CONDITION

Solder poisoning

Solder poisoning is illness caused by exposure to lead or other solder materials and fumes.

WHAT IT IS
Harmful exposure to solder metals or flux fumes

BODY SYSTEM
Nervous system, blood, kidneys, lungs, and digestion

MAIN SYMPTOMS
Abdominal pain, fatigue, headache, cough or wheezing

WHAT CAUSES IT
Lead, other metals, or irritating flux fumes

HOW IT IS DIAGNOSED
Venous blood lead test and targeted exposure testing

MAIN TREATMENT
Exposure removal, supportive care, and sometimes chelation

CAN IT BE CURED?
Sometimes - early effects may improve after exposure ends

IS IT AN EMERGENCY?
Sometimes - severe breathing or nervous system symptoms

LONG-TERM OUTLOOK
Often good, but lasting organ or developmental harm can occur

Overview

"Solder poisoning" is a broad term rather than one specific diagnosis. It usually refers to harmful exposure to lead in solder. It can also involve other metals or the fumes released by flux, a material that helps solder flow and bond.

Exposure may happen at work, during electronics repair, while making stained glass, or through other hobbies. Older solder and some specialist products contain lead. "Lead-free" solder usually contains metals such as tin, silver, or copper, but its flux can still irritate the lungs.

Lead poisoning often develops slowly and may cause no early symptoms. Lead can affect the brain and nerves, blood, kidneys, digestive system, blood pressure, and reproductive health. Children and unborn babies are especially sensitive because their brains are developing.

Flux fumes cause a different type of problem. Rosin, also called colophony, is a common flux ingredient. Its heated fumes can irritate the eyes and airways. Repeated exposure can cause occupational asthma, in which the airways become sensitive and narrow after contact with the fumes.

A hot soldering iron can also cause burns or start a fire. These injuries are important, but they are not poisoning.

Symptoms

Symptoms depend on what was in the solder, how exposure happened, and whether it occurred once or repeatedly.

Lead exposure may not cause noticeable symptoms, even when a blood test shows an increased level. When symptoms occur, they can be mistaken for other conditions.

Possible symptoms of lead exposure include:

Very high exposure can cause repeated vomiting, severe abdominal pain, confusion, loss of coordination, seizures, or reduced consciousness. These effects need emergency assessment.

Children may have learning, attention, behavior, hearing, or growth problems. These changes may be subtle and are not enough by themselves to show that lead is the cause.

Flux fumes more often cause:

Once occupational asthma develops, even a small amount of flux fume may trigger symptoms.

- Tiredness, weakness, headache, or irritability
- Abdominal pain, nausea, constipation, or reduced appetite
- Trouble concentrating, memory problems, or mood changes
- Tingling, numbness, or weakness in the hands or feet
- Pale skin caused by anemia, meaning too few healthy red blood cells
- Burning or watery eyes
- A sore or irritated nose and throat
- Cough, wheezing, chest tightness, or shortness of breath
- Symptoms that improve away from work and return after soldering

Causes and risk factors

The main risk from lead solder is usually getting lead-containing dust or residue into the mouth. This can happen when contaminated hands touch food, drinks, cigarettes, or the face. Dust can also be created while cleaning, scraping, sanding, cutting, or working on lead-contaminated material.

Normal soldering temperatures do not usually boil lead. However, the work can still release particles, contaminated smoke, and flux fumes. Heating painted, coated, dirty, or unknown materials may create additional hazards.

Risk is higher with frequent soldering, poor ventilation, or work in a small enclosed space. Eating or drinking at the workbench, cleaning with compressed air, and dry sweeping can spread contaminated dust.

Other important risks include:

Pregnancy requires particular care because lead can cross the placenta. Lead stored in bones from earlier exposure can also return to the bloodstream during pregnancy.

Not every solder contains lead. Some specialist solders may contain other hazardous metals, including cadmium. The product label and safety data sheet can help identify the ingredients.

