

Lung cancer among silica-exposed workers: the quest for Truth between chance and necessity

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KEY WORDS

Silica; silicosis; lung neoplasms; occupational health; carcinogenesis

SUMMARY

Background: In 1997, IARC upgraded crystalline silica to a Group 1 human carcinogen. However, the IARC report itself acknowledged variations in risk depending on inherent characteristics of the crystalline silica or external factors affecting its biological activity or distribution of its polymorphs. **Methods:** We reviewed silica physical and physico-chemical properties and how such properties may affect its interaction with the target cells. Studies of silica, silicosis and lung cancer published from 1997 onwards are then reviewed in the search of any new advances in knowledge about silica carcinogenicity. Finally, other possible confounding factors contributing to inconsistent findings on silica, silicosis, and lung cancer are reviewed. **Results:** Host factors, physico-chemical characteristics of the surface of silica particles, exposure circumstances, and the mineral ore composition experimentally affect the ability of silica particles of inducing release of reactive oxygen species (ROS) and TNF- α by alveolar macrophages, possibly accounting for the great variation in lung cancer risk among dust exposed workers across the individual studies. Most recent epidemiological studies do not consider such complex pattern of modifying factors, and they keep replicating inconsistent findings. The hypothesis of a silicosis-mediated pathway, although more consistent from an epidemiological perspectives, and reassuring in terms of the effectiveness of current standards in preventing lung cancer risk among silica exposed workers, does not seem to explain elevated risks at low silica exposure levels. **Conclusion:** Future studies of lung cancer risk among workers exposed to silica-containing dust should consider measurement of ROS and TNF- α release by workplace dust samples as intermediate end-points predicting lung cancer risk better than silica concentration, allowing to more effectively address preventive action.