141

##### **Influence of Calcium/phosphate Supplements to Acidic Conditions on Clinically Related Properties of Glass-ionomers**

**XY WANG<sup>1</sup>, AUJ YAP<sup>1</sup>**

<sup>1</sup>Restorative Dentistry, National University of Singapore - Faculty of Dentistry, Singapore

**Aim:** This study investigated effect of environmental calcium/phosphate on clinically related properties of glass-ionomers exposed to acidic conditions.

**Methods:** Two capsulated highly viscous glass-ionomers (HVGICs), Fuji IX Fast [(FN), strontium-based] and KetacMolar [(KM), calcium-based], were mixed and fabricated according to manufacturers' instructions. Specimens were kept in 100% humidity at 37°C for 1 hour and then subjected to acidic conditions with varied levels of calcium/phosphate supplements: control group – Ca:0 mmol/L, P:0 mmol/L; group A – Ca:2.4 mmol/L, P:0 mmol/L; group B – Ca:1.5 mmol/L, P:0.9 mmol/L; group C – Ca:1.2 mmol/L, P:1.2 mmol/L; group D – Ca:0 mmol/L, P:2.4 mmol/L. After 4 weeks of conditioning, wear resistance was evaluated with a reciprocal compression-sliding wear testing system for 500, 1000, 2000 and 3000 wear cycles. Shear punch strength (MPa) was determined using an Instron micro-force testing system with a shear punch apparatus. Results were analysed using ANOVA/Scheffe post-hoc test ( $P < 0.05$ ).

**Results:** In all cases, wear depth ( $\mu\text{m}$ ) raised sharply after first 500 wear cycles then increased with a low magnitude as a function of cycle numbers. When phosphate was supplied to acidic conditions, both FN and KM showed decreased wear depth and increased shear punch strength. The following significant differences were observed: wear depth – control, A > B > C > D; shear punch strength – D > A & control and C > control.

**Conclusion:** Regardless of the type of HVGICs, phosphate supplements improved wear resistance and strength of glass-ionomers in acidic conditions and may extend longevity of glass-ionomers in vivo.

#### P142

##### **Detection of Genomic Signatures of Positive Selection within MRP1 and Subsequent Identification of a Functional Promoter Polymorphism**

**ZH WANG<sup>1</sup>, BS WANG<sup>2</sup>, K TANG<sup>3</sup>, EJD LEE<sup>4</sup>, SS CHONG<sup>5</sup>, CGL LEE<sup>2,3</sup>**

<sup>1</sup>Bioengineering Programme, National University of Singapore - Staff & Student - Office of Life Sciences, Singapore, <sup>2</sup>Research Divisions - Medical Sciences, National Cancer Centre, Singapore, <sup>3</sup>Biochemistry, <sup>4</sup>Pharmacology, <sup>5</sup>Paediatrics, National University of Singapore - Yong Loo Lin School of Medicine, Singapore

**Aim:** The 190-kDa multidrug resistance-associated protein-1 (MRP1/ABCC1) is a member of the ATP-binding cassette superfamily of transporters. It is an efflux pump that regulates the accumulation of xenobiotics and drugs in cells and has been implicated in the resistance of various cancers to chemotherapy. Functional sequence variations within MRP1 might contribute to inter-individual and population differences in drug response. We wished to identify single nucleotide polymorphisms (SNPs) within MRP1 with potentially important functional significance, by scanning for genomic signatures of recent positive selection at this locus.

**Methods:** Linkage disequilibrium (LD) and haplotype profiles of 13 SNPs spanning MRP1 were determined from ~480 individuals in 5 different populations. Two independent strategies, the long range haplotype (LRH) test and  $F_{ST}$  statistic, were employed to screen for genomic signatures of

positive selection. Functionality of candidate positively selected SNPs was verified experimentally using an MRP1 promoter-reporter assay.

**Results:** Despite high haplotype diversity and weak LD across MRP1, a high frequency haplotype containing the G-allele of SNP 5'FR/G-260C exhibited extended haplotype homozygosity in European Americans. Strong genomic evidence of positive selection for 5'FR/-260G was detected using both LRH and  $F_{ST}$  tests. Functional analysis in 4 different cell-lines all showed reduced activity from an MRP1 promoter containing 5'FR/-260G compared with 1 containing 5'FR/-260C ( $P < 0.01$ ).

**Conclusion:** We successfully used a genomic strategy to detect signatures of positive selection within MRP1 and identify a SNP with functionally different alleles. Variation at this SNP site may modulate cellular expression of the MRP1 transporter and affect drug efflux levels.

#### P143

##### **A Highly Sensitive Liquid Chromatography-tandem Mass Spectrometry Method and its Significance on Accurate Analysis of Pharmacokinetic Parameters of Gemcitabine in Human Plasma**

**LZ WANG<sup>1</sup>, HS LEE<sup>1</sup>, LS THAM<sup>2</sup>, YM KHOO<sup>1</sup>, R SOO<sup>2</sup>, BC GOH<sup>2</sup>**

<sup>1</sup>Pharmacology, National University of Singapore - Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Haematology-Oncology, National University Hospital, Singapore

**Aim:** To validate a highly sensitive liquid chromatography-tandem mass spectrometry (LC-MS/MS) method and evaluate its impact on pharmacokinetic (PK) parameter analysis of gemcitabine.

**Methods:** Blood samples were collected from patients before initiation of a 30-min gemcitabine (1000 mg/m<sup>2</sup>) infusion, 10, 30 min during infusion, 10 min before end of the infusion, and 30 min, 1 h and 2 h after end of the infusion. Sample preparation was protein precipitation with acetonitrile. Cytarabine was the internal standard. Baseline chromatographic separation was achieved with an Atlantis<sup>TM</sup> dC18 column (2.1 x 100 mm) at a flow rate of 0.2 mL/min using a gradient mobile phase containing 10 mM ammonium acetate (pH = 6.8) and methanol. PK parameters were calculated from plasma concentrations of gemcitabine using non-compartmental analysis.

**Results:** The LC-MS/MS method is >10 time more sensitive than previous HPLC-UV assay which could not detect gemcitabine for last samples (2 h). Its linear calibration ranges were 5 to 1000 ng/mL for gemcitabine (dFDC) and 50 to 10,000 ng/mL for its deaminated metabolite 2',2'-difluoro-2'-deoxyuridine (dFDU). The overall precision variability was within 10% and accuracy of the assay was 88% to 112% for both analytes. The mean half-life ( $T_{1/2}$ ) of gemcitabine was significantly ( $P < 0.01$ ) increased from 12.7 to 17.0 min when analysed with the last concentrations. Furthermore, a poor correlation of  $T_{1/2}$  was detected between with and without the last concentrations. However, CL and Vss were not significantly affected.

