

Water Quality Project Health Information

Health Effects of Lead ¹

Lead is a toxic metal that is harmful to human health. Lead has no known value to the human body. The human body cannot tell the difference between lead and calcium, which is a mineral that strengthens the bones. Like calcium, lead remains in the bloodstream and body organs like muscle or brain for a few months. What is not excreted is absorbed into the bones, where it can collect for a lifetime.

Young children, those 6 years and younger, are at particular risk for lead exposure because they have frequent hand-to-mouth activity and absorb lead more easily than do adults. Children's nervous systems are still undergoing development and thus are more susceptible to the effects of toxic agents. Lead is also harmful to the developing fetuses of pregnant women.

No safe blood lead level in children has been determined. Lead can affect almost every organ and system in your body. The most sensitive is the central nervous system (brain), particularly in children. Lead also damages kidneys and the reproductive system. The effects are the same whether it is breathed or swallowed. Low blood levels of lead (those below 10 µg/dL) have been associated with reduced IQ and attention span, learning disabilities, poor classroom performance, hyperactivity, behavioral problems, impaired growth, and hearing loss. Very high lead level (blood lead levels above 70 µg/dL) can cause severe neurological problems such as coma, convulsions, and even death. The only method to determine a child's lead level is for them to have a blood lead test done by a health provider.

The degree of harm from lead exposure depends on a number of factors including the frequency, duration, and dose of the exposure(s) and individual susceptibility factors (e.g., age, previous exposure history, nutrition, and health). In addition, the degree of harm depends on one's total exposure to lead from all sources in the environment - air, soil, dust, food, and water. Lead in drinking water can be a significant contributor to overall exposure to lead, particularly for infants whose diet consists of liquids made with water, such as baby food, juice, or formula.

Sources of Lead ^{1, 2}

Lead is distributed in the environment through both natural and man-made means. Today, the greatest contributions of lead to the environment stem from past human activities. Sources of lead exposure include the following:

- **Lead based paint.** The most common sources of lead exposure for children are chips and particles of deteriorated lead paint. Although children may be exposed to lead from

paint directly by swallowing paint chips, they are more often exposed by house dust or soil contaminated by leaded paint. Lead paint chips become ground into tiny bits that become part of the dust and soil in and around homes. This usually occurs when leaded paint deteriorates or is subject to friction or abrasion (as on doors and windowsills and window wells). In addition, lead can be dispersed when paint is disturbed during demolition, remodeling, paint removal, or preparation of painted surfaces for repainting.

- **Lead in the air.** Lead in the air comes from industrial emissions.
- **Lead in soil.** Lead deposits in soils around roadways and streets from past emissions by automobiles using leaded gas, together with paint chips and lead paint dust.
- **Lead industry.** Byproducts brought home by industrial workers on their clothes and shoes.
- **Lead in consumer products and food.** Lead may be found in some imported candies, medicines, dishes, toys, jewelry, and plastics.
- **Lead in water.** Lead in water occurs through corrosion of plumbing products containing lead.

The U.S. government has taken steps over the past several decades to dramatically reduce new sources of lead in the environment: by banning the manufacture and sale of leaded paint; by phasing out lead additives in gasoline, and by encouraging the phase-out of lead seams in food cans; by banning the sale of pipes and plumbing for drinking water that are not "lead-free"; and by banning lead-lined water coolers, among other activities. More recently, the government has begun to address persistent sources of lead in the environment. For example, programs have been instituted to minimize the hazards posed by lead paint covering millions of homes across the United States, more stringent air control standards are being applied to industries emitting lead, and more stringent regulations are in place to control lead in drinking water.

Lead contribution to individuals from water varies based on the amount of lead-contaminated water ingested. For example, an infant who is fed formula constituted with lead-contaminated water is likely to have a higher contribution to his or her blood lead level (BLL) than an adult or child who occasionally drinks from that source. There is no indication that any children have been exposed to elevated lead levels in water at UCSF.

While lead in drinking water can contribute to elevations in blood lead levels, it is rarely the primary source. According to the CDC, most studies show that exposure to lead-contaminated water alone would not be likely to elevate blood levels in most adults. The CDC also notes that exposure can vary, depending on the individual, the circumstances, and the amount of water consumed. The SFPDPH Childhood Lead Prevention Program, which investigates sources of lead exposures in places where children spend time, reports that in the 22 years it has been following these cases, the program has never found water as a source of lead poisoning.

