



Heavy Metal Toxicity

Heavy Metals

For the purposes of this article, the term “heavy metals” refers to toxic elements that adversely affect health, including lead, mercury, arsenic, cadmium, aluminum, and uranium.

Chronic Low Level Toxicity

Although the diagnosis of heavy metal toxicity is considered in mainstream medicine (especially for lead toxicity in children and occupation-related health problems), the role of long-term bioaccumulation of heavy metals in chronic health problems is considered far less often. Because metals are a natural part of the earth, nearly all people have some level of heavy metals in their bodies. However, bio-accumulation of heavy metals in the post-industrial age can be far greater than levels that occur from natural sources and can interfere with vital physiological processes. Heavy metal toxicity is thus an important consideration in medical workups, in particular for health problems for which no cause or solution has been found.

Heavy Metals and Biology

The metals discussed in this newsletter not only have no beneficial role in biology, they also have widespread adverse effects on health. For example, the role of heavy metals in inducing autoimmune disease is well documented. Some people are predisposed to heavy metal toxicity because of age (infants, children, and the elderly are more vulnerable), malnourishment, or genetic or acquired impaired ability to excrete or detoxify heavy metals. Nutrient deficiencies increase the toxic effects of heavy metals, while improved nutrition greatly helps prevent or lessen the toxic effects of heavy metals. In adults, 90-95 percent of the body

Testing for Heavy Metal Toxicity

Our patients often say that their family doctor already tested their blood or urine for mercury and were told that their test results were normal. However, only very small portions of the body's total burden of heavy metals are in the blood or urine, the bulk being stored in other body tissues. A more revealing test of the actual body burden of heavy metals requires that a chelating agent (e.g., EDTA, DMSA) be given to “pull” metals from body tissues for excretion by the kidneys prior to the urine being tested.

Toxic Brews

Exposure to a combination of toxins is far more common in real life than exposure to one toxin and has proven to be far more toxic than single exposures. Dartmouth Research Professor Roger D. Masters, a specialist in neurotoxicology, brain chemistry, and behavior, tested more than 400,000 lead toxic children and found that those who drank fluoridated water always had significantly higher lead levels.

Lead Plumbum (Pb),

The Latin word for lead, is the origin of the word “plumbing.” Lead toxicity affects the brain, bone marrow, nerves, muscles, and kidneys as well as the reproductive, digestive, and cardiovascular systems. Signs of lead toxicity include a gray metallic stain on gums near the teeth. Symptoms of lead toxicity include metallic taste in the mouth, exhaustion, constipation, poor appetite,

hearing loss, muscle spasms, fertility and reproductive problems, severe abdominal cramps, and progressive paralysis. Children may experience decreased IQ and problems with coordination, memory, headaches, seizures, growth, and behavior changes.

In adults, 90-95 percent of the body burden of lead is stored in bones. Aging causes bones to break down faster than they are rebuilt, causing osteoporosis, fracture risk, and release of lead from bones. Johns Hopkins professor and researcher Ellen Silbergeld found that a 30 percent increase in lead levels during menopause was associated with an increase in blood pressure and a decrease in cognitive skills and kidney function. Lead can be inhaled or ingested. Sources include soil, paint dust and flakes, pesticides, lipstick, moonshine, pottery, soil close to freeways, older homes, and gas stations (leaded gasoline was banned in the U.S. in 1996), and renovating homes painted with leaded paints prior to 1978, water from pipes with lead solder (according to the EPA, even legally "lead-free" plumbing may contain up to eight percent lead), older pewter (pewter was once 50 percent lead; U.S.-made pewter is now lead-free), and animal-based foods and plants that grow on lead-contaminated soil. Imported sources of lead include herbs from China, India, and the Middle East plus children's toys, games, chalk, eyeliner, and jewelry from China. Work- and hobby-related lead exposures include ammunition and battery plants, mines, foundries, and shooting ranges, as well as working with stained glass and reloading ammunition. In 1999, an article in the Journal of the American Medical Association (JAMA) found that people with the highest ascorbic acid (vitamin C) levels had lower blood levels of lead. Also in 1999, 75 male subjects who took 1,000 mg of vitamin C per day had significantly lower lead levels compared to a control group, likely due to increased urinary excretion of lead.

Inspecting homes painted before 1978 and testing tap water to detect lead contamination are the first steps to detect sources of lead toxicity, and remediation of toxic sources, if needed, is the next step. If copper water pipes are soldered with leaded solder, run cold water for 30-60 seconds before using water for consumption or cooking and purchase ice or make ice from bottled water. Because not all of lead's toxic effects can be reversed in children, pre-conception care needs to consider lead contamination in the home in addition to the mother-to-be's body burden of lead.