**Conclusion:** A highly sensitive LCMSMS method was validated. The inclusion of the quantifiable low concentrations impacted significantly the accuracy of  $T_{1/2}$  determination of gemcitabine.

#### P144

##### **The Hepatitis B Virus Core Promoter Plays a Necessary but not Sufficient Role in HBV Replication**

**S WASSER<sup>1</sup>, CSL ONG<sup>1</sup>, TMC TAN<sup>2</sup>, FJ PETER<sup>3</sup>, SG LIM<sup>1</sup>**

<sup>1</sup>Medicine, <sup>2</sup>Biochemistry, National University of Singapore - Yong Loo Lin School of Medicine, Singapore, <sup>3</sup>Hepatology Programme, National University of Singapore - Staff & Student - Office of Life Sciences, Singapore

**Aim:** To investigate the role of the hepatitis B virus (HBV) core promoter (CP) in HBV replication.

**Methods:** The HBV CP transcribes both the pre-core and pre-genomic mRNA which produce the HBeAg and HBcAg, respectively. Published CP studies have focused almost entirely on the effect of the A1762T/G1764A mutation on CP activity. However, the clinical importance of this mutation and its effect on viral replication in vivo remains uncertain. There is therefore a need to identify novel naturally occurring mutations in clinical samples

which may have a greater role in effecting a change in CP activity and viral replication. Paired samples, pre- and post-HBeAg seroconversion, were selected from 14 chronic HBV patients with a 104 decrease in serum viral load after HBeAg seroconversion. The CP activity from each sample was quantified via a luciferase reporter gene assay in the liver cell line HepG2. 5' RACE analysis was carried out to discriminate between pre-core and pre-genomic mRNA.

**Results:** Sequence analysis showed the presence of previously reported and novel CP mutations which caused changes in CP activity. There was a decrease in the CP activity driving transcription of pre-genomic mRNA in patients that spontaneously underwent HBeAg seroconversion ( $P < 0.05$ ). However, there was only a non-significant correlation in CP activity resulting in pre-genomic RNA transcription and viral titre, with a Pearson correlation coefficient of 0.359.

**Conclusion:** The regulation of HBV replication is a complex process in which the CP plays a necessary but insufficient role.

#### P145

##### A Rapid Sampling Method for Salivary $\alpha$ -amylase

**A WEE<sup>1</sup>, V NG<sup>1</sup>, D KOH<sup>1</sup>**

<sup>1</sup>COFM, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** To observe real-time fluctuation caused by acute stressors, rapid sampling of acute stress markers is crucial. Salivary  $\alpha$ -amylase has been shown as a potential surrogate marker of plasma nor-epinephrine. However sampling techniques for saliva are non-standardised and vary widely. We studied the correlation of salivary  $\alpha$ -amylase between spit and accumulated saliva samples.

**Methods:** Thirty-six paired saliva samples were collected by a single spit sample (M1) followed by a 3-minute unstimulated accumulation method (M2). Saliva samples were collected from 3 healthy adults under the following conditions. Food consumption – 15 min before lunch; immediately, 20 min and 40 min after lunch. Running – 5 min before a 20-min run; immediately, 15 min and 30 min after the run. Exposure to cold – before entering a cold room (5°C), after 10 min in the cold room, and 15 min and 30 min after leaving the cold room. A kinetic assay method was used to determine salivary  $\alpha$ -amylase activity.

**Results:** As the data was positively skewed, log transformation was performed prior to further parametric statistical analysis. Salivary  $\alpha$ -amylase showed acute and transient increases after running and cold exposure. The geometric mean (95% confidence interval) for M1 and M2 samples were 153.0 (122.0-191.7) U/mL and 142.8 (116.6-175.0) U/mL, respectively. Log M1 and M2 values were highly correlated (Pearson's  $r = 0.94$ ,  $P < 0.00$ ).

**Conclusion:** There is good correlation of  $\alpha$ -amylase activity between both collection methods. We suggest that spit samples can be used as a simple and rapid collection method for obtaining saliva for  $\alpha$ -amylase measurement.

#### P146

##### Developing a Tool for the Assessment of Physical and Psychological Morbidity after Axillary Lymph Node Dissection (ALND) in Invasive Breast Cancer: A Local Perspective

**R WJAYA<sup>1</sup>, DCS HO<sup>1</sup>, WS YONG<sup>2</sup>, HK ONG<sup>3</sup>, H HOSAIN<sup>3</sup>, YW CHAN<sup>3</sup>**

<sup>1</sup>Surgery, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Clinical Departments – Surgical Oncology, National Cancer Centre, Singapore, <sup>3</sup>Physiotherapy, Singapore General Hospital, Singapore

**Aim:** For several decades, axillary lymph node dissection (ALND) has been part of the standard surgical treatment of patients with invasive breast cancer in Singapore. With new techniques of axillary surgery being introduced locally, there is a need to assess the morbidity associated with ALND among the local breast cancer patient population. The aim of this study was to

develop a comprehensive tool for assessing the physical and psychological morbidity of breast cancer patients after ALND.

**Methods:** A 2-page assessment tool was developed incorporating both a questionnaire and physiotherapy physical assessment form.

**Results:** The interviewer-administered questionnaire consists of 12 questions dealing with both symptom- and function-specific complaints. Questions screened symptoms related to the upper limb, functional tasks as well as psychological morbidity. The physical assessment form was developed to objectively measure physical upper limb morbidity associated with ALND. Both upper limb volume as well as goniometric shoulder assessment was part of this assessment. Entry fields for patient biodata were also included.

**Conclusion:** The questionnaire and physical assessment form was administered to 20 patients who had undergone ALND in the surgical unit at the National Cancer Centre and Singapore General Hospital. After analysing their results, a revised 2-page assessment tool is now available. This can be used for the prospective assessment of physical and psychological morbidity of ALND in breast cancer patients in Singapore.