Action You Can Take to Limit Exposure

Generally, children are most often exposed to lead when they touch damaged paint, soil, or surfaces with lead dust and when they place those objects in their mouth.

The San Francisco Department of Public Health's Childhood Lead Prevention Program works to eliminate children's exposure to lead hazards. For a free inspection in San Francisco, call 415/252-3956. The program offers [useful resources for childproofing homes on its website](#) [1].

For drinking water, individuals residing in houses that are not campus owned and built before 1986 (when lead soldering was banned), may have lead sources in their local water pipes. These individuals are encouraged to **flush tap water for 30 seconds to 2 minutes before drinking** or run the water until it reaches the coldest temperature possible, especially before preparing baby formula or cooking. The amount of time to run the water depends on whether the home has a lead service line and whether the water in the home has been sitting in the pipes for more than six hours. A study conducted by Maas, et. al., found that among water samples with a first-draw lead level >15 ppb, 83% of cases could be reduced to < 15 ppb simply by running the tap for a full minute.

Use only the cold water tap for drinking, cooking, and especially for making infant formula. Families can fill a pitcher with water after flushing the tap and keep it in the refrigerator for drinking, cooking, and making baby formula. The captured flushed water can be used for other purposes, such as watering plants.

Clean and remove any debris from faucet aerators on a regular basis to clear out any particles of lead that may become trapped in the aerator.

UCSF Resources

Employees or occupants of areas in which water sources have tested above the EPA standard, a questionnaire is available through UCSF Occupational Health Service <link> to help identify whether individuals might be at risk. Clinical guidance also can be obtained through eConsult.

Employees or students who have additional questions or health concerns may consult with:

- UCSF Occupational Health Program (for employees) at 415/885-7580;
- Student Health and Counseling Service (for students) at 415/476-1281; or
- Their personal medical care providers.

Other Resources

- [CDPH Lead Poisoning Prevention Branch Contacts by County](#) [2]
- [California Poison Control](#) [3]: 800-222-1222
- [Western States Pediatric Environmental Specialty Unit](#) [4]: (866) 827-3478
- [Drinking Water Alliance](#) [5]: Includes a literature review of research on drinking water access and consumption.
- [American Academy of Pediatrics statement on Lead Exposure and Lead Poisoning](#) [6]
- CA DPH web site: [CA Management Guidelines on Childhood Lead Poisoning](#) [7]
- CA DPH Occupational Lead Poisoning Prevention Program [medical management guidelines](#) [8] for adults.
- California Department of Public Health (CADPH) [Occupational Lead Poisoning Prevention Program has developed Medical Guidelines for Lead-Exposed Workers](#) [9]
- UCSF e-consult
- [UCSF Environment, Health and Safety](#) [10]

If you have further questions, please contact UCSF Occupational Health Services, at OccupationalHealthServices@ucsf.edu [11].

¹ Excerpts taken from ?3Ts for Reducing Lead in Drinking Water in Schools: Revised

Technical Guidance?, USEPA, October 2006

²<https://www.sfdph.org/dph/eh/CEHP/Lead/> ^[12]

[UCSF Main Site](#)
[Report Broken Link](#)

© 2016 The Regents of the University of California

Source URL: <http://ehs.ucsf.edu/water-quality/health>

Links:

- [1] <https://www.sfdph.org/dph/EH/CEHP/Lead/InfoParent.asp>
- [2] <https://www.cdph.ca.gov/programs/CLPPB/Pages/CLPPPIndex.aspx>
- [3] <http://www.calpoison.org/>
- [4] <http://wspehsu.ucsf.edu/>
- [5] <http://www.drinkingwateralliance.org/>
- [6] <https://www.aap.org/en-us/advocacy-and-policy/aap-health-initiatives/lead-exposure/Pages/default.aspx>
- [7] https://www.cdph.ca.gov/programs/CLPPB/Documents/HAGS_201107.pdf
- [8] <http://www.cdph.ca.gov/programs/olppp/Documents/AdultMgtGuide.pdf>
- [9] <http://www.cdph.ca.gov/programs/olppp/Documents/medgdln.pdf>
- [10] <http://ehs.ucsf.edu/water-quality>
- [11] <mailto:OccupationalHealthServices@ucsf.edu>
- [12] <https://www.sfdph.org/dph/eh/CEHP/Lead/>