- Using old or unidentified solder
- Repairing stained glass, radiators, plumbing, or older electronics
- Heating surfaces covered with lead paint or metal coatings
- Working without local exhaust ventilation
- Bringing dust home on clothing, shoes, tools, or bags
- Living with a soldering worker or hobbyist, especially for young children

Diagnosis

A clinician will ask what type of solder you used, how often you used it, how the area was ventilated, and whether you may have swallowed material or inhaled fumes. Bringing the product name, packaging, or safety data sheet can be helpful.

A venous blood lead level is the standard test for recent or ongoing lead exposure. "Venous" means that blood is taken from a vein. A finger-prick result may need confirmation because lead on the skin can contaminate the sample.

There is no single test that confirms every type of solder exposure. If the solder contained another metal, a toxicology or occupational health specialist may recommend a specific blood or urine test. Broad, untargeted "heavy metal panels" can be difficult to interpret and may miss

the relevant exposure.

Other tests may check:

If a solid piece of lead-containing solder was swallowed, imaging may sometimes be used to see whether it remains in the digestive tract.

- Red blood cells for anemia
- Kidney and liver function
- Blood pressure
- Breathing tests when work-related asthma is suspected
- Development, learning, or behavior in an exposed child

Treatment and management

The first step is to stop or reduce further exposure. This may require changes to ventilation, work methods, hygiene, or job duties. Simply opening a window may not control fumes produced close to your face.

After a recent skin exposure, wash your hands and exposed skin with soap and water. Change contaminated clothing before entering living areas. If fumes cause irritation, move into fresh air without putting yourself at further risk.

Treatment then depends on the substance, test results, symptoms, age, and health of the person exposed.

Mild lead exposure is often managed by finding and controlling the source, followed by repeat blood testing. Blood lead levels usually fall after exposure ends, although lead stored in bone may remain for years.

Chelation may be used for some people with substantial lead poisoning. Chelating medicines bind to lead so the body can remove it more easily. These medicines can cause significant side effects and do not reverse every injury, so they are used under specialist supervision rather than as a general "detox."

Severe poisoning may require hospital monitoring and treatment for complications such as seizures, dehydration, anemia, or kidney problems. A swallowed piece of solder may need specialist management if it remains in the body.

Flux-related asthma is managed by preventing further fume exposure and treating airway symptoms. This may include inhaled asthma medicines. Continued exposure after sensitization can make symptoms harder to control.

Complications

Lead can affect several parts of the body. Possible complications include anemia, kidney damage, high blood pressure, nerve injury, fertility problems, and difficulties with memory or concentration.

In children, lead can interfere with brain development. Learning, attention, and behavior effects may continue even after the exposure has ended. Early recognition can help prevent additional exposure and allow developmental or educational support to begin.

Exposure during pregnancy may affect both the pregnant person and the developing baby. Anyone who is pregnant or planning pregnancy should mention current or past lead work when seeking medical advice.

Severe lead poisoning can damage the brain and may cause seizures, coma, or death, although this is not the usual course of routine soldering exposure.

Repeated flux-fume exposure can lead to persistent occupational asthma. Symptoms may continue for months or years, particularly if exposure continues after asthma begins.

Prevention

Most solder-related exposure can be prevented or greatly reduced. Replacing lead solder lowers lead risk, but lead-free solder and flux fumes still require safe handling.

Before using a product, check its label and safety data sheet. Avoid unidentified solder, especially for home hobbies.

Useful controls include:

A desk fan can blow fumes and contamination across the room rather than remove them. Respirators may be needed for some jobs, but they should be part of a proper workplace respiratory-protection program. They do not replace ventilation and exposure control.

If soldering is part of your job, workplace health services may arrange exposure monitoring and blood testing where appropriate.