#### P147

##### Rate of Progression of Diabetic Retinopathy in a Tertiary Ophthalmic Centre

**HK WONG<sup>1</sup>, FP YANG<sup>1</sup>, C TAN<sup>2</sup>**

<sup>1</sup>Ophthalmology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Ophthalmology, Tan Tock Seng Hospital, Singapore

**Aim:** To study the rate of progression of diabetic retinopathy in patients seen in a tertiary ophthalmic centre.

**Methods:** A retrospective review of 250 consecutive type II diabetic patients being seen at the ophthalmology outpatient clinic of Tan Tock Seng Hospital was conducted. Patients above 21 years of age and with at least 1 year of follow-up were included. The stage of diabetic retinopathy was recorded at each annual visit from presentation and the time taken to progress from one stage of diabetic retinopathy to the next was calculated.

**Results:** There were 201 eyes with no diabetic retinopathy at initial presentation and with at least 2 years of follow-up. Of these, after 2 years, 154 eyes (76.8%) still had no diabetic retinopathy, while only 2 eyes (1%) progressed to severe non-proliferative diabetic retinopathy (NPDR). There were 109 eyes with no retinopathy initially and with at least 5 years of follow-up. Of these, after 5 years, 70 eyes (64.2%) still had no diabetic retinopathy while only 5 eyes (4.6%) developed severe NPDR. The mean time taken to progress to mild NPDR was 3.7 (SD 3.0) years, from mild to moderate NPDR was 2.9 (SD 2.9) years and from moderate to severe NPDR was 1.4 (SD 0.8) years.

**Conclusion:** The progression of diabetic retinopathy is initially slow. However, once early changes have occurred, the progression tends to become more rapid, requiring only a mean of 1.4 years to progress from moderate to severe NPDR.

#### P148

##### Is the Lowest Lumbar T-score Among L1-L4 Sufficient to Diagnose Osteoporosis?

**PS WONG<sup>1</sup>, SL LOW<sup>1</sup>, YP XU<sup>2</sup>, S DAS DE<sup>1</sup>**

<sup>1</sup>Orthopaedic Surgery, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Orthopaedic Surgery, National University Hospital, Singapore

**Aim:** Degenerative changes in the spine could artificially elevate lumbar spine BMD values in elderly subjects. Assessment of lumbar spine BMD is made using the mean of L1-L4, which may include vertebrae with artifacts or degenerative changes. We hypothesise that the use of the lowest T-score among the four lumbar vertebrae may decrease the impact of degenerative changes on the classification of low bone mass.

**Methods:** We reviewed the BMD images and data of subjects from 2000 to 2004 who has sustained a low-trauma fracture in the hip or spine. This consisted of 134 women, aged 50 to 97 years (mean, 71.2  $\pm$  11.8 years) and

22 men, aged 54 to 98 years (mean,  $73.2 \pm 12.1$  years). The mean L1-L4 BMD and lowest T-score among the 4 lumbar vertebral bodies was classified according to WHO criteria.

**Results:** Out of 156 fracture subjects, 62 (40%) were diagnosed as osteoporosis by the mean L1-L4 T-score while 87 (56%) were diagnosed as osteoporosis by the lowest vertebral body T-score. The results show that use of the lowest vertebral body T-score classified an additional 16% of subjects with prior fracture as osteoporotic compared to T-score determined by the L1-L4 average value. The lowest vertebral body T-score method had a higher sensitivity in predicting osteoporosis.

**Conclusion:** Using a single vertebral body for diagnosis may not be appropriate as precision and accuracy is lower due to the smaller area of measurement. Prospective studies should be conducted to validate the usefulness of the lowest vertebral body T-score in predicting osteoporotic fractures.

## P149

### Eye Injuries – Don't Risk It, Do More. A Prospective Study

**JH WOO<sup>1</sup>, G SUNDAR<sup>2</sup>**

<sup>1</sup>Ophthalmology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Ophthalmology, National University Hospital, Singapore

**Aim:** To describe the epidemiology of eye injuries presenting to National University Hospital, NUH.

**Methods:** A prospective study was conducted over a 7-week period (11 April 2005 to 29 May 2005) on all ophthalmic trauma patients seen by the Department of Ophthalmology in NUH. Data on patient presentation, source of injury and intervention were collected via a standardised interview and examination, and documented using a validated data sheet.

**Results:** A total of 133 patients with 139 eyes were included in the study. The average age was 33.5 years and 84.2% (n = 112) were men. 56.4% (n = 75) of all eye injuries were work-related and only 5% (n = 7) of eyes were open-globe injuries. Commonest sources of eye trauma included: Use of high-powered tools (38.3%, n = 51), human-inflicted (12.0%, n = 16) and road traffic accidents (8.3%, n = 11). Of the work-related eye injuries, 29.3% (n = 22) reported to have used eye protection, 38.7% (n = 29) were issued but did not use them, while 32% (n = 24) reported that eye protection was not issued. Superficial foreign bodies (22.4%, n = 55) were the most common clinical finding, followed by periorbital bruise (12.2%, n = 30), lid ecchymoses (6.9%, n = 17) and orbital fractures (6.5%, n = 16).

**Conclusion:** Work-related trauma makes up a significant proportion of ophthalmic injuries seen. Young, non-Singaporean Indian males working with powered tools are at particular risk. Preventive efforts are important in work and other settings. A collaborative registry and database of eye injuries is recommended.

## P150

### Enhanced Production of Interleukin 18 Protein is Associated with SNP -607 C Allele in Normal Individuals and Systemic Lupus Erythematosus Patients

**Q XU<sup>1</sup>, SK TIN<sup>2</sup>, J THUMBOO<sup>2</sup>, KY FONK<sup>2</sup>**

<sup>1</sup>Medicine, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Rheumatology and Immunology, Singapore General Hospital, Singapore

**Aim:** Interleukin 18 (IL-18) is a proinflammatory cytokine, which strongly induce interferon production. Two single nucleotide polymorphisms were detected in the promoter region and previous studies have indicated that 1 of the polymorphisms is associated with SLE. The aim of the present study is to determine the IL-18 protein concentrations in normal individuals and lupus patients with different genotypes.

**Methods:** Peripheral venous blood samples were obtained from 76 patients with systemic lupus erythematosus (SLE) and 110 healthy controls. Genomic DNA was extracted. Sequence specific primer PCR and restriction fragment length polymorphism (RFLP) analysis were used to genotype the DNA

samples for SNP-607. Levels of bioactive IL-18 in plasma were measured using a commercially available sandwich enzyme-linked immunosorbent assay.

