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Lead Poisoning

Lead poisoning may date as far back as ancient Rome, and there is some who say that 'the fall of the Roman Empire' was partially due to it. They had lead water pipes, lead cooking pots, and some of their storage containers were made of lead. Lead poisoning then or now can cause infertility, memory impairment, and loss of various cognitive abilities.

That said there has been a massive increase in lead levels in people over preindustrial times. Estimates vary but it is thought that people currently have 50-1000 times more lead than such earlier generations. The primary reason for the massive increase was the use of leaded gasoline during 20th century which spewed it into the air worldwide so that it ended up in the soil and waterways. Its use peaked in 1973 when about 200,000 tons of lead were added to gasoline that year alone in the U.S. One estimate is that 5 million metric tons of lead was put into the air from the use of leaded gasoline (<https://nutritionfacts.org/video/normal-blood-lead-levels-can-be-toxic/>).

The other major source of lead was in house paint. It was learned over 100 years ago that kids could be poisoned by ingesting lead paint. By 1926 lead poisoning in kids was frequent. But its use in house paint was not banned until 1978. A number of countries in Europe banned it as early as 1909. (<https://nutritionfacts.org/video/how-the-lead-paint-industry-got-away-with-it/>)

According to the EPA leaded house paint was used in

- ❖ 87% of houses built before 1940
- ❖ 69% of houses built between 1940-1959
- ❖ 24% of houses built between 1960-1977

Leaded house paint can create problems by contaminated dust being made such as through opening and closing windows and doors with friction on the paint turning it into fine dust that can be inhaled. The risk is greatest when it is peeling, chipping, chalking, or cracking. Removing leaded paint such as by scraping or blowtorches also creates lots of opportunity for it to get into the air and then contaminate the soil and subsequently waterways. So, although the leaded gasoline and paint period is in the past the leftover effects of lead contamination are still with us.

Lead is still being heavily used in the U.S. to this day, most notably in making lead-acid car batteries. It can also be found in

- ❖ ashwagandha root powder
- ❖ baby food
- ❖ bone broth
- ❖ calcium supplements
- ❖ candy (especially imported from Mexico, Malaysia, China and India and made with tamarind, chili powder or certain salts)
- ❖ canned food (imported from other countries that still use lead solder)
- ❖ chili peppers/powder/hot sauce
- ❖ chocolate
- ❖ cocoa
- ❖ echinacea
- ❖ eyeliner
- ❖ eye shadow
- ❖ fruit juice
- ❖ leafy greens (e.g. lettuce, spinach)
- ❖ lipstick/lip gloss
- ❖ paprika
- ❖ protein powders (e.g. hemp, soy)
- ❖ root vegetables
- ❖ tamarind
- ❖ turmeric
- ❖ tea (especially from China such as oolong and black teas)
- ❖ wild game (shot with lead bullets/shotgun pellets)
- ❖ water (from pipes made of lead, or older pipes that were soldered with lead)
- ❖ wine

Lead can also be found in toys, such as plastic or wooden play items that babies all too often put into their mouth. It can also be in hair dye and jewelry.

Lead exposure can arise through jobs such as

- ❖ ammunition manufacturing
- ❖ battery manufacturing and recycling
- ❖ construction (especially restoration and retrofitting)
- ❖ crystal and glass manufacturing
- ❖ firing range instruction
- ❖ lead smelting
- ❖ lead weight manufacturing
- ❖ mining
- ❖ pewter manufacturing
- ❖ plumbing and radiator repair
- ❖ pottery making
- ❖ shipbuilding
- ❖ stain glass making
- ❖ welding

Hobbies also expose one to lead contamination. Among non-industrial exposure the #1 risk is shooting firearms (CDC, Morbidity & Mortality Weekly Report, “Adult blood lead epidemiology and surveillance, U.S. 2008-2009, 7/1/2011). Other hobbies with potential lead exposure include painting, remodeling and renovation, and molding bullets and fishing weights.

One study found that employees at a California firing range had lead levels of 20-40 mcg/dl. Another study looked at police cadets and found that blood lead levels went from 6 mcg to 15+ mcg/dl after five days of training. As to how fast lead levels dropped, sixty-nine days after training was completed levels were on average still at 9 mcg/dl. It is estimated that 1 million police officers train with guns at indoor ranges.

Another study reported on by the CDC (Morbidity & Mortality Weekly Report, “Indoor firing ranges and elevated blood levels – U.S. 2002-2013” 4/25/2014) concluded that there is “serious lead exposure from indoor firing ranges. ...Firing range customers and family members of firing range employees, in addition to employees themselves, can be exposed to hazardous amounts of lead. There are an estimated 19 million active target shooters in the U.S.” This study also found that 34% of recreational target shooters had blood levels at 25 mcg/dl or higher, and about 21% had levels between 10-24 mcg/dl.

