Getting the Lead Out, and Fast:

Sensible Steps to Eliminate Lead Can Help Young and Old People Alike

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Eversince the 1970s, U.S. public health officials have voiced alarm over the possibility of excessive lead in our drinking water, food supply, and home environment. But the concern actually dates back to ancient Rome, where its extensive use in cooking utensils, cosmetics, wine vessels, aqueducts and water pipes may have contributed to widespread toxic effects—possibly accounting for imperial madness, infertility, and miscarriage rates that kept the ruling class from replacing themselves. The bones from Roman graves show high concentrations of lead, and it seems ironic that the powerful empire may have been defeated more primarily by its lack of environmental health awareness than by any opposing army per se.

Our recent history has again boosted the lead count, but by very different means. Three industrial centuries have greatly increased the mining and smelting of lead, resulting in its widespread dispersal in air, water, and soil. In the 1970s, when leaded gasoline was in vogue, automobiles were the number one contributor. Thankfully, this form of gasoline was phased out, and blood lead levels have dropped as a consequence. Much of the decline also may be attributed to the phase-out of lead-containing paints and of lead solder in food cans. (Lead from solder will leach more readily into acidic foods, like tomatoes and citrus, than into nonacid and dry foods. Tests of canned tomato products in the late 1980s found that about one quarter of the cans tested contained lead-soldered seams.)

Lead exposure is still a problem today. Although we have been repeatedly assured that modern lead levels are normal and tolerable, this assessment now appears to be incorrect. Researchers at the U.S. National of Academy of Sciences have estimated that modern body burdens of lead are still hundreds of times higher than those natural, prehistoric levels with which we evolved. And young, developing brains are uniquely susceptible to the toxic effects of lead. Some research indicates, moreover, that infants and children tend to absorb up to five times more lead and excrete much less than their adult

counterparts.

Lead's Threat to Adult Health and Well-Being

It's not just young people who are at risk of lead-related health effects. There is now powerful evidence from many studies that lead promotes hypertension—and moreover boosts the risk of dying from cardiovascular disease. For example, in the October 2006 issue of *Environmental Health Perspectives*, researchers reported on a 12-year study of nearly 9,800 adults, all over age 40, who were part of the Third National Health and Nutrition Examination Survey, or NHANES III. Those people with blood lead levels higher than 10 µg/dL were 59% more likely to die from cardiovascular disorders compared with people who had blood lead below 5 µg/dL.

Another NHANES III-based study looked into the connection between blood lead levels and overall mortality over a 12-year period. Reporting in the medical journal *Circulation* on September 26, 2006, the researchers concluded that blood lead levels as low as 2 µg/dL—which is deemed to be safe by the U.S. Centers for Disease Control—were linked with a significantly increased risk of overall mortality and an increased risk of dying from both coronary heart disease and stroke. Because an estimated 38% of U.S. adults have a 2 µg/dL blood lead level, the public health implications of these findings are immense.

Yet another study from NHANES found that people with higher blood lead levels were nearly three times more likely to have chronic kidney disease, and about two times more likely to have peripheral arterial disease, as reported in the 10 October 2005 *Archives of Internal Medicine*.

Long-term effects of lead on the brain have also been identified. A recent look at data from the Nurses Health Study found a significant link between cognitive deficits in the elderly and higher lead levels in the tibia or "shinbone" (a leg bone that records long-term lead exposure). Reporting in the April 2009 issue of *Environmental Health Perspectives*, researchers were able to show that psychological deterioration was correlated with tibia

lead levels in this population. In another recent study, the bone lead levels predicted cognitive decline in people over age 55, as reported in the January 2009 issue of *Neuropsychology*.

It's important to note that the development of senile dementia is most likely preceded by small and often subtle decreases in cognitive functioning over time. In this regard, adults are at risk of "silent" toxicity from low-level lead exposures that damage the brain subtly and gradually over decades. Thus, the brain-toxic effects of lead may be very hard to perceive or sort out in the context of the aging process.

How Low Can You Go?

Overt symptoms of lead toxicity are rare at blood lead levels of less than 70 µg/dL. But much lower levels are still toxic to the brain, and as we just noted above, lead can alter brain function in a gradual, silent manner, whereby the cognitive and behavioral changes are themselves subtle and gradual. For very young people, however, the effects of lead exposure are more readily seen in the form of reduced test scores, spelling ability, reading comprehension, and attention span—all of which correlate significantly with blood lead levels.

The U.S. Centers for Disease Control has set a safe blood lead level for children at 10 µg/dL. Any lead level above 10 µg/dL may promote hyperactivity, distractability, memory loss, hearing loss, and low IQ scores. But new research indicates that even lower lead levels—on the order of 3 to 5 µg/dL—may compromise one's cognitive ability. For infants and young children, there currently appears to be no safe threshold for lead exposure, especially if other brain-toxic pollutants (e.g., pesticides, mercury) and poor dietary habits are thrown into the mix.

Just how bad is the problem of lead exposure in the general population? A study in the March 2, 2009 issue of *Pediatrics* concludes that, although blood lead levels have dropped since the 1970s, they continued to be higher for low-income children, non-Hispanic black children, and children living in older housing (built before 1950). Some

of the children with high blood lead levels have received their lead from consumer products, imported toys, imported traditional medicines, and house wares. And children whose parents worked with lead are confronted with "take-home" lead exposure.

