

Lead & Lead compounds

Pb

Summary of Health Effects

Lead can affect many organs in the body, and it primarily harms the nervous system. It can hurt the brain and kidney, change the immune system and harm the reproductive system and development in humans. Unborn babies and children are especially sensitive to lead exposure since their nervous systems are still developing.

How are lead and lead compounds used?

Lead is an abundant element extracted from ores used in many industries, including energy, mining, construction, and manufacturing. Lead has been used to produce solders, batteries, plumbing, ammunition, gasoline, pigment, paint, radiation shields and metal alloys. Lead has been phased out of many products since the discovery of its neurotoxicity.¹

Lead has been used in consumer products such as ceramics, pottery, glass, paint, home remedy medicines, cosmetics, dyes, caulking, food cans, cigarettes, and pipe soldering.¹ Consumer product testing has detected lead in a variety of products and children's products, not limited to, toys, jewelry, personal care products, art & school supplies, clothing, baby bottle nipples, teethingers and pacifiers.²

Toxicity: What are its health effects?

According to the U.S. Centers for Disease Control there is no safe blood lead level.³ Lead The State of California lists lead and lead compounds under Proposition 65 as a carcinogen and developmental and reproductive toxicant.⁴ Inorganic lead is considered a probable human carcinogen by the International Agency for Research on

Cancer.⁵ The Environmental Protection Agency (EPA) Integrated Risk Information System has classified inorganic lead and inorganic lead compounds as a category B2, a probable human carcinogen.⁶ The National Toxicology Program has characterized lead as an anticipated carcinogen.⁷ Lead is designated as a Substance of Very High Concern (SVHC) by the European Union based on evidence of reproductive toxicity.⁸ The American Conference of Industrial Hygienists has characterized lead and specific inorganic lead compounds as an A3, confirmed animal carcinogen with unknown relevance to humans.⁹ Lead was added to the 2014 Toxic Substances Control Act work plan due to its developmental, neurological and reproductive toxicity potential, high environmental persistence and moderate bioaccumulation.¹⁰

Though lead can affect many organs in the body, the primary target organ for lead toxicity is the nervous system.¹ Severe brain and kidney damage, altered immune parameters and hematological, cardiovascular, neurological, reproductive, and developmental toxicity may occur when humans are exposed to lead.^{1,11-76} Fetuses and children are especially sensitive to lead exposure as they are undergoing nervous system development. When a child swallows lead, a larger proportion of lead will be absorbed into the bloodstream as compared to adults. Children have demonstrated impaired neurological function including decreased cognitive ability, IQ, and severe neurologic problems such as seizure, coma and death when exposed at high levels.¹ Animals exposed to lead have developed tumors and cancers, alterations in testis, delays in sexual maturation, decreased birth weight, gestational age, delayed puberty in females, and increased

immunoglobulin E (IgE) antibody levels in perinatally exposed offspring.⁷⁷⁻⁸⁸

Exposure: How can a person come in contact with it?

A person may come in contact with lead by breathing in contaminated air or dust, eating or drinking contaminated food or drink or by skin contact with consumer products containing lead or lead compounds.

Lead is a high production volume substance and is listed on the EPA Toxic Release Inventory.⁸⁹ Historically, elevated levels of lead in soil and ambient air were influenced by the burning of fossil fuels, such as gasoline containing lead. Atmospheric levels of lead in the U.S. have generally decreased since gasoline lead additives were banned for use in motor vehicles in 1996.¹

Lead has been shown to leach out of lead pipes or soldering and contaminate drinking water. Lead paint can deteriorate and turn into lead dust. Lead has been detected in various foods,

including vegetables grown in soils that contain lead.¹ Lead has been detected through Health Canada, California, and the U.S. National Health and Nutrition Examination Survey biomonitoring studies in human blood or urine.^{90,91,92} Other biomonitoring studies have detected lead in umbilical cord blood, breast milk, and other bodily tissues such as hair and nails. Lead was detected in indoor air, household dust, drinking water, and consumer products. Lead has been found in the natural environment in soil, surface water, ambient air, fish and wildlife.⁹³

The EPA has set a lead drinking water Action Level and a National Ambient Air Quality Standard.^{94,95} Occupational exposure lead limits have been established by NIOSH, OSHA and ACGIH.^{96,97,98} The Consumer Product Safety Commission (CPSC), under the Federal Hazardous Substance Act, has banned lead in lead containing paint and certain consumer products at concentrations greater than 0.009%.⁹⁹

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