

Lead

What is Lead?

Lead is a naturally occurring bluish-gray metal found in small amounts in the earth's crust. Lead can be found in all parts of our environment. Much of it comes from human activities including burning fossil fuels, mining, and manufacturing. Lead has many different uses. It is used in the production of batteries, ammunition, metal products (solder and pipes), and devices to shield X-rays. Because of health concerns, lead from paints and ceramic products, caulking, and pipe solder has been dramatically reduced in recent years. The use of lead as an additive to gasoline was banned in 1996 in the United States.

What happens to lead when it enters the environment?

- Lead itself does not break down, but lead compounds are changed by sunlight, air, and water.
- When lead is released to the air, it may travel long distances before settling to the ground.
- Once lead falls onto soil, it usually sticks to soil particles.
- Movement of lead from soil into groundwater will depend on the type of lead compound and the characteristics of the soil. How might I be exposed to lead?
 - Eating food or drinking water that contains lead. Water pipes in some older homes may contain lead solder. Lead can leach out of the solder and into the water.
 - Spending time in areas where lead-based paints have been used and are deteriorating. Deteriorating lead paint can contribute to lead dust.
 - Working in a job where lead is used or engaging in certain hobbies in which lead is used, such as making stained glass.
 - Using health-care products or folk remedies that contain lead.
 - Chewing or mouthing toys that contain lead-based paint.

How can lead affect my health?

The effects of lead are the same whether it enters the body through breathing or swallowing. Lead can affect almost every organ and system in your body. The main target for lead toxicity in adults and children is the nervous system. Long-term exposure of adults can result in decreased performance in some tests that measure functions of the nervous system. It may also cause weakness in fingers, wrists, or ankles. Lead exposure also causes small increases in blood pressure, particularly in middle-aged and older people and can cause anemia. Exposure to high lead levels can severely damage the brain and kidneys in adults or children and ultimately cause death. In pregnant women, high levels of exposure to lead may cause miscarriage. High level exposure in men can damage the organs responsible for sperm production.

How likely is lead to cause cancer?

We have no conclusive proof that lead causes cancer in humans. Kidney tumors have developed in rats and mice that had been given large doses of lead compounds. The Department of Health and Human Services (DHHS) has determined that lead and lead compounds are reasonably anticipated to be human carcinogens and the EPA has determined that lead is a probable human carcinogen. The International Agency for Research on Cancer (IARC) has determined that inorganic lead is probably carcinogenic to humans and that there is insufficient information to determine whether organic lead compounds will cause cancer in humans.

How does lead affect children?

Small children can be exposed by eating lead-based paint chips, chewing on objects painted with lead-based paint, or swallowing house dust or soil that contains lead. Children are more vulnerable to lead poisoning than adults. A child who swallows large amounts of lead may develop blood anemia, severe stomachache, muscle weakness, and brain damage. If a child swallows smaller amounts of lead, much less severe effects on blood and brain function may occur. Even at much lower levels of exposure, lead can affect a child's mental and physical growth.

Exposure to lead is more dangerous for young and unborn children. Unborn children can be exposed to lead through their mothers. Harmful effects include premature births, smaller babies and decreased mental ability in the infant, learning difficulties, and reduced growth in young children. These effects are more common if the mother or baby was exposed to high levels of lead. Some of these effects may persist beyond childhood.

How can families reduce the risk of exposure to lead?

- Avoid exposure to sources of lead.
- Do not allow children to chew or mouth surfaces that may have been painted with lead-based paint.
- If you have a water lead issue, run or flush out the water that has been standing in pipes overnight before using new water for drinking or cooking.
- Some types of paints and pigments that are used as make-up or hair coloring contain lead. Keep these kinds of products away from children.
- If your home contains lead-based paint or you live in an area contaminated with lead, wash children's hands and faces often to remove lead dusts and soil, and regularly clean the house of dust and tracked in soil.

Is there a medical test to show whether I've been exposed to lead?

A blood test is available to measure the amount of lead in your blood and to estimate the amount of your recent exposure to lead. Blood tests are commonly used to screen children for lead poisoning. Lead in teeth or bones can be measured by X-ray techniques, but these methods are not widely available. Exposure to lead also can be evaluated by measuring erythrocyte protoporphyrin (EP) in blood samples. EP is a part of red blood cells known to increase when the amount of lead in the blood is high. However, the EP level is not sensitive enough to identify children with elevated blood lead levels below about 25 micrograms per deciliter ($\mu\text{g}/\text{dL}$). These tests usually require special analytical equipment

that is not available in a doctor's office. However, your doctor can draw blood samples and send them to appropriate laboratories for analysis.

Reporting lead levels in Pennsylvania

Pennsylvania state law requires that both in-state and out-of-state clinical laboratories analyzing blood for lead must report elevated levels to the Pennsylvania Department of Health (PADOH). All laboratories analyzing blood for lead must be licensed and approved by the Commonwealth. In addition, laboratories analyzing blood lead levels (BLLs) for adults must also be certified by the federal Occupational Safety and Health Administration (OSHA).

The PADOH has a list of approved laboratories available for health care providers and employers. Reporting regulations and updates are published in the Pennsylvania Bulletin. The following is a brief synopsis of key components of the state's lead reporting law.

For persons under sixteen (16) years of age and pregnant females, the state law requires clinical laboratories to report all blood lead test results to the PADOH's Childhood Lead Poisoning Prevention Program, Division of Child and Adult Health Services, Bureau of Family Health.

For adults, defined as persons sixteen (16) years of age or older, the state law requires clinical laboratories to report all blood lead level test results to the PADOH's Division of Environmental Health Epidemiology, Bureau of Epidemiology. An elevated BLL for an adult is currently 10 $\mu\text{g}/\text{dL}$ or more.

The PADOH tracks both children and adults with elevated BLLs to determine what causes the lead exposure. It provides advice and educational materials to health care providers and the general public on reducing lead exposures at work, at home, and in the environment.

Has the federal government made recommendations to protect human health?

The Centers for Disease Control and Prevention (CDC) recommends that states test children at ages 1 and 2 years. Children should be tested at ages 3 – 6 years if they have never been tested for lead, if they receive services from public assistance programs for the poor such as Medicaid or the Supplemental Food Program for Women, Infants, and Children, if they live in a building or frequently visit a house built before 1950; if they visit a home (house or apartment) built before 1978 that has been recently remodeled; and/or if they have a brother, sister, or playmate who has had lead poisoning. CDC considers a BLL of 5

µg/dL or greater to be an elevated level for children. EPA limits lead in drinking water to 15 µg per liter.

Reference

Agency for Toxic Substances and Disease Registry (ATSDR). 2007. ToxFAQs™ for Lead. Atlanta, GA: U.S. Department of Health and Human Services.

Where can I get more information?

For more information, contact:

Occupational Health Program, Division of Environmental Epidemiology, Bureau of Epidemiology or the Childhood Lead Poisoning Prevention Program at (717)787-1708 or the Division of Child and Adult Health Services, Bureau of Family Health at 440-LEAD (for children), Pennsylvania Department of Health.

ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

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