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Cobalt Exposure and Heart Disease (April 2006)

Cobalt in the form of Vitamin B₁₂ (hydroxocyanocobalamin) is essential for humans. Vitamin B₁₂ supports important synthetic reactions in metabolic processes and is essential for the production of red blood cells. The metabolism of Vitamin B₁₂ and the daily ingestion of cobalt-containing foodstuffs provide the most significant source of cobalt (e.g. background level) in the human body. Background levels of cobalt are not known to be associated with adverse health effects in humans.

Humans may ingest up to several milligrams of cobalt per day in their diet and based on case reports, appear to tolerate even higher daily doses of cobalt during clinical treatment for anaemia without adverse effects to the heart. However, the ingestion of relatively high levels of cobalt (when compared to dietary intake) from inorganic cobalt salts with large amounts of alcohol has been reported to pose health risks to some humans. In the mid 1960's, small amounts of cobalt (1-2 parts per million) in the form of cobalt chloride were added to a brand of beer as a foam stabiliser. A number of fatalities related to cardiomyopathy were reported in men who consumed large amounts (more than 8 pints per day) of the cobalt-laden beer. Daily oral doses of cobalt in this group were in the range of 0.1 milligram per kilogram body weight.

Cardiomyopathy is a type of heart disease characterised by damage to the muscle and structure of the heart. The resultant effect is muscle cell death and a decrease in the volume of blood pumped. Studies of animal and human exposure to cobalt indicate that oral cobalt exposure, poor diet, and alcohol consumption are jointly associated with heart damage similar to that reported in beer drinkers.

A recent (2004) cross-sectional occupational exposure study of about 200 cobalt refinery workers found no clinically significant heart disease. However, among the most highly exposed workers, there was a relationship between cumulative cobalt exposure and alterations in left ventricular filling and relaxation times. The clinical significance of these changes is currently being investigated.

References:

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