**Results:** Plasma IL-18 concentrations were significantly higher in SLE patients than in control subjects. ( $P < 0.05$ ). In the patients group, the mean of the IL-18 concentrations for 6 patients who had AA genotype at position -607 bp was 75.33 pg/mL while for the 22 patients who had AC genotype was 214.2 pg/mL. Those 48 patients with CC genotype had a mean of 217.3 pg/mL. Significant differences were observed in the three subgroups ( $P < 0.02$ ). In the control group, 21 subjects with AA genotype at SNP-607 had significantly lower IL-18 protein concentrations when compared to the 45 subjects with AC genotype and 47 with CC genotype ( $P < 0.002$ ). The mean values for the three subgroups are 65.9 pg/mL, 143.7 pg/mL and 136.7 pg/mL respectively.

**Conclusion:** The IL-18 promoter gene polymorphism at SNP-607 allele may result in the enhanced productions of IL-18 protein in SLE and normal individuals.

## P151

### Prevalence of Heart-reactive Autoantibodies in Systemic Lupus Erythematosus Patients

**Q XU<sup>1</sup>, SK TIN<sup>2</sup>, J THUMBOO<sup>2</sup>, KY FONK<sup>2</sup>**

<sup>1</sup>Medicine, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Rheumatology and Immunology, Singapore General Hospital, Singapore

**Aim:** Cardiac dysfunction can lead to significant morbidity and mortality in systemic lupus erythematosus (SLE) patients. Heart-reactive autoantibodies (HRAA) may play an important role. The study aims to determine the prevalence of HRAA in SLE patients.

**Methods:** Sera were collected from 80 patients with SLE, 50 patients with antiphospholipid syndrome (APS), 40 patients with rheumatoid arthritis (RA), 15 osteoarthritis (OA) patients and 120 healthy controls. The BALB/c mouse heart lysate was then used as an antigen in Western blot analysis.

**Results:** Two autoantibodies with molecular weights between 24 kD and 30 kD were found in lupus patients' sera but not in normal controls' sera. These autoantibodies are heart-specific as they did not bind to brain, kidney, liver and spleen cellular membrane lysates of BALB/c mice. The autoantibodies were not detected in healthy controls, RA and OA patients. In lupus patients, 23 (29%) showed positive bands: 12 (15%) showed band 1, 13 (16%) showed band 2, and 2 (2.5%) had both bands. In APS patients, only 3 (6%) sera showed band 1 and none had band 2.

**Conclusion:** Our results showed that the autoantibodies found in lupus patients are specific to SLE, and may contribute to cardiac manifestations in lupus patients.

## P152

### Age-related Changes in Nestin Expression in Müller Glial Cells and its Induction following Optic Nerve Transection in Rats

**LP XUE<sup>1</sup>, J LU<sup>2</sup>, C KAUR<sup>1</sup>, SX HU<sup>3</sup>, P DING<sup>4</sup>, EA LING<sup>1</sup>**

<sup>1</sup>Anatomy, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>DSO National Laboratories, Defence Medical and Environmental Research Institute, Singapore, <sup>3</sup>Zhongshan Ophthalmic Centre, Sun Yat-sen University, China, <sup>4</sup>Kun Ming Medical College, The First Affiliated Hospital, China

**Aim:** To examine the immunoexpression patterns of nestin and glial fibrillary acidic protein (GFAP) in the developing retina and to ascertain if the expression would be altered in injured retinas.

**Methods:** A total of 13 Wistar rats were used for developmental study. The rats were aged 0 day (n = 2), 7 days (n = 2), 14 days (n = 2), 21 days (n = 2) and 28 days (n = 2), 7 weeks (n = 2) and 5 months (n = 1). In addition, 9 adult female rats aged 3 months were used for optic nerve transection.

**Results:** Nestin immunoexpression was detected in neural progenitor cells in the retina at P0. This persisted and was subsequently localised in differentiating



and differentiated Müller glial cells. In the postnatal period, nestin expression was down-regulated as maturation proceeded. By 5 months, nestin immun-expression was completely diminished. GFAP immun-expression was confined to the inner layer of the neural retina later confirmed to be astrocytes. Expression of both nestin and GFAP was induced in mature Müller glial cells by optic nerve transection. Our findings have shown that nestin is not exclusively expressed by neural progenitors; it is also expressed in differentiated Müller glial cells and can be enhanced in these cells by acute retina damage. In the latter, it may represent a state of dedifferentiation. Reactive changes of Müller glial cells to acute retina injury are more evident in glutamine synthase (GS) immunoreactive end-feet coexpressing nestin and GFAP.

**Conclusion:** This study suggests that both nestin and GFAP may be useful biomarkers in retinal injuries.

#### P153

##### Isolation of Oestrogenic Endocrine-disrupting Compound Produced by Phytoplankton in Singapore Seawater

L YANG<sup>1</sup>, YH GONG<sup>1</sup>, MJ HOLMES<sup>2</sup>, EL YONG<sup>1</sup>

<sup>1</sup>Obstetrics & Gynaecology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Tropical Marine Science Institute, Singapore

**Aim:** It has been reported that Singapore's seawater samples from certain areas exhibited high oestrogenic activities in human cell-based reporter gene bioassays. Our preliminary study suggests that the bioactivity is related to the phytoplankton. This study aims to isolate and purify the bioactive compound(s) from phytoplankton extracts.

**Methods:** Some phytoplankton species isolated from Singapore seawater were cultured in the lab under controlled conditions. The culture media (200 L) and culture cell were separated and extracted by solid phase extraction and ultrasonic extraction. Guided by reporter gene bioassay, the bioactive extracts were fractionated by semi-preparative HPLC and a bioactive pure fraction was achieved for chemical structure elucidation.

**Results:** The negative control sample (blank culture media) showed no bioactivity. All the phytoplankton culture cells extracts exhibited very weak bioactivity. However, the culture media of the raphidophyte *Chattonella marina* displayed strong oestrogen receptor (ER) bioactivity. A semi-preparative HPLC fraction from this culture media was purified and exhibited high ER activity (12% activity of 1 nM E2 at the dosage 80 µg/mL). LCMS/MS analysis showed the molecular weight of this compound was 414. The chemical structure of this compound is under investigation.

**Conclusion:** Phytoplankton can secrete endocrine-disrupting compounds into seawater. One ER-active compound has been isolated and purified from *Chattonella marina* culture media.

