

# Multifactorial Aetiology of Lung Cancer Among Silica-exposed Workers

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## Abstract

*In 1997, the International Agency for Research on Cancer (IARC) upgraded its evaluation of crystalline silica to a Group 1 human carcinogen. Criticism against such decision is based on the lack of consistency in experimental results across animal species, violation of an important principle for causality, such as the replication of findings under different circumstances of exposure, and the lack of a clear dose-response curve. The most recent epidemiological literature on the silica-silicosis-lung cancer link replicates the inconsistent findings that have been characterising 50 years of scientific debate in the occupational arena. Exposure circumstances capable of modifying the silica-lung cancer association include chronic bronchitis, composition of the dust mixing, particularly concerning co-occurrence of other known or probable lung carcinogens, total respirable dust, concentration of silica in respirable dust, type of crystalline silica and particle surface characteristics. The hypothesis of a silicosis-mediated pathway points toward an unspecific mechanism shared with other fibrotic conditions, for which silica might be just one of the triggers. In envisaging a multivariate multistep model of lung cancer among silica-exposed workers, silica might be considered as a “passive components of the sufficient cause”, i.e., one of the associated risk factors, concurrent or subsequent to the “active component(s) of the sufficient cause” (including, for instance, smoking, asbestos, radon-daughters, arsenic, hexavalent chromium, nickel, polycyclic aromatic hydrocarbons (PAH), and diesel exhausts among the external risk factors; and DNA repair enzymes polymorphism and spontaneous inactivation of tumour suppressor genes among the internal risk factors), which adds up in modulating the tumoral development in not easily predictable directions. If silica acts as a human lung carcinogen depending on certain occupational exposure circumstances, perhaps those circumstances and not silica itself should be classified for their human carcinogenicity potential.*

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**Key words:** Carcinogenesis, Lung neoplasms, Occupational health, Silica, Silicosis

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