



Optimizing Metabolism

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Lead Leads Prevention Opportunities

Lead exposure is a matter of personal health. Unfortunately, people mistakenly consider lead exposure a public health concern relevant to only a few populations. And they also mistakenly think that the introduction of unleaded gasoline and the removal of lead from house paint will soon resolve the issue. Medical science is raising red flags to suggest otherwise: lead exposure is a health issue for most of us today. Excess exposure to this metal toxicant is present today in the young and old. Across the age spectrum, it is associated with health problems; among the most prominent are cardiovascular problems, the topic of this month's *Townsend Letter*. In this column, I elaborate on the reasons for my opinion that blood lead testing should be used in the prevention and treatment of cardiovascular and other diseases.

From High to Low

Lead enters the brain and nerves throughout the body, which is the basis of its remarkable history. For example, the "wake" held in conjunction with a funeral service got its name quite literally: people who drank alcohol prepared or served in lead containers would sometimes go into a coma that wore off in up to three days, before which point someone pronounced dead could literally wake. The "waker's" blood lead level may have been in the range of 100 ug/dL and was accompanied by an equally high blood alcohol level.

Lead levels in the 30–40 ug/dL range produce symptoms of central nervous system effects such as depression, anxiety with panic attacks, decreased cognition, and poor executive function. I'll relay the story of a painter who had been exposed to lead fumes. His rapid onset of neuromuscular symptoms led to an intensive care unit admission for suspected Lou Gehrig's disease. Thankfully, one sharp clinician ordered a blood lead level, which came back at 70 ug/dL, in time to guide treatment for his recovery.

Now much lower lead levels, even as low as 2 ug/dL in some cases, are associated with broad adverse

health effects: increased systolic blood pressure; renal disease; hypertension; peripheral neuropathy; peripheral vascular disease; and impaired healing of diabetic foot ulcers, frostbite, depression, attention deficit hyperactivity disorder, bipolar disorder, generalized anxiety, and panic disorder. A 2006 publication that analyzed data from the Third National Health and Nutrition Examination Survey reported: "In a nationally representative sample of the U.S. population, blood lead levels as low as 5–9 mug/dL were associated with an increased risk of death from all causes, cardiovascular disease, and cancer."

Blood Lead As a Screening Tool

Despite ample data to underscore the health benefits of screening, uptake has been poor, even for testing in infants. The one time lead testing is recommended or required is for all children at age 1 year. Blood lead levels of 10 ug/dL or greater are considered actionable. Around the time of the massive recall of lead-tainted toys from China, the CDC (Centers for Disease Control) announced that blood lead levels between 6 and 9 ug/dL should be repeated and families receive teaching on prevention.

Furthermore, when infants do undergo lead testing, the results are not always reported correctly to the parents. Lab tests less than 10 ug/dL are reported as "normal" directly on the lab sheet. I once had a well-respected doctor and her staff tell me that a lead level of 6 ug/dL was "normal" and therefore no further testing of the 1-year-old was needed. Low lead levels in older children and adults are reported as less than 3 ug/dL, rather than 2.8 ug/dL or 0.8 ug/dL, for example, two values with differing clinical profiles.

Mistaken Assumptions

Informed patients may find that they need to request and even advocate for a blood lead level and educate their health-care practitioners on its significance. I'll editorialize based on my observations:



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- Practitioners mistakenly think that there is no treatment for lead exposure other than IV chelation, with which they may have no experience.
- Some practitioners mistakenly think that because blood lead in adults can come from bone where it may have been stored since childhood, current levels don't reflect an ongoing exposure and aren't relevant.
- Others mistakenly conclude that lead tests are not helpful since sometimes the harms attributed to lead could be from smoking, a source of lead exposure, rather than directly from lead itself.
- The biggest reason may be that lead has no drug under patent, no attractive political platform, and insufficient funding for public health. *Townsend Letter* is one of few educational sources for doctors and their patients.

Screen to Reduce Exposure

Lead levels in the 2 and 9 ug/dL range are likely to be from ongoing exposure, and sleuthing the cause can be important for prevention. Paint that contains lead may also contain harmful cadmium and mercury, exposures less likely to be diagnosed. Screening may lead to an important diagnosis for others such as household members or coworkers. A lab test can be an excellent reminder to wash hands frequently and quit smoking.

I have been intrigued by a possible application for blood lead tests – interpreting bone densitometry results. Bone density is a poor surrogate for bone strength, partly because of how lead can falsify this assessment. Lead is radiopaque, as illustrated by the fact that we use a lead apron to protect the organs during an X-ray. Bones with lead therefore appear strong while weakened by the intruding metal toxicant.

Screening to Identify Treatment Opportunities

Low levels of lead respond to treatment, too. Here are the 4 treatments that I recommend:

1. Eat lots of carbohydrates, and let them be fruits and vegetables. Cut sugar and starch. This will reduce lead absorption and improve calcium utilization.
2. Supplement with calcium 500 mg per day. A study of pregnant women in a region of Mexico with lead endemic in the soil found that the expecting women in a randomized controlled clinical trial had lower lead levels if they were in the calcium supplementation arm of the trial. In other words, if the body is deficient in calcium, it will substitute lead, absorbing it from the intestines to a greater extent.
3. Use nutrients such as glutathione and alpha-lipoic acid, which are known to chaperone heavy metals out the door.
4. Maintain vitamin D levels in the optimal range year round.

Questions Surrounding Causality

The “wakers” and the painter described above became ill because of extreme lead exposure. Treating the lead in a clinically advisable manner will treat the problem. However, one must use scientific caution when extrapolating to low lead levels. Reducing a patient's blood lead level from 4 ug/dL to 2 ug/dL might not necessarily improve his blood pressure, for example. Studies to establish the treatment benefits in the low ranges of exposure are lacking, although the prudent approach is prevention of exposure and the treatments described above, which are recommended for everyone.

Another important consideration is that even if lead does not cause the disease in question, it is associated with the disease and can serve as a marker. Lead is a risk factor for hypertension, for example, and one that is not accounted for by other blood tests.

Unanswered Questions About Seasonal Variation

A highly regarded study reported that in Northern Hemisphere populations, blood lead levels are lowest in March and highest in June. The stated reason was that in spring, children play outdoors and paint dust on window sills blows into the house as people fling open the shutters. These, of course, are sources of lead exposure but might not fully explain the seasonal variation. What about vitamin D levels? They too are lowest in March, often suboptimally low, and rise in summer. A sudden rise in vitamin D might increase calcium absorption to the point that lead is absorbed too? If that is the case, wintertime vitamin D supplementation, for those of us unable to afford a midwinter tropical trip, could help avoid lead absorption. A study probing this question is feasible and would have a high public health impact.

Conclusion

Lead can detract from anyone's optimal health. A screening blood lead test is prudent because results can guide patient health risk assessment, exposure reduction, and clinical treatment. Even if lead is sometimes a confounder in the range of 2–9 ug/dL, it has been shown to predict cardiovascular disease risk unaccounted for by other lab parameters.

However, blood lead testing is a poor predictor of being cited by the police for speeding. That's called having a lead foot. In seriousness, I would particularly welcome comments from readers on this topic.

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