Another study by NIOSH (National Institute for Occupational Safety & Health, part of the CDC; “Reducing exposure to lead and noise at outdoor firing ranges”) noted that outdoor ranges have natural ventilation and so there is more dispersal of lead. However, the “personal breathing zone lead levels can exceed the NIOSH recommended exposure” limits. At one firing range in California the highest lead exposure was on the range’s instructor. In wiping down surfaces, the highest lead contamination was found on firearms. But lead was also found on picnic tables where employees ate.

The city of Los Angeles did a study of full-time shooting instructors (“Lead exposure at uncovered outdoor firing ranges” Robert Goldberg, et al) who worked at uncovered outdoor ranges. Air monitoring and blood lead levels were measured. What they found was significant lead exposure and absorption occurred. Use of copper-jacketed ammo may decrease the amount of lead in the air and the lead absorption by instructors. In 2014 OSHA inspected only 201 of over 16,000 shooting ranges in the country.

Other forms of paint such as for boats, cars and bridges can still contain lead and use of those may lead to exposure. Ayurvedic medicine can be contaminated with lead.

The U.S. Federal government now recognizes that *NO* level of lead exposure is safe. The average blood lead level of adults in the U.S. is 1.2 micrograms/deciliter (mcg/dl), and kids are around 1.0-1.4 mcg/dl. The CDC considers anything above 5 mcg/dl to be ‘elevated.’ Using a standard of 5 mcg/dl an estimated 500K children age 1-5 years are above it, according to the CDC. Other research (offered in Pediatrics, April 2017) found that there was an underreporting of lead contamination in kids and estimated that 1.2 million kids between the age of 1-5 years old (during 1999-2010) had elevated blood levels. This obviously does not include kids under the age of 1,

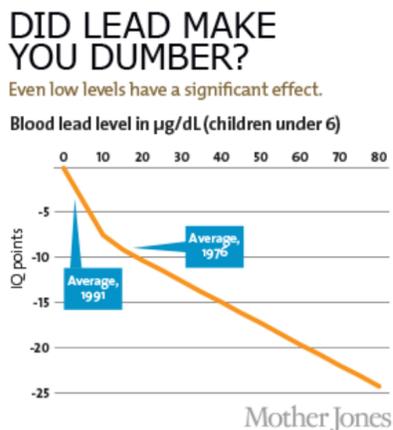
nor those age 5-17. One estimate is that kids in about 4 million households in the U.S. are exposed to high levels of lead (Family & Community Health, “Inequitable chronic lead exposure – a dual legacy of social and environmental injustice” Tamara Leech et al, Sept. 2016). Firm numbers of how many kids of all ages have lead poisoning are hard to come by but is clearly well into the millions.

However, such numbers are based on a standard of 5 mcg/dl. One study found that the typical level of lead around 1.2 mcg/dl in adults is associated with an increased prevalence of gout leading them to conclude that “very low levels of lead may still be associated with health risks.” A study in The Lancet (4/1/2018) looked at a nationally representative sample of 14,289 Americans who were 20 years or older and who were part of the NHANES 3 study (National Health & Nutritional Examination Survey). It ran between 1988-1994 and follow-up lasted until the end of 2011. The average lead level was 2.71 mcg/dl. By their calculations and extrapolating to the entire country their findings included

blood lead levels higher than 1 mcg/dl are responsible for around 412,000 deaths in the U.S. each year. Of these, around 256,000 are from cardiovascular disease. These results remained after accounting for a number of possible confounding factors, including participants’ age, sex, body mass index (BMI), diet, smoking status, and alcohol intake.” (Cited in Medical News Today, “Over 400,000 U.S. deaths per year caused by lead exposure).

i.e. The CDC is using a standard of 5 mcg/dl being elevated, while 1 mcg/dl is contributing to the deaths of hundreds of thousands of adults every year. Kids are more sensitive to the effects of lead poisoning than adults due to their brains being in the early stages of development. If 1 mcg/dl is harmful for adults, it certainly must be so for kids. Consequently, if the average childhood level is 1.0 mcg/dl or higher, as already stated, then the vast majority of kids in this country are suffering some deleterious effects from it.

Below is a graphic showing just one effect of lead as to lowering IQ (Mother Jones, “Lead: America’s real criminal element” Kevin Drum, Feb. 2013)



Another study (PLOS Medicine, “Decreased brain volume in adults with childhood lead exposure”, Kim Cecil et al, 5/27/2008) found that high exposure to lead in childhood was linked to a permanent loss of brain tissue, especially in males. It occurred primarily in what is called the prefrontal cortex (i.e. right behind the forehead, and the region that ‘makes us human’ and separates us from ‘lower animals’). This part of the brain controls executive functions which is involved with skills such as emotional regulation, impulse control, attention, verbal reasoning, and mental flexibility.

