Arsenic, Gold and Copper Antidotes

Excess levels of arsenic, copper, and gold can produce adverse effects in the human body. Arsenic disrupts ATP production via several mechanisms including inhibition of pyruvate dehydrogenase and also can uncouples oxidative phosphorylation. Arsenic also leads to an increase in oxidative stress and can lead to multi-system organ failure. Excess amounts of copper can also harm the body as it can generate reactive oxygen species. Acute symptoms of copper poisoning by ingestion include vomiting, hypotension, melena, jaundice, GI distress, as well as coma. Chronic exposure can damage the liver and kidneys. Gold is also a type of heavy metal that can cause poisoning from excessive exposure. Symptoms include dermatitis, headache, vomiting, bone marrow depression, as well as kidney damage. Penicillamine is a chelator that can be used in the treatment of toxicities caused by excessive exposure to these heavy metals.



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Toxic Metals

Arsenic
Arson-hick
Naturally occurring metalloid element that can cause ingestion toxicity due to arsenic-containing insecticides or drinking water. It inhibits lipoic acid, a cofactor for pyruvate dehydrogenase leading to lactic acidosis and neurological deficiencies. Acute toxicity can lead to nausea, vomiting, abdominal pain, rice water stools and garlic breath. Toxicity is associated with squamous cell carcinoma of the skin, lung cancer, and liver angiosarcoma.

Gold
Gold-vault
Naturally occurring metalloid element that can cause toxicity due to its use in the treatment of rheumatoid arthritis. Toxicity can cause dermatitis, stomatitis, hematuria and proteinuria.

Copper
Copper-cop
Naturally occurring metalloid element that can result in toxicity due to ingestion or absorption of excess copper from acidic foods or beverages kept in contact with copper containers. Toxicity can cause gastroenteritis, nausea, vomiting, diarrhea, hemolytic anemia, and basal ganglia degeneration. Toxicity can also be due to inherited Wilson's Disease.

Antidotes

Penicillamine
Pencil-mine
A chelating agent that can remove various metalloid elements, including copper, arsenic and gold from tissues.

Dimercaprol (BAL)
Dime-cap
Dimercaprol, or BAL (British anti-Lewisite), is an antidote for treating toxic metal poisoning. It is used for arsenic, gold, mercury and lead. In the past, it was used for treatment of copper poisoning from Wilson's disease, but is not commonly used for this purpose currently. This drug chelates medications, allowing them to be excreted safely. Dimercaprol has a very narrow therapeutic range, and can lead to side effects of nephrotoxicity and hypertension.

Succimer
Sucker
Succimer is an oral medication taken to treat poisoning for arsenic, but also lead and mercury. This drug is a chelator, which binds to the toxic metals in the bloodstream and eliminates them in the urine.

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