#### P154

##### Risk Factors for the Development of Diabetic Retinopathy

FP YANG<sup>1</sup>, HK WONG<sup>1</sup>, C TAN<sup>2</sup>

<sup>1</sup>Ophthalmology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Ophthalmology, Tan Tock Seng Hospital, Singapore

**Aim:** To study the risk factors associated with the development of diabetic retinopathy.

**Methods:** A retrospective review of 412 eyes of patients with type II diabetes mellitus seen at the general ophthalmology outpatient clinic of Tan Tock Seng Hospital was conducted. Patients above 21 years of age with at least 1 year of follow-up were included. The stage of diabetic retinopathy recorded at each annual visit was correlated with demographic characteristics, diabetic history, as well as the presence of co-morbidities such as hypertension and ischaemic heart disease.

**Results:** Of the 412 eyes, 228 eyes (55.3%) already had retinopathy on initial presentation. Patients who were 65 years of age or younger and those with duration of diabetes greater than 10 years were more likely to have pre-existing diabetic retinopathy at presentation ( $P < 0.05$ ). There were 109 eyes with no diabetic retinopathy at presentation, and had had at least 5 years of

follow-up. Of these, 39 eyes (35.8%) developed diabetic retinopathy during the 5 years. Diabetic retinopathy developed more commonly in those who were not hypertensive ( $P = 0.01$ ). Females, those of Malay ethnicity, and those on insulin therapy were also more likely to develop diabetic retinopathy.

**Conclusion:** Diabetic retinopathy was more likely to develop in patients who were 65 years of age or younger and in those with a duration of diabetes greater than 10 years.

#### P155

##### Enhanced Osteogenesis of Mesenchymal Stem Cells in Conditioned Media of Heat-shocked Somatic Osteoblasts

CP YE<sup>1</sup>, BC HENG<sup>1</sup>, H LIU<sup>1</sup>, WS TOH<sup>1</sup>, XF TIAN<sup>1</sup>, BA JALIL RUFAlHAH<sup>1</sup>, T CAO<sup>1</sup>

<sup>1</sup>Restorative Dentistry, National University of Singapore – Faculty of Dentistry, Singapore

**Aim:** Osteogenic cells differentiated from stem cells hold much promise for cell transplantation therapy for bone disease. There is a dire need for well-defined and efficient protocols to promote the osteogenesis of ex vivo cultured stem cells. Hence, this study investigated whether a combination of chemical stimuli (ascorbic acid, beta-glycerophosphate and dexamethasone) and culture media conditioned by a human fetal osteoblast cell line (hFOB) had any synergistic effect on the osteogenesis of bone marrow-derived mesenchymal stem cells (BMSC).

**Methods:** Conditioned media, with or without prior heat shock treatment (42°C for 1 h) of the hFOB cell line, were collected and tested on rabbit BMSC cultures, in the presence and absence of chemical stimuli. Osteogenic differentiation of BMSC was assessed on both day 14 and day 21 of ex vivo culture.

**Results:** The results showed conclusively that conditioned media promoted osteogenesis of BMSC, which was further enhanced by prior heat shock-treatment of the hFOB cells, as well as the presence of chemical stimuli. Among all experimental groups, the combination of culture medium conditioned by heat-shocked hFOB cells together with chemical stimuli, exhibited the highest level of calcium mineralisation, as assessed by Von Kossa staining.

**Conclusion:** This study provides clear evidence of a synergistic effect of conditioned media, heat shock and chemical stimuli. It is hoped that the data will contribute to the development of a more well-defined and efficient in vitro culture protocol to promote the osteogenesis of BMSC and other stem cells like embryonic stem cells for both clinical and non-clinical applications.

#### P156

##### Skeletal Myoblast Transplantation for Attenuation of Hyperglycaemia and Improvement of Glucose Tolerance

L YE<sup>1</sup>, WC TOH<sup>1</sup>, KH HAIDER<sup>2</sup>, JT LU<sup>3</sup>, PK LAW<sup>4</sup>, KO LEE<sup>5</sup>, EKW SIM<sup>3</sup>

<sup>1</sup>National University Medical Institute, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Department of Pathology, University of Cincinnati, USA, <sup>3</sup>Surgery, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>4</sup>Cell Transplants Singapore Pte Ltd, Singapore, <sup>5</sup>Medicine, National University Hospital, Singapore

**Aim:** Type II diabetes mellitus is characterised by insulin resistance and hyperglycaemia. The aim of this current study is to investigate the effects of skeletal myoblast transplantation for attenuation of hyperglycaemia on type II diabetes in a mouse model.

**Methods:** KK Cg-Ay/J mice (inbred mice with insulin-resistant type II diabetes mellitus) were divided into 2 groups: control group 1 receiving 1.5 mL DMEM only and experimental group 2 receiving 1.5 mL DMEM with human skeletal myoblast. Medium, with or without human skeletal myoblasts (HSM), was injected intramuscularly into the lower limb muscle of both legs of KK Cg-Ay/J mice aged 10 to 12 weeks. All the mice were clearly diabetic (random blood glucose  $> 25$  mmol/L). A glucose tolerance test and 3-hour postprandial glucose were taken before and 6 weeks after HSM transplantation.

**Results:** The mean fasting glucose concentration at 6 weeks in group 2 after

HSM transplantation was  $4.7 \pm 0.56$  mmol/L compared to control group 1 at  $6.48 \pm 0.89$  mmol/L ( $P < 0.05$ ). The mean 3-hour postprandial glucose 6 weeks after HSM transplantation was  $13.43 \pm 1.68$  mmol/L compared with  $20.52 \pm 2.10$  mmol/L ( $P < 0.05$ ) in the control group 1. Intra-peritoneal glucose tolerance test (0 h, 0.5 h, 1 h and 2h) showed that hyperglycaemia in the HSM-treated group 2 was 4.7, 14, 9.63 and 5.25 mmol/L respectively, compared to 6.48, 15.68, 16.38 and 8.18 mmol/L in the control group 2.

**Conclusion:** Skeletal myoblast transplantation can significantly improve fasting and glucose tolerance in type II diabetic mice.

