

Treatment of Acute Inflammatory Systemic Disease using Arsenic Trioxide

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DESCRIPTION

Arsenic trioxide, also known by the brand name Trisenox, is an inorganic compound and medication. As an industrial chemical, its main applications include the manufacture of wood preservatives, pesticides, and glass. As a medicine, it is used to treat a kind of cancer known as acute promyelocytic leukaemia. For this reason, it is administered through vein injection. Common adverse effects include vomiting, diarrhoea, edoema, shortness of breath, and headaches. APL differentiation syndrome and heart problems are potential severe side effects. Use during pregnancy or breastfeeding may be harmful to the infant. Arsenic trioxide's formula is As_2O_3 .

In the United States, arsenic trioxide was licenced for medicinal use in 2000. It is on the World Health Organization's List of Essential Medicines. Every year, approximately 50,000 tonnes are produced. Due to its toxicity, a number of countries have banned its manufacturing. Arsenic trioxide is used to treat acute cancer, a type of cancer (APL). It may be used in cases that have not responded to other agents, such as All-Trans Retinoic Acid (ATRA), or as part of the first treatment of newly diagnosed cases. This initial treatment may include a combination of arsenic trioxide and then All Retinoic Acid Therapy (ATRA).

The effectiveness appears to be similar to Realgar/Indigo naturalis, which can be taken orally and is less expensive but less widely available. This application was found in the 1970s by Chinese researcher Zhang Tingdong and colleagues. It was approved for the treatment of tumors in the United States in 2000. The University of Hong Kong developed a liquid form of arsenic trioxide that can be given orally. Arsenic trioxide seems to be the source of organoarsenic compounds such as feed additives (roxarsone) and medication (neosalvarsan). Industrial uses include use as a precursor to forestry products, the production of colorless glass, and electronics. As the main arsenic compound, trioxide is the precursor to elemental arsenic, arsenic alloys, and arsenide semiconductors. The trioxide is converted into the bulk arsenic-based compounds sodium arsenite and sodium cacodylate. Arsenic's toxicity is utilized in a variety of applications,

including the use of the oxide as a wood preservative. Copper arsenates, which are derived from arsenic trioxide, are extensively used as a wood preservative in the United States and Malaysia, however they are banned in many other parts of the world. This technique is still controversial. Arsenic trioxide, when mixed with copper(II) acetate, creates the vibrant pigment known as Paris green, which is used in paints and as a rodenticide. This application has been decommissioned. Arsenic trioxide is quickly absorbed by the digestive system, and its hazardous effects *via* inhalation or skin contact are well documented. Due to methylation to monomethylarsonic acid and dimethylarsinic acid and excretion in the urine, initially excretion was quick and half life of 1-2 days. But a certain amount (30-40% in the case of repeated exposure) is incorporated into the bones, muscles, skin, hair, and nails (all epithelial tissues) and eliminated over a period of weeks or months.

The initial signs of acute arsenic poisoning caused by the ingestion are digestive problems such as vomiting, stomach aches, and diarrhea, which is usually accompanied by bleeding. Sub-lethal doses can cause convulsions, cardiovascular problems, liver and kidney inflammation, and abnormal blood coagulation. These are followed by the appearance of characteristic white lines on the nails (Mees' lines) and hair loss. Lower doses cause liver and renal problems, in addition to changes in skin pigmentation. Even dilute solutions of arsenic trioxide are dangerous to the eyes. Arsenicosis is a chronic arsenic poisoning. Smelter workers, persons whose drinking water includes high amounts of arsenic (0.3-0.4 ppm), and patients who have been treated for a long period with arsenic-based medications are all affected by this sickness.

Similarly, studies on workers exposed at copper foundries in the U.S, Japan, and Sweden indicate that the most exposed workers have such a 6-10 times higher risk of lung cancer than that of the general population. Long term exposure to arsenic trioxide, either from drinking water or as a medical treatment, can lead to cancer. One study of women exposed to arsenic trioxide dust as employees or neighbours of a copper foundry found reproductive problems (high rates of miscarriage, low birth weight, and congenital deformations).

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