CONDITION

Lead poisoning

Lead poisoning is harmful lead buildup in the body after exposure to contaminated dust, paint, water, soil, or products.

WHAT IT IS
Harmful buildup of lead in the body

BODY SYSTEM
Brain, nerves, blood, kidneys, and digestive system

MAIN SYMPTOMS
Abdominal pain, constipation, fatigue, learning or behavior changes

WHAT CAUSES IT
Exposure to lead in homes, work, water, or products

HOW IT IS DIAGNOSED
Blood lead testing, usually confirmed with a venous sample

MAIN TREATMENT
Exposure removal, monitoring, supportive care, and sometimes chelation

CAN IT BE CURED?
Sometimes - levels fall, but some effects may persist

IS IT AN EMERGENCY?
Sometimes - seizures, confusion, or loss of consciousness

LONG-TERM OUTLOOK
Often improves after exposure ends; lasting effects are possible

Overview

Lead poisoning happens when lead enters your body faster than it can be removed. Exposure may occur suddenly, such as after swallowing a lead-containing object, or gradually over months or years.

Lead can affect almost every organ. The developing brain and nervous system are especially sensitive, so young children and unborn babies face the greatest risk of lasting harm. Lead can affect attention, learning, behavior, hearing, and growth. In adults, it can contribute to nerve, kidney, blood pressure, and reproductive problems.

Many people with raised blood lead levels feel well. Symptoms often appear only after significant exposure, and they can resemble other conditions. A blood test is the main way to find out whether lead has entered the body.

There is no known safe blood lead level for children. A result used to identify children who need follow-up is not a line between "safe" and "poisoned." Even a relatively low result may lead to steps to find and remove the source.

Lead poisoning is not contagious. It comes from exposure to lead in the environment, at work, through hobbies, or in certain products.

Symptoms

Lead exposure often causes no obvious symptoms, particularly in children. Changes may be gradual and easy to mistake for normal behavior, stress, or another health problem.

Possible symptoms include:

Children may lose skills they had already gained, struggle at school, or have changes in attention or behavior. These signs are not specific to lead poisoning and do not confirm it.

Adults with long-term exposure may develop memory or mood changes, reduced fertility, high blood pressure, kidney problems, or weakness in the hands and wrists. Exposure during pregnancy can affect both the pregnant person and the developing baby.

Very high exposure can cause severe vomiting, marked weakness, confusion, poor coordination, seizures, or loss of consciousness. These symptoms need emergency care.

- Tiredness, irritability, headache, or difficulty concentrating
- Abdominal pain, nausea, reduced appetite, or constipation
- Muscle or joint pain, weakness, or tingling in the hands or feet
- Learning difficulties, developmental delays, or behavior changes
- Pale skin caused by anemia, meaning too few healthy red blood cells

Causes and risk factors

Lead poisoning occurs when lead is swallowed or inhaled. Lead dust can settle on hands, toys, food, floors, and other surfaces. Young children are at higher risk because they frequently put their hands and objects in their mouths.

Common sources include older lead-based paint and the dust created when it peels, is sanded, or is disturbed during renovation. Soil near older buildings, former industrial sites, or busy roads may also contain lead.

Other possible sources include:

Workers can carry lead dust home on their clothes, shoes, skin, tools, or vehicles. This is sometimes called take-home exposure.

Risk is higher in children younger than 6 because their brains are still developing and their bodies absorb lead more readily. Living in or regularly visiting an older building with damaged paint also raises risk. Pregnancy, poor nutrition, and iron deficiency may increase the amount of lead absorbed or the harm it causes.

- Drinking water that passes through lead pipes, fittings, or solder
- Work involving construction, demolition, batteries, smelting, recycling, or firing ranges
- Hobbies such as stained-glass making, pottery glazing, fishing-sinker casting, or furniture restoration
- Some imported spices, cosmetics, traditional remedies, toys, jewelry, cookware, or glazed pottery
- Retained bullets, fragments, or swallowed lead-containing objects

Diagnosis

A blood lead test confirms recent or continuing exposure. A small sample may first be taken from a finger or heel. Because lead dust on the skin can contaminate this sample, an elevated screening result is usually confirmed using blood drawn from a vein.

The result is reported as micrograms of lead per deciliter of blood, written as µg/dL. The US Centers for Disease Control and Prevention uses a blood lead reference value to identify children whose levels are higher than those of most children. This value is a public health action point, not a safe-versus-dangerous boundary.

The meaning of a result also depends on age, symptoms, possible sources, and whether the level is rising or falling. Repeat testing may be needed to track the level after exposure is addressed.

Additional tests may check for anemia, iron deficiency, kidney function, or other effects. An abdominal X-ray may be considered if someone may have swallowed a lead object, paint chips, or contaminated material.

Finding the source is part of the assessment. This may involve questions about housing, renovations, water, work, hobbies, travel, and household products. A public health department or qualified environmental professional may arrange home testing or an inspection.

Treatment and management

The most important treatment is to identify and stop the exposure. Blood lead levels may remain raised if lead dust, contaminated water, unsafe work practices, or a lead-containing product is still present.

Management can include:

Foods containing iron, calcium, and vitamin C can support general nutrition and may reduce lead absorption. Food does not remove lead already stored in the body and should not replace environmental action or medical follow-up.

Chelation therapy may be used for certain people with very high blood lead levels or serious symptoms. Chelating medicines bind to lead so that the body can pass more of it in urine. These medicines can have significant side effects and require specialist supervision. They do not prevent exposure from continuing, so removing the source remains essential.

Severe poisoning may require hospital treatment. If lead-containing objects or material have been swallowed, treatment may also focus on preventing further absorption from the digestive system.

