

## **ARSENIC – A BENEFICIAL THERAPEUTIC AND AN ENVIRONMENTAL POISON**

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Arsenic is a ubiquitous element in the earth's crust with a crustal average of about 2 mg/kg but with concentrations in clastic sedimentary rocks as high as 500 mg/kg. Arsenic is transported mainly by water, although other natural and anthropogenic sources of exposure to arsenic, including volcanic emissions, forest and agricultural fires, pressure treated wood, mining and smelting activities, and burning of arsenic-rich coal, are of increasing concern. The history of arsenic is double-edged – it has a beneficial or medicinal aspect and a detrimental or poisonous aspect. In medicine, arsenicals were used in the Greek and Roman civilizations to treat a wide range of ailments. In the 1930s arsenic trioxide was the main therapeutic agent in the treatment of chronic myeloid leukemia. Later in the 20th Century, arsenic trioxide was introduced as an anticancer agent in China for the treatment of acute promyelocytic leukemia (APL). In the US, the use of arsenic trioxide in medicine has been approved by the FDA for the treatment of patients with relapsed or refractory APL. As an environmental poison, acute and chronic health effects of inorganic arsenic exposure in humans have been described from contaminated drinking water and food. An example of the breadth and severity of health problems caused by exposure to arsenic can be found in Guizhou Province, P. R. China where villagers used coal with arsenic concentrations as high as 35,000 mg/kg in a residential setting. Exposure to arsenic resulted from ingestion of crops dried over coal fires, ingestion of arsenic-rich dust, and inhalation of indoor air polluted by the arsenic mobilized by coal combustion. Tens of thousands of people in the region consequently suffered from chronic arsenic poisoning. Those affected exhibited typical symptoms of arsenic poisoning including hyperpigmentation, hypopigmentation, hyperkeratosis, Bowen's disease, and squamous cell carcinoma.

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