Another study (Environmental Health Perspectives, Dec. 2006) also found evidence that small amounts of lead exposure in kids can cause problems. Adjusting for a number of factors (age, sex, race/ethnicity, preschool attendance, prenatal exposure to tobacco smoke, smoker in the house, insurance status, and serum ferritin levels) having the 'typical' level of lead doubled the risk of ADHD vs. having a blood lead level below 0.8 mcg/dl. Having a lead level of 2.0 mcg/dl or greater quadrupled the risk of ADHD.

Effects of lead poisoning can include:

- ❖ aggressiveness
- ❖ anemia
- ❖ attention span being shortened
- ❖ behavioral problems
- ❖ cancer
- ❖ concentration difficulties
- ❖ constipation
- ❖ damage to the brain and nervous system
- ❖ digestive problems
- ❖ dyslexia
- ❖ fatigue
- ❖ headaches
- ❖ hearing problems
- ❖ high blood pressure
- ❖ hyperactivity
- ❖ kidney damage
- ❖ loss of appetite
- ❖ lower IQ in kids
- ❖ memory impairment
- ❖ miscarriage, premature birth, still birth
- ❖ muscle and joint pain
- ❖ reproductive problems in both men and women
- ❖ seizures
- ❖ slowed physical growth
- ❖ tingling in the hands or feet
- ❖ death

Having laid out all the ways one can suffer contamination from lead and its effects on our health, what can be done about it? I am not a medical doctor and will not delve into medical treatments of it. Ask your doctor for advice on that score.

There are simple approaches to consider that are over the counter in nature that may be of interest. Much of the research that has been done in this area has used rats, and there is always uncertainty if such results will then apply to humans.

There was one study done in 2012 (Basic and Clinical Pharmacology & Toxicology, “Comparison of therapeutic effects of garlic and D-Pencillamine in patients with chronic occupational lead poisoning” Sina Kianoush et al) that took 117 workers who had lead exposure from the car battery industry. One group was given medical chelation therapy involving a drug called D-pencillamine. Another group got the equivalent of two cloves of fresh garlic using the powder form compressed into a tablet. Both groups saw blood lead levels drop by about 20%, and the garlic had fewer side effects. What was more amazing is that the garlic group had significantly less irritability and fewer headaches, plus their deep tendon reflex and systolic blood pressure improved. The drug group did not benefit in such a manner. So, the garlic was safer and more effective. Their conclusion included that “garlic can be recommended for the treatment of mild-to-moderate lead poisoning.”

Another study (Journal of the American College of Nutrition, “The effect of ascorbic acid supplementation on the blood lead levels of smokers” Earl Dawson et al, 1999) took 75 males ages 20-30 and who were smoking at least a pack per day. In one week of using 1,000 mg of vitamin C there was an “81% decrease in blood-lead levels... possibly by reducing the intestinal absorption of lead.”

There is also research that vitamins B6 (pyridoxine) and B1 (thiamine) can help alleviate health problems due to lead poisoning. Vitamin C also is “unsurpassed in its ability to bind to and remove lead [and so therefore] highly effective at alleviating lead toxicity.” (Annals of Occupational Environmental Medicine, “Evaluation and management of lead exposure” Hwan-Cheol Kim, et al, 12/15/2015). They go on to note that “Quercetin is effective in alleviating lead-induced liver, kidney, and brain damage... by being able to bind to some of the lead accumulated in the hippocampus” which is a key brain structure involved with memory. “Though the optimal dosage has not been settled, the oral ingestion of quercetin is known to cause no particular side effects.”

Still other approaches that some have offered (Medical News Today, “What is a heavy metal detox?” Natalie Olsen, 12/16/2019) to consider include

- ❖ dietary fiber
- ❖ chlorella (a form of seaweed available in capsule form)
- ❖ foods rich in sulfur (e.g. broccoli)
- ❖ modified citrus pectin (using a commercially available product called PectaSol)

Others (Nutrients, “Dietary strategies for the treatment of cadmium and lead toxicity” Qixiao Zhai et al, Jan. 2015) offer that green tea, tomatoes, and ginseng can be helpful. Some probiotics in the lactobacillus family have been found able to bind lead based on mice studies. Sodium alginate (another pill form of seaweed) also has been used for chelation of lead (“If it’s not food, don’t put it in your mouth” Becky Plotner, www.nourishingplot.com/2014/06/23/chelating-heavy-metals-naturally/). There also has been research that following a lactovegetarian diet for a year lead to reduced levels of lead, along with mercury and cadmium.