Children with developmental or learning effects may benefit from early-intervention services, school support, hearing assessment, or developmental care. These supports address the effects of exposure even after the blood lead level falls.

- Removing or safely controlling the source of lead
- Repeating blood tests to make sure the level is falling
- Testing other household members who may share the exposure
- Checking for iron deficiency and supporting adequate nutrition
- Monitoring a child's development, hearing, learning, and behavior

Complications

The risk of complications generally rises with the amount and duration of exposure. However, harm can occur without clear symptoms.

In children, lead can affect brain development, attention, learning, behavior, hearing, and growth. Some effects may continue even after exposure stops. Early support can help a child develop skills and manage difficulties.

Long-term exposure can also cause anemia, nerve damage, kidney injury, high blood pressure, and reproductive problems. During pregnancy, lead can cross the placenta and may affect fetal

growth and development.

Severe poisoning can cause swelling and dysfunction of the brain, known as lead encephalopathy. This may lead to confusion, seizures, coma, permanent neurological injury, or death. It is uncommon but requires emergency treatment.

Lead can remain stored in bones for years. Some of it may later move back into the blood, so levels do not always fall quickly or in a straight line.

Prevention

Many cases of lead poisoning can be prevented, although you may not know that lead is present until testing identifies it.

If your home was built when lead-based paint was still in use, keep painted surfaces in good repair. Do not dry-sand, scrape, burn, or demolish suspected lead paint without proper controls. Renovation should follow lead-safe practices.

Regular wet cleaning can reduce dust. Wash children's hands, toys, and pacifiers, especially before meals and sleep. Avoid letting children play in bare soil known or suspected to contain lead.

If lead in drinking water is a concern, use testing and advice from your local water authority or public health service. A filter must be specifically certified to reduce lead. Boiling water does not remove lead and may concentrate it as water evaporates.

At work or during hobbies, use the recommended protective equipment and dust controls. Change clothes and shoes before entering your living area, shower when appropriate, and wash work clothing separately.

Use caution with imported remedies, cosmetics, spices, cookware, pottery, toys, and jewelry when their lead content is unknown. A product cannot be judged as lead-free by its appearance.

Living with it and what to expect

After the source is removed, blood lead levels often fall over months. The pace is influenced by the amount of exposure, how long it lasted, age, and lead stored in bones. Repeat blood tests show whether the level is moving in the expected direction.

Symptoms such as abdominal discomfort or tiredness may improve as exposure ends. Kidney, nerve, or developmental effects can take longer to assess. Some effects, especially changes

involving childhood brain development, may not fully reverse.

Most follow-up happens through planned blood tests, environmental action, and monitoring of health or development. Children may need continued attention to learning, hearing, speech, or behavior over the following years. This does not mean every exposed child will develop lasting difficulties.

A level that stops falling or rises again usually leads to another search for exposure. Possible explanations include contaminated dust that remains in the home, an unrecognized product, workplace exposure, or lead stored in the body.

People can usually continue school, work, and everyday activities while follow-up is underway, provided the source has been controlled and there are no severe symptoms. The goal is to prevent further exposure and respond early to any lasting effects.

When to get medical help

Arrange routine medical advice if you or your child may have been exposed to lead, even if there are no symptoms. Reasons include damaged paint in an older home, recent renovation, contaminated water, a lead-related job or hobby, or use of a product linked to lead.

Also arrange an assessment for unexplained developmental changes, learning problems, persistent abdominal pain, constipation, unusual tiredness, or anemia when lead exposure is possible. These symptoms have many causes, so testing is needed rather than assuming lead is responsible.

Seek urgent advice from a poison center or emergency service after a known or suspected swallowing of lead-containing material. Do not induce vomiting unless a poison specialist tells you to do so. In the United States, Poison Control can be reached at 1-800-222-1222.

Call emergency services for:

These signs can have causes other than lead poisoning, but they require immediate assessment.

- A seizure
- Severe confusion or unusual difficulty waking
- Loss of consciousness
- Sudden severe weakness or poor coordination
- Repeated vomiting with possible major lead exposure

Common questions

Can lead poisoning go away?

Blood lead levels often fall after the source is removed. Some symptoms may improve, but developmental, kidney, or nerve effects can persist. Lead stored in bones may remain for years and slowly return to the blood.

What blood lead level is dangerous?

There is no known safe level for children. The CDC reference value identifies children with more lead in their blood than most children; it is not a toxicity cutoff. The need for action is based on the result, symptoms, age, and exposure circumstances.

How long does it take for blood lead levels to fall?

Levels may begin falling after exposure stops, but the process can take months or longer. Continuing exposure and lead stored in bones can slow the decline. Repeat blood tests are more useful than predicting an exact timetable.

Can tap water cause lead poisoning?

Yes. Lead may enter water from service lines, household plumbing, solder, or fittings. The water source itself may contain little lead before it reaches the building. Testing is the only reliable way to measure it.

Does boiling water remove lead?

No. Boiling kills many germs but does not remove lead. If lead is present, use water from a safer source or a filter specifically certified to reduce lead, following local advice.

Can lead poisoning spread from person to person?

No. It is not contagious. Several people can be affected when they share the same home, water, workplace, hobby, or product. Lead can also cross the placenta during pregnancy.

Sources

- Centers for Disease Control and Prevention. Recommended Actions Based on Blood Lead Level
- Centers for Disease Control and Prevention. About the Data: Blood Lead Surveillance
- World Health Organization. Lead poisoning and health

- World Health Organization. WHO guideline for clinical management of exposure to lead, 2021
- Agency for Toxic Substances and Disease Registry. Toxicological Profile for Lead, 2020
- US Environmental Protection Agency. Protect Your Family from Sources of Lead