HEALTH BASICS

Lead and tap water

Lead can enter tap water when water comes into contact with lead-containing plumbing.

WHAT IT IS
Lead entering water from pipes, fixtures, or solder

WHERE IT COMES UP
Older plumbing, lead service lines, or tap-water test results

WHY IT MATTERS
Exposure can harm the brain, kidneys, blood, and development

WHAT IT IS NOT
Not a disease or diagnosis

WHO TO ASK
Water utility, health department, pediatrician, or primary care clinician

HOW IT IS CHECKED
Certified water testing and, when appropriate, a blood lead test

Overview

Lead is a metal that can enter tap water through plumbing. It usually does not come from the original water source. Instead, it may enter after treated water reaches lead-containing service lines, pipes, solder, faucets, or other fixtures.

A service line is the pipe connecting a building to the water main in the street. Some older service lines contain lead. Plumbing installed before local restrictions on lead may also be more likely to contain lead-containing materials.

Lead and tap water is not a disease or diagnosis. A water test measures lead in a particular sample. It does not show whether someone has lead in their body. A blood lead test is used to assess a person's exposure.

You cannot reliably see, smell, or taste lead in water. Clear water may still contain it. Whether lead enters water can be affected by plumbing materials, water chemistry, temperature, and how long water has been sitting in the pipes.

How it works

Lead can dissolve into water when water reacts with lead-containing plumbing. This process is called corrosion. Water systems may treat water to reduce corrosion, but the materials inside or leading to an individual building still matter.

Water that has remained in pipes for several hours may have more contact with plumbing. Warm or hot water can also release lead more readily than cold water. Small lead-containing particles may break free from pipes, solder, or scale inside the plumbing.

Lead levels can differ between buildings and even between taps in the same building. They can also change over time. A result from the local water system describes the system or sampled properties; it may not represent the water from your own kitchen tap.

Sample collection matters. A laboratory may request water that has been sitting in the pipes, water collected after flushing, or several samples taken in sequence. Follow the laboratory's instructions exactly so the result answers the intended question.

Why it matters for your health

Lead has no useful role in the body. Exposure can affect the brain and nervous system, blood formation, kidneys, and other organs.

Babies and young children are especially vulnerable because their brains are developing and their bodies absorb lead more easily than adults. Lead exposure in childhood is associated with problems involving learning, attention, behaviour, hearing, and growth. These effects may occur without obvious signs.

Lead can also affect adults. Higher or sustained exposure is associated with kidney problems, cardiovascular effects such as increased blood pressure, and reproductive harm. During pregnancy, lead in the pregnant person's blood can cross the placenta and expose the developing baby.

Drinking water is only one possible source. Lead may also come from older paint and household dust, contaminated soil, some jobs or hobbies, imported products, certain traditional remedies or cosmetics, and lead-glazed pottery. A raised blood lead result does not by itself identify the source.

A water test and a blood test answer different questions. A water test checks the sampled tap water. A blood test checks lead circulating in the body and can help a clinician decide what follow-up is appropriate.

What can go wrong

Continued exposure can contribute to an elevated blood lead level. At higher exposures, a person may develop lead poisoning. Many people with elevated blood lead levels do not feel unwell, so testing may be important when a meaningful exposure is possible.

Children may face developmental and learning effects. Adults may develop kidney, cardiovascular, neurological, or reproductive problems. These are effects of lead exposure, not symptoms caused by "tap water" itself.

Testing can also give an incomplete picture. Lead may be missed if the wrong tap is sampled, collection instructions are not followed, or plumbing conditions change. A single low result does not necessarily describe every tap or every time of day.

Most concerns about lead in household water can be handled through prompt, routine follow-up. Contact your water utility or health department if a test detects lead, your service line may contain lead, or you need help arranging certified testing. Ask a pediatrician, obstetric clinician, or primary care clinician whether a blood lead test is appropriate, particularly for a young child or during pregnancy.

Suspected swallowing of a lead object, lead powder, or another concentrated lead product is different from routine tap-water exposure. Contact a poison centre promptly. Call emergency services for a seizure, collapse, severe confusion, trouble breathing, or another immediately life-threatening problem.

What you can do

First, find out what plumbing serves your home. Your water utility may have a service-line inventory or records showing whether the line is lead, another material, or unknown. In rented housing, ask the landlord or property manager about the service line and internal plumbing.

If you need to test, use a laboratory approved or accredited for drinking-water analysis in your area. Home test kits differ in quality and may not provide the same information as laboratory testing. Keep the laboratory report, sample location, collection date, and collection method.

While a concern is being assessed, practical steps can reduce exposure:

Boiling kills many germs, but it does not remove lead. As water evaporates, the lead may become more concentrated.

A filter must be designed and certified for lead reduction; an ordinary taste-and-odour filter may not remove lead. Check the certification claim for the exact filter and use it only within its stated capacity.

Bathing and showering are generally considered safe because lead does not pass readily

through the skin. Take care to keep young children from drinking bath water.

If a test identifies lead, ask the utility or a qualified plumbing professional what part of the plumbing may be responsible. Replacing lead-containing service lines, pipes, or fixtures may provide a longer-term solution. Coordinate service-line work with the utility because ownership and replacement responsibilities differ by location.

There is nothing you can observe in your body that can confirm whether tap water has exposed you to lead. If exposure is plausible, ask whether a blood lead test is needed rather than waiting for signs of illness.

- Use cold tap water for drinking, cooking, and preparing infant formula
- Follow local flushing instructions after water has sat unused
- Use a filter independently certified specifically for lead reduction
- Replace filter cartridges on schedule and according to the instructions
- Clean faucet aerators, where small particles can collect
- Do not boil water to remove lead

Common questions

Can I tell whether water contains lead by looking at it?

No. Lead usually does not change the water's colour, taste, or smell. Testing is the reliable way to check.

Does boiling make lead-contaminated water safe?

No. Boiling does not remove lead and may concentrate it as water evaporates.

Is bottled water always lead-free?

Not necessarily. Bottled water is regulated, but its source and treatment differ by product. If using it because of a local lead concern, check advice from your health department or water utility.

Will any water filter remove lead?

No. Look for a filter independently certified for lead reduction. Install, use, and replace it according to the manufacturer's instructions.

Should everyone have a blood lead test?

Not necessarily. Testing decisions are based on age, pregnancy, local screening requirements, known water results, housing, work, hobbies, and other possible exposures. A clinician or public

health service can advise you.

Does a normal blood test prove my water is safe?

No. It answers a different question. A blood test assesses exposure in the body, while a water test measures the sampled water.

Does my utility's water-quality report cover my own pipes?

Not completely. The report provides useful system-level information, but lead may enter water through the service line or plumbing specific to your building.

Sources

- US Environmental Protection Agency. Basic Information about Lead in Drinking Water
- US Environmental Protection Agency. Protect Your Tap: A Quick Check for Lead
- Centers for Disease Control and Prevention. About Lead in Drinking Water
- Centers for Disease Control and Prevention. About Childhood Lead Poisoning Prevention
- World Health Organization. Lead Poisoning and Health
- American Academy of Pediatrics Council on Environmental Health. Prevention of Childhood Lead Toxicity . Pediatrics. 2016;138(1):e20161493