

GLASS provides information & referrals on lead poisoning & lead contamination prevention & management, with the goal of eliminating lead poisoning globally & protecting the environment from lead. GLASS is run by The LEAD Group Incorporated ABN 25 819 463 114



global lead advice
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Pectin: Panacea for both lead poisoning and lead contamination

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Lead (Pb)

Lead is an element which is regarded as one of the heavy metals. When freshly cut it has a bluish-white colour; upon exposure to air it turns a dull grayish colour. When melted into a liquid it has a shiny chrome-silver lustre¹.

Lead Contamination

Over the last three decades, environmental Lead (Pb) concentrations have fallen considerably in some countries, due to removal of Pb from gasoline, household paint, solder, and other consumer products (CDC Centres for Disease Control and Prevention, 2005). Despite this progress, human populations are still exposed to low levels of Pb via contaminated food, water, dust, and soil, and occupational activities.

Lead Poisoning

Elevated levels of the heavy metal lead in the body result in a medical condition known as lead poisoning. Lead interferes with various body processes and is toxic to organs and tissues such as heart, bones, intestines, kidneys and reproductive and nervous systems. It is predominantly toxic to children, because it interferes with the development of the nervous system thereby results in potentially permanent learning and behaviour disorders.

Contaminated air, water, soil, food and consumer products are routes of exposure to lead. In adults the common cause of lead poisoning is occupational exposure. On the other hand in children the main cause is lead paint which is found in many homes in particular older ones.

Toxicity is determined by both the quantity of lead in the blood and tissues and also the time course of exposure. Lead poisoning could be either acute or chronic. Acute lead poisoning is caused by intense exposure of short duration whereas chronic lead poisoning is the result of repeated low-level exposure over an extended time. The amount of lead in the blood - measured in micrograms of lead per deciliter of blood ($\mu\text{g/dL}$) - is used in the diagnosis and treatment of lead exposure.

A blood lead level of $10\mu\text{g/dL}$ or above is considered to be a cause for concern according to The US Centres for Disease Control and Prevention and The World Health Organization. Even at lower levels lead may impair development and have harmful health effects hence there is known safe exposure level.

Treatment

The treatment for lead poisoning includes removal from the source of lead, and chelation therapy for people who have markedly high blood lead levels or who have symptoms of poisoning. Another part of treatment for lead poisoning is the treatment of iron, calcium and zinc deficiencies that are associated with increased lead absorption. If materials consisting lead are found in the gastrointestinal tract whole bowel irrigation, cathartics, endoscopy or surgical removal may be utilized to remove it from the gut and avoid further exposure. Bullets consisting of lead and shrapnel may also pose a danger of further exposure and may have to be surgically removed if they are in or near fluid-filled or synovial spaces. In the case of lead encephalopathy, anticonvulsants may be provided to control seizures, and treatments to control swelling of the brain include corticosteroids and mannitol. Organic lead poisoning

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can be treated by eliminating the lead compound from the skin, avoiding further exposure, treating seizures and chelation therapy could be used for people with high blood lead concentrations. A molecule with at least two negatively charged groups which enable it to generate complexes with metal ions with multiple positive charges such as lead is known as a chelating agent. The chelate formed as a result of this process is non-toxic and can be excreted in the urine, initially at up to 50 times the normal rateⁱⁱ.

Pectin

Pectin is a structural heteropolysaccharide found in the cell walls of terrestrial plants. It is predominantly extracted from citrus fruits and is produced commercially as a white to light brown powder and is utilised in food as a gelling agent, especially in jams and jelliesⁱⁱⁱ. Khotimchenko et al have demonstrated that pectin substances are capable of binding heavy metals especially lead. The extent of metal uptake is determined by the chemical structure of pectin and it increases with decrease in the degree of esterification^{iv}.

Modified Citrus Pectin (MCP)

MCP is a nutritional supplement derivative of the inner white pulp of citrus fruit peels. Citrus pectin is a complex polysaccharide soluble fibre. It has been shown that MCP is capable of binding toxic heavy metals and excreting them without perturbing the vital minerals in healthy humans. This is because MCP has the ideal structure for chelation of heavy metals. For instance, it contains approximately 10% rhamnogalacturonan II, and this is able to bind heavy metals and not necessary mineral cations. In this study all the subjects had a huge increase in urinary excretion of lead and a significant reduction in blood lead levels^v. Low esterified pectin has been demonstrated to promote a significant improvement of thyroid function in rats with thyroid gland pathology as a result of lead injections. Furthermore, lead content in rats treated with pectin was significantly lower than in untreated animals^{vi}.

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