DreamWeaver

LIMITED

ELECTRONIC ALCHEMY
RESEARCH PROJECT

RESOURCE LIBRARY DOCUMENT

www.DreamWeaver.Ltd.uk

4.6.1 general

There is no known physiological function of silver in the human body and it is considered a contaminant when found in tissues. Toxicity is generally not seen until ingestion reaches about one gram per day. No studies are known documenting cancer or birth defects in humans due to silver exposure. Reproductive tissue damage due to silver nitrate injections is reversible.

Apart from some occupational exposure studies, the health effects on people of either short-term or long-term exposure to known specific concentrations of silver in the air, food or water are not known (Anon. 1990). Most silver exposure is incidental or anecdotal and unquantified.

4.6.2 inhalation

No studies are known documenting death or cardiovascular, musculoskeletal, immunological, neurological, developmental or genotoxic effects due to inhalation of silver or silver compounds in animals or people (Anon. 1990).The only study showing renal effects had co-exposure to cadmium, a known renal toxin, so the possible effects of silver are not known. Decreased night vision was also reported by these workers (Rosenman *et al*. 1987).

Dusts with a high silver oxide or silver nitrate content may cause gastrointestinal effects in occupationally-exposed workers. There was a burning abdominal pain reported by 10 of 30 workers which was relieved by antacids. Estimated exposure levels were between 39 and 378 µg silver per m^3 of air. Chemical forms and particle sizes were not known and employment duration ranged from <1 to >10 years. The symptoms were correlated with blood silver levels. Apart from one man with an elevated hemoglobin level, there were no hematological effects and blood counts were normal (Rosenman *et al*. 1979).

These same dusts also caused respiratory effects. Twenty-five of the above workers complained of upper respiratory irritation (runny nose, sneezing, sore throat or stuffiness) and 20 of these also had coughs, wheezing or chest tightness. Chest radiograms and respiratory function tests were normal (Rosenman *et al*. 1979). Further study of these same workers showed granular deposits in the conjunctiva and cornea of the eyes of 20 of the men. Subjective assessment of the degree of silver deposition showed correlation with the duration of employment, the reports of changes in skin colour and decreased night vision (Rosenman *et al*. 1979).

A man suffered respiratory problems 14 hours after working with molten silver ingots. Concentrations and the silver species were not known, nor was the prior history of exposure to silver. Breathing was noisy, pulse rapid, capillary blood low in oxygen and there were scattered thickenings in the lungs as seen in a chest radiogram. The patient suffered acute respiratory failure but eventually recovered fully (Forycki *et al*. 1983).

Silver reclamation workers chronically exposed to insoluble silver compounds (silver halides) showed marginal increases in mean corpuscular volume and marginal decreases in red blood cell counts (Pifer *et al*. 1989). The toxicological significance of these changes, if any, is not known. Measured levels of liver enzymes (alanine amino transferase, aspartate amino transferase, gamma glutamyl transferase and alkaline phosphatase) found no significant differences between workers exposed to silver and insoluble silver salts and those with no history of silver exposure. Conjunctival and corneal silver deposits were found in about 25% of these workers and nasal-septal pigmentation in about 75% of them (Pifer *et al*. 1989).

4.6.3 dermal

No studies were located concerning death, respiratory, cardiovascular, neurological, developmental, genotoxic, gastrointestinal, hematological, musculoskeletal, hepatic, renal or ocular effects in people after dermal exposure to silver or silver compounds. Silver may cause mild allergic responses such as rashes, swellings and inflammation in some people. Silver is not likely to be a health hazard through skin contact.
Silver nitrate eye drops have been used for many years to prevent blindness in newborns exposed to gonorrhea. Many people have used skin creams containing silver nitrate or silver sulphadiazine for extended periods with no known detrimental health effects (Anon. 1990).

Medical case histories indicate that dermal exposure to silver or silver compounds for a long time can lead to localized skin discolouration similar to the generalized argyria which results from oral exposure. There is no quantification of this effect (Buckley 1963, McMahon and Bergfield 1983). Mild allergic responses are possible after repeated dermal contact with silver and silver compounds such as silver cyanide (6 months), radiographic processing solutions (10 years), and dental amalgams (20 years) (Catsakis and Sulica 1978, Heyl 1979, Marks 1966).

4.6.4 oral

Breath mints coated with silver, silver nitrate capsules for the relief of gastrointestinal discomfort, silver nitrate nose drops, silver acetate anti-smoking lozenges, and silver nitrate solutions for treating gum disease have also been used with no apparent adverse health effects, if taken as directed. There are case histories of people who have ingested excessive amounts of silver through abuse of these products. However, the data are mainly anecdotal, neither quantitative nor reliable, and cannot be used to set criteria or establish effect levels (Aeseth *et al.* 1981, Blumberg and Carey 1934, East *et al.* 1980, Landas *et al.* 1985, MacIntyre *et al.* 1978, Marshall and Schneider 1977, Shelton and Golding 1979, Shimamoto and Shimamoto 1987).

Gram amounts of silver-containing medicines taken over several months in small doses are needed to cause argyria and ingestion of gram levels would likely be required to cause life-threatening conditions. Silver nitrate taken orally causes necrosis of the gastrointestinal tract. Doses of 10 to 1000 mg do not cause any symptoms but 2 to 30 g cause death in hours to days (MRI 1975, Sollman 1957)

Apart from the above, no studies were located documenting death or respiratory, hematological, immunological, musculoskeletal, cardiovascular, developmental, genotoxic, hepatic or renal effects in humans after oral exposure to silver or silver compounds. Silver may build up and be retained in the body under some conditions. Long exposures may cause a grey or blue-grey build-up of silver called argyria which is a permanent, but only a cosmetic, effect.

http://wlapwww.gov.bc.ca/wat/wq/BCguidelines/silver/bcsilver-28.htm