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**The Effect of Inhalation of Cobalt Substances on the Lungs.
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Occupational inhalation exposures to elemental cobalt powders, salts, oxides and mixed-metal cobalt compounds such as hardmetal (cobalt-tungsten carbide) powders have been associated with asthma in workers. In some instances, antibodies to cobalt were detected in their blood. Workers exposed to cobalt-containing diamond dust in diamond polishing operations (which use cobalt powders as adhesives on the polishing disk) have been reported to undergo pathological changes in their lung tissue that range from intense inflammation to cellular infiltration and fibrosis. Some hardmetal workers have also been reported to contract this condition which has been named “hardmetal lung disease” or “hardmetal pneumoconiosis”. Outside of diamond polishing and hardmetal operations, hardmetal disease has not been reported in workers exposed to cobalt substances alone. The prevalence of hardmetal lung disease in hardmetal operations is not known.

With respect to cobalt exposure (in the absence of mixed metals) in humans and lung cancer, there is one epidemiology study and a follow-up study investigating deaths in cobalt salt workers. The initial study reported four deaths due to lung cancer which would have been significantly higher than the expected deaths. However, the study authors later reclassified one lung cancer death after review of death certificates. Based on three deaths, the initial study results were not statistically significant, and the follow-up study did not report any increased deaths due to lung cancer.

There are four epidemiological evaluations of occupational hard metal exposure and lung cancer. While all four studies reported low but significantly increased deaths due to lung cancer, each study has confounding issues. These issues include: the effects of tobacco smoking and other life-style factors, incomplete current exposure data on workers, and lack of information on previous exposure history of the workers.

Animal studies include a lifetime (2-year) inhalation study of cobalt sulphate heptahydrate aerosol in rodents where lifetime inhalation exposure was associated with lung cancer (significant increases in bronchio-alveolar tumours) in rats and mice. Severe inflammation of the entire respiratory tract at all doses was reported as well. Studies with rodents and miniature swine have reported inflammation, lung fibrosis and emphysema after long-term inhalation or intra-tracheal instillation of cobalt, cobalt oxide and cobalt-tungsten carbide powders. Studies investigating the long-term inhalation of hardmetal powder and lung cancer in experimental animals have not been found in the scientific literature.

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