### P157

#### Common Peroneal Nerve Rupture, A Rare Complication in Knee Dislocations

**NEM YEO<sup>1</sup>, MH CHEW<sup>2</sup>, JSB KOH<sup>2</sup>, PCC CHANG<sup>2</sup>**

<sup>1</sup>Orthopaedic Surgery, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Orthopaedic Surgery, Singapore General Hospital, Singapore

**Aim:** Traumatic knee dislocations are uncommon injuries and are considered orthopaedic emergencies.

**Methods:** Complications include neurovascular injuries as well as multi-ligamentous damage. The common peroneal nerve is highly susceptible to damage. Common peroneal nerve injuries vary in incidence from 25% to 40%. However, complete rupture of the common peroneal nerve is rare. Repair is often difficult and the outcome, poor.

**Results:** We present a case of a patient with knee dislocation, complicated by common peroneal nerve rupture.

**Conclusion:** We also review the current understanding in the management as well as recommendations to improve the outcome of common peroneal nerve injuries.

### P158

#### Modulation of Multidrug Resistance in Doxorubicin-resistant Cancer Cells by Antimalarials (Mefloquine, Chloroquine) and Immunosuppressants (Cyclosporine A, Tacrolimus)

**NN ZHANG<sup>1</sup>, BC GOH<sup>2</sup>, T TAN<sup>3</sup>, SC LEE<sup>2</sup>, HS LEE<sup>1</sup>**

<sup>1</sup>Pharmacology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>Haematology & Oncology, National University Hospital, Singapore, <sup>3</sup>Biochemistry, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** The resistance of anti-cancer drugs is one of the most serious problems in cancer chemotherapy. P-glycoprotein, a membrane efflux pump encoded by the MDR1 gene, plays an important role in the development of multidrug resistance (MDR). In this study, we investigated the effects of mefloquine (MQ), chloroquine (CQ), cyclosporine (CSA) and tacrolimus (FK506), all being modulators of MDR, on the enhancement of doxorubicin (DOX) cytotoxicity in a MDR rat prostate cancer cell line (MLLB-2).

**Methods:** The DOX concentration that produced 50% growth inhibition (IC<sub>50</sub>) in the cell line was determined and additional effects of CSA, FK 506, MQ and CQ at different concentrations of 1  $\mu$ M, 5  $\mu$ M, and 10  $\mu$ M, respectively, were measured using MTT cytotoxicity assay. The modulators' effect were evaluated by using modulating factor (MF) = the IC<sub>50</sub> without modifier (DOX alone)/the IC<sub>50</sub> with modifier.

**Results:** In combination with DOX, cell growth was inhibited 140-fold by 10  $\mu$ M MQ; 40-fold by 5  $\mu$ M CSA. CQ effect was poor. MFs were not high (<10) for all the modulators at 1  $\mu$ M. CSA at 10  $\mu$ M showed significant protective effect on cells. Unlike CSA, FK 506 (10 $\mu$ M) did not show protective effect and its MF was 120, but was unable to cause near-complete cytotoxicity.

**Conclusion:** Mefloquine potently reversed the multidrug-resistance phenomena through likely action with P-glycoprotein in dose-related manner. Cyclosporine is a more potent modulator, but has a significant paradoxical protective effect on cells at a higher concentration.

### P159

#### Suppressed NF- $\kappa$ B and Sustained JNK Activation Contribute to the Sensitisation Effect of Parthenolide to TNF $\alpha$ -induced Apoptosis in Human Cancer Cells

**SY ZHANG<sup>1</sup>, CN ONG<sup>1</sup>, HM SHEN<sup>1</sup>**

<sup>1</sup>COFM, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** Parthenolide (PN) is the main sesquiterpene lactone found in feverfew, a traditional herbal medicine with potent anti-inflammatory activities. While the anticancer property of PN has been reported in both in vitro cell culture and in vivo animal model, the in-depth molecular mechanisms remain to be further elucidated.

**Methods:** In the present study, we evaluated the involvements of nuclear transcription factor- $\kappa$ B (NF- $\kappa$ B) and c-Jun N-terminal kinase (JNK) in the anticancer activity of PN by examining the sensitisation effect of PN on tumour necrosis factor (TNF) $\alpha$ -induced apoptosis in human cancer cells.

**Results:** We observed that pre-treatment with PN greatly sensitised human cancer cells to TNF $\alpha$ -induced apoptosis and such sensitisation was closely associated with the inhibitory effect of PN on NF- $\kappa$ B activation induced by TNF $\alpha$ . It has been revealed that PN inhibits TNF $\alpha$ -induced NF- $\kappa$ B activation via disrupting the recruitment of the IKK complex to TNF receptors, which then blocks the subsequent NF- $\kappa$ B signalling events. Furthermore, PN pretreatment also converted a TNF $\alpha$ -induced transient JNK activation into a sustained JNK activation. Inhibition of JNK activation by a specific JNK inhibitor (SP600125), or overexpression of dominant-negative forms of JNK1 and JNK2, significantly abolished the apoptotic cell death induced by PN and TNF $\alpha$ , suggesting that the sustained JNK activation plays a pro-apoptotic role in the sensitisation effect of PN.

**Conclusion:** In conclusion, results from this study suggest that the inhibition of NF- $\kappa$ B activity and sustained JNK activation are the important mechanisms which contribute to the sensitisation effect of PN to TNF $\alpha$ -mediated cell death in human cancer cells.

### P160

#### Insulin-like Growth Factor and Voltage Gated Na<sup>+</sup> and K<sup>+</sup> Channel Expression in the Retina in Response to Hypobaric Hypoxia

**Y ZHANG<sup>1</sup>, V SIVAKUMAR<sup>1</sup>, C KAUR<sup>1</sup>, J LU<sup>2</sup>, EA LING<sup>1</sup>**

<sup>1</sup>Anatomy, National University of Singapore – Yong Loo Lin School of Medicine, Singapore, <sup>2</sup>DSO National Laboratories, Defence Medical and Environmental Institute, Singapore

**Aim:** Hypoxia develops in cardiovascular disorders, chronic lung diseases and sojourns to high altitude, leading to vasodilatation and increased blood flow. The retina is extremely sensitive to oxygen fluctuations, which may lead to development of retinopathy. Since the pathophysiology of hypoxic retinopathy is not fully understood, we aimed to examine the involvement of insulin-like growth factor-I and II (IGF-I and IGF-II), Na<sup>+</sup> and K<sup>+</sup> channels in the development of hypoxic retinopathy.

