

Cancer Immunotherapy – The Target is Precisely on The Cancer and Also Not

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Abstract

In recent years, the impressive number of cancer immunotherapy drugs approved has been unprecedented—building on over a century of understanding on how the immune system combats cancer, and how cancer evades it. Leading the charge are the immune checkpoint inhibitor monoclonal antibodies, and adoptive cell therapy with chimeric-antigen-receptor (CAR)-T cell therapy. These breakthrough therapies have led to improved survival in patients with many advanced cancers. Some of the clinical outcomes have been striking, and may even be potentially curative in some terminal cancer patients. While immune checkpoint inhibitors work by blocking regulatory immune checkpoint signals between cancer and the immune cells to awaken an effective anticancer immunity, CAR-T cell therapy targets specific molecules on cancer cells. Tumour antigens as cancer targets take many forms and may not necessarily be proteins related to known functional cellular mechanisms. The convergence of cutting edge omics, bioinformatics, protein synthesis, immunobiology and immunotherapy have led to novel, potentially highly effective cancer targeting against neoantigens, hence reviving the quest for anticancer vaccines. Early clinical trials of neoantigen vaccines have provided proof-of-principle efficacy, especially in melanoma patients. Combinations of immunotherapies through rational design are underway aiming to further improve clinical outcomes. Moving forward, cancer immunotherapy will gain even more momentum from the discovery of more cancer targets—both on the cancer itself and in the tumour microenvironment as well as the identification of biomarkers of treatment resistance and efficacy.

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