- Use local exhaust ventilation that captures fumes close to the soldering point
- Keep your face out of the rising fume
- Wash your hands after soldering and before eating, drinking, or smoking
- Keep food, drinks, cosmetics, and children away from the work area
- Clean surfaces with wet methods or a suitable high-efficiency vacuum

- Do not dry sweep or use compressed air on suspected lead dust
- Change contaminated work clothing and footwear before entering living spaces
- Store solder securely and dispose of waste according to local rules

Living with it and what to expect

Many people improve after the exposure is identified and controlled. Digestive symptoms, fatigue, and some blood changes may settle as the blood lead level falls. Follow-up testing may continue for months to confirm that exposure has stopped.

Lead can remain stored in bones for years. This does not always cause ongoing symptoms, but it means recovery cannot be judged from one test alone. Kidney, nerve, developmental, or cognitive injuries may not fully reverse after substantial exposure.

Children with developmental effects may benefit from hearing, learning, behavioral, or early-development services. Their progress should be followed over time rather than judged from a single assessment.

Flux irritation may clear after time away from fumes. Occupational asthma can last longer. Some people need permanent changes to their work environment or duties because later exposures trigger symptoms.

Routine follow-up may include repeat blood tests, checks of blood pressure and kidney function, or breathing tests. The exact follow-up is based on the material involved and the amount of exposure.

When to get medical help

Call emergency services for:

If someone swallows solder, contact a poison information service promptly, especially if the person is a child or the solder may contain lead. Do not make them vomit unless a poison specialist tells you to do so.

Seek prompt medical advice for new wheezing, chest tightness, breathlessness, or symptoms that repeatedly occur during soldering. Known exposure during pregnancy also deserves prompt assessment.

Arrange routine medical or occupational health follow-up if you solder regularly, have used lead solder without good hygiene controls, or may be bringing contaminated dust home. Testing may be appropriate even when there are no symptoms.

- Severe trouble breathing, blue or grey lips, or inability to speak normally
- A seizure, collapse, severe confusion, or reduced consciousness
- Sudden severe weakness or loss of coordination
- Repeated vomiting or intense abdominal pain after substantial exposure

Common questions

Can ordinary soldering cause lead poisoning?

It can, particularly when lead solder is used often or handled without good hygiene. Hand-to-mouth transfer of residue and dust is usually more important than lead vapor from the soldering iron.

Is lead-free solder completely safe?

No. It removes or reduces the lead hazard, but hot metal can still cause burns. Flux fumes can irritate the eyes and lungs, and some products contain other metals that require safe handling.

Can lead enter my body through my skin?

Inorganic lead in most solder does not pass easily through intact skin. The larger risk is transferring residue from your hands to your mouth. Cuts, contaminated dust, and some unusual lead compounds may create additional concerns.

How long does lead stay in the body?

Lead in blood falls after exposure ends, but some lead moves into bone and may remain for years or decades. Follow-up blood tests show whether recent exposure is continuing or decreasing.

Can I test myself for solder poisoning at home?

Home environmental kits may help screen surfaces or materials, but they do not diagnose poisoning. A venous blood test is used to assess lead exposure. Testing for other metals should be chosen according to the solder's ingredients.

Will a mask protect me from solder fumes?

An ordinary surgical or cloth mask does not reliably control solder fumes or metal particles. Capturing fumes at their source is more effective. Workplace respirators require correct selection, fitting, and training.

Sources

- World Health Organization. WHO Guideline for Clinical Management of Exposure to Lead . 2021.
- Agency for Toxic Substances and Disease Registry. Toxicological Profile for Lead . U.S. Department of Health and Human Services, 2020.
- Centers for Disease Control and Prevention, National Institute for Occupational Safety and Health. Lead: Information for Workers .
- Occupational Safety and Health Administration. Lead: Safety and Health Topics and occupational lead standards.
- UK Health and Safety Executive. Solder Fume and You . Guidance on controlling exposure to rosin-based solder flux fumes.
- American College of Medical Toxicology. ACMT Position Statement: Post-Chelator Challenge Urinary Metal Testing . Journal of Medical Toxicology , 2017.