LEAD TESTING
at Environmental Health Laboratories

ABOUT LEAD

Lead is a naturally-occurring metal found in the earth's crust. A wide variety of historic and some current industrial uses have redistributed the metal to soil, air, water and materials that people may ingest. Because of their increased susceptibility to toxic effects of lead, children's lead poisoning is the greatest concern.

People most often encounter lead from paint, household dust and soil. Other sources include contaminated water, tobacco smoke, fossil fuels, plumbing and some cosmetics, ceramics, food—especially spices—and industrial facilities.[1] Regulatory standards, such as eliminating lead from gasoline and interior paint, have greatly reduced the general population's exposure risk. Yet exposure still occurs and can greatly affect human health.

When lead enters the body, it is stored in bones and teeth and is distributed to tissues. From there, it interferes with red blood cells' ability to carry oxygen throughout the body and can cause a number of negative health effects.[2]

Health Effects of Lead[3]

Children

- Behavioral/learning problems
- Decreased IQ
- Hyperactivity
- Slowed growth
- Hearing problems
- Anemia

Pregnancy/Childbirth

- Miscarriage
- Premature/small birth
- Brain, kidney or nervous system issues in developing child

Adults

- Cardiovascular effects (increased blood pressure, hypertension)
- Decreased kidney function
- Reproductive problems

Protect Yourself From Lead[3]

- Have your house inspected for lead if it was built before 1978 and children or women of child-bearing age live there.
- Inspect and maintain all painted surfaces. Have the paint tested to determine if it contains lead.
- Keep your home clean to decrease dust, especially on window wells (windows are often painted with outdoor paint that may have contained lead). Clean leaded surfaces with trisodium phosphate (TSP), available at hardware stores.
- Always use cold water for drinking, cooking and brushing teeth. Prior to consuming tap water, flush standing water from pipes by running the water until you feel a temperature change.
- Replace brass and bronze plumbing fixtures, as these may contain lead.
- For more information, visit the CDC's Lead Poisoning Prevention website.

HOW DO ENVIRONMENTAL HEALTH LABORATORIES PROTECT YOU?

Environmental health laboratories are governmental laboratories that conduct testing to identify and monitor for environmental contaminants in water, air, soil, food and manufactured products. Some laboratories also conduct biomonitoring, testing blood and urine for contaminants. Without this testing, many environmental threats to people's health would go unidentified.

Environmental Testing

When a child has been found to have high lead levels in their blood, public health department inspectors and nurses are assigned to determine the exposure source by investigating the child's school and home environment, and to manage their care. Environmental health laboratories collaborate with these professionals to test paint, dust wipes, drinking water, soil and/or items that may contain lead such as glazed potteries, cultural/traditional medicines, toys and jewelry. Once the source is determined, a plan will be developed by the health department to decrease or eliminate lead exposure. This varied testing can be challenging and expensive to obtain reliable results. Without the environmental health laboratory's expertise and mission to protect public health, it would be unlikely this testing would be done.

Success Story: Massachusetts Lead Law

Prior to the 1970s, hundreds of Massachusetts children were affected by lead poisoning. Because of this, the Massachusetts legislature passed the Lead Law in 1971, which requires all children to be screened for lead poisoning three times before the age of three. Lead screening must take place before any child can enter daycare, kindergarten or preschool. The Lead Law also established the Massachusetts Childhood Lead Poisoning Prevention Program in collaboration with the Massachusetts Department of Public Health (MA DPH), which helps families prevent exposure, diagnose illness and remediate for lead to protect public health. Thanks to the work done by MA DPH, Massachusetts was one of the first states in the US to enact a lead law, and its success lead to the creation of similar laws in other states.[2, 5]

Other environmental health laboratory lead testing includes measuring levels in drinking water from different sources such as private wells or schools and child care facilities with old fixtures. While water utilities commonly test drinking water to determine if lead levels comply with EPA standards, the state laboratory plays the reference laboratory role and is the final authority on results if there are any measurement issues. The environmental health laboratories are also generally the first to conduct emergency testing needed for public health purposes. Many laboratories also test drinking water from homes on a fee-for-service basis. This testing measures contamination in the water coming from the tap, an important consideration as lead may be introduced by the pipes and plumbing in the distribution system.

Biomonitoring

Biomonitoring measures the total amount of specific chemicals in a person's body at a given time. It can be used to determine the type of chemical exposure a person has experienced but often not the exact source of contamination. For example, biomonitoring can measure the total level of lead in a child's blood, but the test will not indicate if the lead came from paint, drinking water, food, soil, air or a combination of sources. CDC's Childhood Lead Poisoning Prevention Program expanded public health laboratory capacity to analyze blood and environmental samples for lead, but that funding decreased over time. A 2019 national survey found that 69% of public health laboratories (PHLs, see map right) currently perform blood lead testing, and 92% of laboratories showed interest in expanding their blood lead testing programs.[4]

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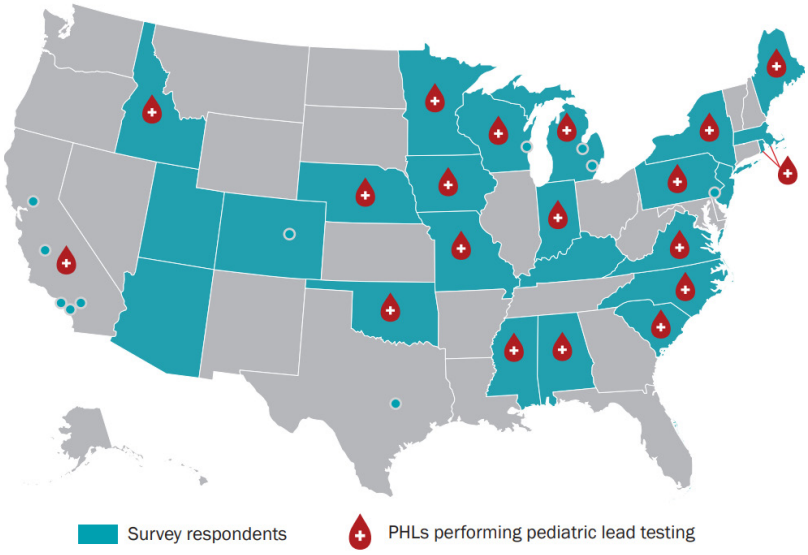

When samples are collected broadly and systematically, biomonitoring data can help identify and track trends, such as geographic regions with higher than normal exposure levels, or exposures to emerging contaminants. It can also let us know when exposure is no longer a concern, perhaps as the result of a public health intervention. Pediatric lead testing is also done for diagnostic purposes, to identify children in need of specialized medical and environmental services.

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4. APHL. Blood lead testing in public health laboratories: An APHL survey report. [Document, Survey Report]. October 2019. Available from: https://www.aphl.org/aboutAPHL/publications/Documents/EH-2019Oct-Blood-Lead-Testing-Survey.pdf
5. LeMoult, Craig. Massachusetts schools not required to test water for lead. WGBH News [Internet, radio news transcript]. November 26, 2019 [cited September 9, 2020]. Available from: https://www.wgbh.org/news/local-news/2019/11/26/mass-schools-not-required-to-test-water-for-lead