



Lead and Your Health

Lead is a common and versatile metal. It is dense yet malleable, has a low melting point, and does not corrode easily, leading to its use in a variety of products. However, lead can harm your health.

Recognizing harm to human health from lead, the federal government banned lead-based paint in 1978, but it remains in older buildings. Lead in gasoline was phased out by 1996, but residue from decades of exhaust, as well as fumes from metal smelting, persist in the environment. Other restrictions on lead were imposed in 1986, but it is still widely present in some products, such as car batteries, ammunition, leaded crystal, stained glass, and radiation protective gear.

No amount is safe

Any amount of lead in the body can cause harm.

A serious problem for children

Lead exposure affects one out of every three children (up to 800 million) around the world, according to a 2020 United Nations International Children's Emergency Fund study.¹ Children under age 5 are particularly vulnerable to harm from lead. It affects the development of the brain and nervous system, causing reduced postnatal growth and lifelong neurological, cognitive, and physical damage.

How does lead get in the body?

Lead poisoning is preventable. Understanding how lead enters a body and acting to prevent lead exposure is the best way to protect your health.

Lead can enter the body through breathing fumes or dust, and by eating or drinking something contaminated with lead (ingestion). Lead is in tobacco smoke, both inhaled and second-hand smoke.² Certain water pipes may contain lead. Lead can enter drinking water from older or damaged plumbing.

Lead dust is a common means of exposure in the U.S. Many older homes, built before 1978, probably contain lead-based paint, inside and out. When that paint cracks or peels, it makes lead dust. The soil around homes can contain lead from old exterior paint.



Children can breathe in lead dust or eat lead from soil, dust, or paint chips when they put their fingers in their mouths. Young children can place other objects in their mouths that could contain lead, such as some toys and toy jewelry. Pregnant women can transfer lead to their fetuses through the placenta, or after birth to their newborns during breastfeeding.

For adults, the most common occupational exposure is inhaling fumes or dusts that contain lead. Workplaces or occupations with the potential for lead exposure include mining, ironwork or welding, construction (particularly renovation and remodeling), smelters, shooting ranges, manufacture and disposal of car batteries, and automobile radiator repair.

How is lead exposure tested?

A blood test is the best way to measure exposure to lead. The amount of lead in blood is called the blood-lead level, which is measured in micrograms of lead per deciliter of blood ($\mu\text{g}/\text{dL}$).

What are the harms to health and well-being?

The risk of any health effect increases as blood-lead levels rise. Lead and lead compounds are reasonably anticipated to be human carcinogens.³ Lead exposure is associated with health effects in both children and adults as summarized on the next page.

Blood Lead Level	Health Effects
At or below 5 µg/dL	Children: Decreased academic achievement, IQ scores, and specific cognitive measures. Increased incidence of attention-related and problem behaviors. Adults: Decreased kidney function. Maternal blood lead associated with reduced fetal growth.
At or below 10 µg/dL	Children: Decreased hearing. Reduced postnatal growth. Delayed puberty. Adults: Increased incidence of essential tremor. Increased blood pressure and risk of hypertension. In men, adverse changes to sperm and difficulty with pregnancy.

Source: National Toxicology Program Monograph on Health Effects of Low-level Lead, 2012.

NIEHS research

NIEHS supports research to find out who is affected by lead exposure and the range of health effects caused by lead.

Black children have higher blood lead levels than other groups. NIEHS-funded researchers concluded that some of this disproportionate lead exposure is transmitted mother-to-child before birth and persists into early childhood.⁴

Research partially funded by NIEHS showed some lead can be removed from the body, but its harmful effects cannot be reversed. The drug succimer lowered blood lead levels⁵ about 25% in the short term, but doing so did not improve cognitive, behavioral, and neuromotor test scores. This research reinforces the need for children to be protected from being exposed to any lead.

NIEHS seeks ways to detect and prevent health effects associated with lead exposure:

- Researching how to reduce lead contamination in urban soils.
- Supporting community-engaged research, which often concerns environmental health disparities and environmental justice.
- Exploring possible connections between lead exposure and Alzheimer's disease.
- Funding development of a hand-held tester for lead in tap water.
- Studying the long-term effects of childhood lead exposure.

What can I do to prevent lead exposure?

- Avoid tobacco smoke.
- Contact your local health department about lead that may be in your home's paint, drinking water, or soil, and what you can do to stabilize or remove it.
- Lead-glazed pottery should not be used for storing food, eating, or drinking.
- A household member who works in a lead-related occupation should change work clothes and shoes before entering the home, and their work clothes should be washed separately.

Learn more about lead

- Centers for Disease Control and Prevention: Childhood lead poisoning prevention <http://cdc.gov/nceh/lead>
- Occupational Safety and Health Administration <https://osha.gov/lead>
- President's Task Force on Environmental Health Risks and Safety Risks to Children <https://ptfeh.niehs.nih.gov/activities/lead-exposures>
- U.S. Environmental Protection Agency <http://epa.gov/lead>
- World Health Organization: Lead poisoning and health <https://who.int/news-room/fact-sheets/detail/lead-poisoning-and-health>

For more information on the National Institute of Environmental Health Sciences, go to <https://niehs.nih.gov>.

¹ UNICEF and Pure Earth. 2020. The Toxic Truth: Children's Exposure to Lead Pollution Undermines a Generation of Future Potential. New York, NY.

² Apostolou A, et al. 2012. Secondhand tobacco smoke: a source of lead exposure in US children and adolescents. Am J Public Health. 102(4):714-22.

³ NTP (National Toxicology Program). 2016. Report on Carcinogens, Fourteenth Edition.; Research Triangle Park, NC: U.S. Department of Health and Human Services, Public Health Service. <https://ntp.niehs.nih.gov/go/roc14>

⁴ Cassidy-Bushrow AE, et al. 2017. Burden of higher lead exposure in African-Americans starts in utero and persists into childhood. Environ Int. 108:221-227.

⁵ Dietrich KN, et al. 2004. Effect of chelation therapy on the neuropsychological and behavioral development of lead-exposed children after school entry. Pediatrics 114(1):19-26.