The authors of the *Pediatrics* report recommended more aggressive efforts to identify sources of lead, and to measure blood lead levels in those children most at risk. In this regard, North Carolina was among the first states to institute such proactive strategies. In the 1980s, public health officials suspected a link between high lead levels and the state's low national ranking in SAT scores. All property owners were required by law to begin eliminating lead hazards such as peeling paint or contaminated soil in places where younger children (under age 6) spend time. The state's Childhood Lead Poisoning Prevention Act, which went into effect on July 1, 1990, is designed to detect and correct high-lead situations prior to exposing the children.

Nutritional Keys and the Calcium Connection

Lead's health effects also bear a close relationship to calcium. Like various radioactive elements, most of the lead we absorb is eventually stored in our bones, where over 99% of the body's calcium is also stored. Scientist once thought the bone's lead deposits were relatively harmless; however, when calcium leaves the bones, lead is released simultaneously, and this results in a rise in the blood lead level.

Whenever the blood's calcium level is low, calcium is drawn from the bones to function in more essential body processes like nerve transmission and heartbeat. Such losses are most dramatic when people consume diets high in meats and other protein-rich foods. For woman, bone-calcium losses occur naturally during pregnancy, lactation, and menopause—a process probably exacerbated by high intakes of animal products and coffee.

People who minimize these dietary habits and consume plenty of dark leafy greens—which are rich in calcium—will be less likely to experience the lead-calcium time bomb. Taking a high-quality calcium supplement is also recommended, ideally one that contains

either calcium citrate or hydroxyapatite.

A substantial amount of today's lead exposure happens through the food chain—from airborne lead that falls on agricultural areas. Such fallout has resulted in major increases in the lead content of rice, oats, lettuce, cabbage, and other vegetable foods. Once lead enters the food chain, it becomes increasingly concentrated in animal flesh—yet another reason to avoid a heavy meat diet. EPA officials estimate that U.S. adults consume, on average, about 30 to 40 micrograms of lead each day through food—the major route for adult exposure.

Getting the Lead Out: An Integrative Approach to Chelation

Since lead has an obvious potential to disturb learning ability, adaptive responses, and other aspects of behavior and personality, it behooves us to find way to pull the lead out of our bodies. At this time, there is only one proven way to do this: chelation. Chelation therapy involves the use of agents that bind to toxic heavy metals, essentially pulling them out of the body through the urine and feces. Some of the best-studied chelating agents include calcium disodium ethylenediamine tetra acetic acid (EDTA), sodium 2,3-dimercaptopropane 1-sulfonate (DMPS), and meso 2,3-dimercaptosuccinic acid (DMSA).

Chelation therapy is considered to be the best treatment against metal poisoning. If your child's lead count is unacceptably high, chelating agents will draw the lead out of the tissues and blood and send it to the kidneys, to be excreted in the urine. Properly administered, such chelation sessions may literally save your child's mind and safeguard his or her intellectual potential. Research reviewed in the October 2008 issue of the *Indian Journal of Medical Research* indicates that chelation therapy is most effective when combined with specific antioxidants and nutritional factors that support the body as it attempts to eliminate the heavy metals.

Adults with high lead levels will generally experience a gradual improvement in symptoms after a series of chelation treatments and an extended period whereby their blood lead level remains low. Those with very high lead levels will show more dramatic

improvements after chelation, including better cognitive function. But in most cases, the improvements will lag behind the decline in blood lead levels, probably because of the relatively slower removal of lead from the brain and central nervous system.

The pace of improvement can be highly variable from one individual to the next, ranging from weeks to a year or more depending on the magnitude of the lead burden. Many people only benefit when the chelation therapy is accompanied by other forms of treatment, such as cognitive rehabilitation) and intensive nutritional support. It's important to note that short-term improvements in cognitive functioning following a decline in the blood lead level may not be able to override or reverse the harmful effects of long-term cumulative lead exposures. This is why getting the lead out at an earlier stage of life is so critical, and why preventing or minimizing lead exposures is always the top priority.

Research reported in the 15 April 2007 issue of *Cellular & Molecular Biology* confirms the value of chelation therapy for reversing a situation of toxic overload with lead and arsenic. The authors of this scientific paper, titled "Arsenic and lead-induced free radical generation and their reversibility following chelation", emphasized the importance of judicious chelation therapy in combination with specific antioxidant nutrients and herbals to support optimal detoxification. Our own clinical experience has shown, similarly, that chelation is only effective when accompanied by such supportive strategies.

Sadly, chelation researchers rarely bother to study chelation therapy in the biologically correct context—that is, using tailored nutritional support that includes selenium, herbal chelators, and glutathione-boosting nutritional strategies within an integrative medical setting. Because virtualy all clinical trials to date have studied chelation therapy without the proper supportive measures, such "gold standard" studies have helped engender the erroneous perception that chelation therapy has no merit. As a result, physicians who practice chelation therapy are often chastised for not adhering to an "evidence-based approach."

The problem, of course, is that the "evidence" derived from these clinical trials should really not be considered evidence at all. Even the most perfectly designed clinical trial is

worthless if the intervention itself is flawed. Until the evidence actually comes from clinical trials that offer the correct intervention, physicians must continue to rely on what works in the clinical setting.

If lead-laced wine did indeed cause the madness of Caesars and bring the Roman empire to ruin, then the rising tide of heavy metal pollution means that our society's sanity and intelligence may be at stake. Unless we clean up our act and fast, we may be putting our brains at risk for the indefinite future. Using appropriate chelation therapy (which must be coupled with selective use of antioxidants in order to succeed)—along with individually tailored nutritional and herbal support in an integrative medical context—is our best hope for turning the biological tide in a body already load with lead and other toxic metals.