Mercury

Alice in Wonderland author Lewis Carroll popularized the phrase "mad as a hatter," referring to the insanity of hat makers caused by mercury used to condition felt. In the 1950s, the contamination of Japan's Minimata Bay with industrial methyl mercury waste became a tragic study of birth defects as well as neurological, sensory, psychiatric, and reproductive problems from eating contaminated seafood. Today, symptoms of chronic mercury toxicity differ from the severe poisoning seen prior to mercury being regulated and now include cognitive and memory problems, fatigue, impaired balance, tremors (including the tongue), emotional instability, and psychiatric effects such as depression and irritability. Current sources of mercury include industrial stack and water emissions (notably coal-burning power plants), imported skin lightening creams and lotions, "silver" dental amalgams (that are 50 percent mercury), fungicides, vaccines, compact fluorescent light bulbs, thermometers, barometers, batteries, crematoriums, fungicides, and wood preservatives. Bottom-dwelling seafood and larger predatory fish bio-accumulate mercury by eating smaller contaminated fish and are the primary sources of organic mercury. Most humans eat from the top of the food chain, eating larger, more toxic fish, further bio-accumulating mercury. Though most drugs containing mercury have been removed from the market, mercury is still in some eye solutions, topical creams, and vaccines.

The WHO adds, "Recent studies suggest mercury may have no threshold below which some adverse effects do not occur." As reported in the Journal of the American College of Cardiology in 1999, 13 adults with a type of heart failure called idiopathic dilated cardiomyopathy (IDCM) had biopsies of their heart muscles that revealed mercury levels more than 22,000 times higher than in the control subjects with no heart disease. Elevation of mercury levels did not occur in other muscles of the afflicted subjects and correlated with the level of cardiac impairment. Mercury can be inhaled, ingested, injected, or absorbed through the skin. Mercury's effects in

the body are due to its ability to cause oxidative damage, incapacitate enzymes' vital roles in health, and destabilize cell membranes, which can result in cell death. Given individual susceptibility, not all people who have the same mercury exposure are equally affected. Exposure to mercury can be prevented or reduced by disposing of any mercury-containing items through community-based recycling programs, eating less fish and seafood that are high in mercury (in particular tilefish, swordfish, shark, mackerel, tuna, orange roughy), using mercury-free alternatives to compact fluorescent bulbs (e.g., Phillips AmbientLED™ energy-efficient bulbs or "regular" incandescent bulbs), avoiding placement of new dental amalgams, and consult biologically-trained dentists (<http://www.iaomt.org>) for safe removal of old amalgam fillings.

Arsenic

The National Institutes of Health (NIH) states that arsenic from mining, agricultural, and industrial sources that enter water aquifers affects millions of people globally. Arsenic, a tasteless, odorless white powder, has been used to intentionally poison people. Arsenic enters the body by eating or drinking contaminated substances, and accumulates in the skin, nails, and hair.

Sources of exposure include poultry, artists' paints, herbicides (notably on golf courses), semiconductors, pesticides, moonshine, and handling, sawing, or burning Chromated Copper Arsenate (CCA)-treated lumber (CCA is a wood preservative banned in 2003 for residential use that gives a green tint to wood). Organic arsenic in bottom-feeding seafood (including crustaceans and mollusks) is mostly excreted within 48 hours of ingestion. Inorganic arsenic, also in seafood, is excreted less rapidly. Symptoms of acute arsenic toxicity include nausea, vomiting, abdominal pain, and diarrhea. Chronic arsenic toxicity affects multiple body systems and organs. Signs of arsenic toxicity include white or brown discoloration of the skin, thickened skin resembling corns on soles and palms, horizontal ridges on the fingernails called Mee's lines, numbness and tingling of feet and hands in a stocking/glove distribution, and anemia. Hair (tested in segments to date the length of the exposure), 24-hour urine samples, fingernails, and red blood cell testing can detect arsenic toxicity. Two million pounds of arsenic-containing chemicals are used in the U.S. chicken industry annually to combat parasite infestations caused by crowded, stressful conditions in chicken houses. Eating free-ranging chicken raised in healthier, humane conditions that don't require the use of arsenic is recommended.

Cadmium

Although cadmium can be ingested, inhalation of direct or second-hand cigarette smoke affects far more people. Cadmium from smoking directly affects the lungs and is also circulated to other organs and tissues. Cadmium is thought to be one mechanism by which smoking causes cancer. Even very low levels of cadmium can affect the kidneys. Secondary effects of kidney damage include osteoporosis, bone pain, high blood pressure, and kidney stones. Cadmium also causes accelerated aging. Occupational exposures to cadmium include mining, pigments, and nickel-cadmium battery industries. Treatment consists of avoiding known sources (e.g., smoking), replenishing deficient zinc, iron, and protein, and chelation therapy.