**Methods:** Adult Wistar rats were subjected to hypobaric hypoxia for 2 h following which expression of IGF-I, IGF-II, voltage gated Na<sup>+</sup> and K<sup>+</sup> (Kv 1.1 subunit) channels in the retina were investigated from 1 hour to 14 day by RT-PCR, Western blotting and immunohistochemistry.

**Results:** Enhanced expression of IGF-I and IGF-II in the ganglion cell layer was observed at 24 hour, 3 days and 7 days after hypoxic exposure following which it decreased at day 14. Na<sup>+</sup> channel expression increased in ganglion cell layer, inner and outer nuclear layers up to day 7. Expression of K<sup>+</sup> showed a decrease at 1 hour-3 day, it increased at day 7 and decreased thereafter.

**Conclusion:** Increased expression of IGF-I and IGF-II may be a protective response to ameliorate the hypoxic damage which may have been caused by an intracellular increase of Na<sup>+</sup>. An increase in intracellular Na<sup>+</sup> causes neuronal swelling and hence neuronal death. Activation of Na<sup>+</sup> channels may also lead to calcium overload and cell death. The decreased/increased expression of K<sup>+</sup> channels indicates that this expression is sensitive to oxygen supply and is an important mechanism in the physiology of retinal activity during reduced oxygen supply.

**P161**

**High Cyclin-dependent Kinase Activity in Mitosis Prevents Premature Cytokinesis and Septation in *Saccharomyces cerevisiae***

**G ZHANG<sup>1</sup>, KE NG<sup>1</sup>, FM YEONG<sup>1</sup>**

<sup>1</sup>Biochemistry, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** The sequential occurrence of cellular events during cell division is critical for the survival of daughter cells. In particular, cytokinesis and septum formation in *Saccharomyces cerevisiae*, which result in the separation of the mother and daughter cells at the end of mitosis, are regulated such that they occur only after sister chromatid segregation and exit from mitosis.

**Methods:** Electron microscopy, fluorescent microscopy, Western blot.

**Results:** We showed that chitin synthase 2 (Chs2p), which was needed for primary septum formation, localised to the mother-daughter neck at the end of mitosis only after the mitotic cyclin levels have decreased. Also, we found that by forcing a decrease in the mitotic kinase activity, Chs2p could be triggered to translocate from the endoplasmic reticulum to the neck prematurely in telophase and even in metaphase. Surprisingly, prematurely localised Chs2p at the necks of metaphase cells was active and capable of chitin deposition and partitioning mother and daughter cells.

**Conclusion:** Our findings suggest that the mitotic kinase normally acts to prevent Chs2p from going to the neck prematurely during metaphase prior to sister chromatid segregation. We therefore provided evidence that the presence of high mitotic kinase activity in metaphase places a constraint on untimely cytokinesis and septum formation before chromosome separation takes place, thereby preserving genomic stability during cell division.

**P162**

**Molecular Characterisation of Sinusoidal Endothelial Cell Capillarisation Critical for Hepatocellular Carcinoma Progression**

**JH ZHANG<sup>1</sup>, IC SONG<sup>2</sup>, R NG<sup>2</sup>, P CHOW<sup>2</sup>, RW GE<sup>3</sup>**

<sup>1</sup>Cancer Programme, National University of Singapore - Staff & Student - Office of Life Sciences, Faculty of Science, Singapore, <sup>2</sup>Experimental Surgery, Singapore General Hospital, Singapore, <sup>3</sup>Cardiovascular Biology/Angiogenesis Programme, National University of Singapore - Staff & Student - Office of Life Sciences, Singapore

**Aim:** To characterise the molecular basis governing the phenotypic and functional changes from SECs to TECs.

**Methods:** A unique syngeneic orthotopic rat hepatocellular carcinoma (HCC) model was used to identify differential gene expressions between liver SECs and HCC TECs by microarray using freshly purified endothelial cells.

**Results:** Immunomagnetic purification methods were developed to purify SECs and TECs from liver and HCC respectively. Genes differentially expressed between the 2 endothelial cells were analysed by microarray. Genes significantly upregulated and downregulated in TECs were clustered and selected genes were verified by real-time RT-PCR as well as immunostaining in purified cells as well as tissues. HCC TECs were found to express classical endothelial markers such as CD31, vWF heterogeneously and at low levels. In contrast, they expressed novel marker genes such as annexin A1 and annexin A2 at very high levels. As angiogenesis switch was a very early event in HCC development, these novel endothelial marker genes could serve as early HCC markers for early diagnostics as well as targets for anti-HCC therapy.

**Conclusion:** Novel HCC markers were identified from microarray study of purified capillary endothelial cells from liver and HCC.

**P163**

**Proteomics of Splenic B Cells from CD38 Knockout Mice**

**N ZHANG<sup>1</sup>, H ZHU<sup>2</sup>, FWS WONG<sup>2</sup>, CF CHANG<sup>1</sup>**

<sup>1</sup>Biochemistry, <sup>2</sup>Pharmacology, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** CD38 is a ~45-kDa type II transmembrane glycoprotein expressed in many tissues, including spleen, thymus and brain. CD38 is initially identified as an ectoenzyme capable of catalysing  $\beta$ -NAD<sup>+</sup> to cyclic ADP-ribose (cADPR), a potent modulator of Ca<sup>2+</sup>-induced Ca<sup>2+</sup>-release (CICR) via ryanodine-sensitive Ca<sup>2+</sup> channel. CD38 also displays activity as a cell surface receptor in lymphocytes and triggers a variety of responses including cell proliferation, rescue from apoptosis, protein tyrosine phosphorylation and intracellular calcium mobilisation. The purpose of this study was to determine differential protein expression in splenic B cells from wild type and CD38 knockout mice by proteomic approach. Novel information on the changes in protein profiles in CD38-deficient mice may provide new insights into the functional roles of CD38 in B cells.

**Methods:** Mouse splenic B cells were isolated using magnetic activated cell sorting (MACS) and its purity was ascertained by flow cytometry. Purified splenic B cells were subjected to two-dimensional gel electrophoresis (2DE) and differentially expressed protein spots were analysed by MALDI-TOF mass spectrometry. The differential expression status of candidate proteins were further analysed by RT-PCR and Western blotting.

**Results:** We have confirmed by RT-PCR that mRNA expressions of 2 identified proteins were consistent with their corresponding differential protein expressions in 2DE.

**Conclusion:** A total of ~15 differentially expressed proteins were identified in the preliminary studies and their identities are consistent with a role of CD38 in cell survival pathway and as an immunoregulatory molecule.

**P164**

**Recovery of Intramuscular Nerve Contributes to the Healing of Lacerated Skeletal Muscle after Epimysial Repair**

**L ZHENG<sup>1</sup>, BP PEREIRA<sup>1</sup>, VP KUMAR<sup>1</sup>, BL TAN<sup>1</sup>, Y ZOU<sup>1</sup>, A LAHIRI<sup>1</sup>, A LIM<sup>1</sup>**

<sup>1</sup>Musculoskeletal Research Laboratories, Orthopaedic Surgery, National University of Singapore – Yong Loo Lin School of Medicine, Singapore

**Aim:** Insufficient recovery of lacerated skeletal muscles is commonly encountered, with progressive denervating muscle atrophy in the distal segment, even at 3 months after epimysial repair. It remains uncertain whether the denervation in distal segment arises from the poor recovery of disrupted intramuscular (IM) nerve or from a defect in the muscle fibres per se.

**Methods:** In a transected muscle after epimysial repair, the integrity of the IM nerve (acetylcholinesterase/neurofilament) in the segments across and distal to laceration site were investigated in 3 repair groups: nonNR (without IM nerve repair), NR (microanastomoses of IM nerve) and NP (with IM nerve preserved). Myofibre regeneration (neonatal MHC/desmin) and interstitial fibrosis (Masson's trichrome/vimentin) were also investigated.

**Results:** An increment in myofibre size and a reduction in scar area were noted in muscle segments across and distal to laceration site in both NR and NP muscles, compared to nonNR muscles. The proximal IM nerve stump was observed with few, inconspicuous nerve sprouting in the expansive scar in nonNR muscles, while abundant, continuous nerve fibres were detected across the repaired site in the NR and NP muscles. Accordingly, denervation was observed in the distal segment of nonNR muscle, in contrast to well-organised reinnervation observed in NR and NP muscles. Additionally, muscle regeneration was evident in nonNR muscles, but rare in NR and NP muscles.

**Conclusion:** Defective recovery of the IM nerve in lacerated muscle may in part account for the scar formation across laceration site and ensuing denervating muscle atrophy distal to laceration site.

## P165

**Human Alveolar Osteoblasts Interactions with PCL-TCP Scaffold Modified with Collagen Type I****YF ZHOU<sup>1</sup>, SL VARAWAN<sup>2</sup>, DW HUTMACHER<sup>3</sup>, TM LIM<sup>4</sup>**<sup>1</sup>Bioengineering Programme, National University of Singapore - Staff & Student - Office of Life Sciences, Singapore, <sup>2</sup>Restorative Dentistry, National University of Singapore - Faculty of Dentistry, Singapore, <sup>3</sup>Orthopaedic Surgery, National University of Singapore - Yong Loo Lin School of Medicine, Singapore, <sup>4</sup>Biological Science, National University of Singapore, Singapore**Aim:** To investigate the collagen coating effect on human alveolar osteoblasts (AOs) in vitro proliferation, and differentiation on the polycaprolactone-tricalcium phosphate (PCL-TCP) (80:20) scaffolds, which is designed for bone constitution, especially in load-bearing defects.**Methods:** Collagen type I was coated on PCL-TCP scaffolds with the freeze drying method. Human AOs were isolated from 2 subjects and their attachment, proliferation rate was measured through quantification of DNA content. Cell growth and distribution were observed by confocal and scanning electronic microscopy, together with formation of mineral nodule and collagen fibrils. Cell differentiation was monitored by reverse transcription-PCR.**Results:** The initial seeding efficiency and cell proliferation were enhanced by collagen coating for the first 7 days, although at later time points, total DNA content was not affected and came to 1600 ng/scaffolds. AOs grew extensively and cells extended and bridged across the pores within coated scaffold. Scanning electron microscopy demonstrated AOs formed multilayer cells and dense collagenous fibers with distinct mineral nodules formation at day 28. After AOs seeded onto scaffolds, ALP activity level increased 3- to 5-folds and remained high during the whole culture period. During osteogenic differentiation, both kinds of scaffolds-AOs constructs showed upregulation of expression of osteopontin (OPN), downregulation of osteocalcin (OCN) with not significantly variation of collagen type I and core DNA-binding protein A (Runx2).**Conclusion:** Our results indicated that collagen coating increased the human AOs attachment on of PCL-TCP scaffolds but did not significantly affect cell differentiation.

## P166

**Pharmacoproteomics of Cysteinyl Leukotriene 1 Receptor Antagonist in Allergic Airway Inflammation****H ZHU<sup>1</sup>, LH YEONG<sup>1</sup>**<sup>1</sup>Pharmacology, National University of Singapore - Yong Loo Lin School of Medicine, Singapore**Aim:** Cysteinyl leukotrienes (CysLT) play a critical role in asthma and CysLT1 receptor antagonists are widely used in the treatment of asthma. The purpose of this study was to investigate global protein profiling in mouse bronchoalveolar lavage (BAL) fluid from mouse allergic asthma treated with a CysLT1 receptor antagonist MK-571, using a proteomics approach to identify novel therapeutic targets and/or biomarkers for asthma.**Methods:** BALB/c mice were sensitised with OVA/Alum on day 0 and day 14 followed by OVA aerosol challenge on days 19, 20 and 21. MK-571 was administered intraperitoneally 1 h before every challenge. Control group was given saline vehicle. BAL fluid cells were counted and serum immunoglobulin level measured. Lung tissue was stained for histological study. BAL fluid protein profiling was examined using 2-dimensional gel electrophoresis.**Results:** Alleviation of pulmonary eosinophilia as well as serum IgE and IgG1 level was observed in the MK-571-treated group as compared to the saline-treated group. Histological study showed that MK-571 treatment suppressed airway mucus production and inflammatory cell infiltration. Several BAL fluid proteins, which have been shown to be up-regulated in our previous study, were significantly ( $P < 0.05$ ) reduced by MK-571 treatment. These include lungkine, a chemokine that regulates neutrophil migration; Ym1 and Ym2, members of the chitinase family, which have been shown to be eosinophil chemotactic factors; and  $\gamma$ -actin, whose relationship to asthma is not known.**Conclusion:** We have identified novel mechanisms of action of CysLT1 receptor antagonist for the treatment of allergic airway inflammation. These new protein targets may shed some light on the development of selective inhibitor and biomarker for asthma.