

Mad as a Hatter

How to Avoid Toxic Metals and Clear Them from the Body

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What's wrong when people follow Dr. Weston A. Price's dietary principles but still suffer from significant health problems? Why do so many people try to eat good fats but find they cannot digest them? What is the reason for digestive distress and dysbiosis despite taking high-quality probiotics and consuming cultured foods and broth? Why are some babies sickly even when the parents eat a nourishing diet prior to conception and throughout pregnancy and lactation?

The answer may be toxic metals. Though we may honor our bodily temples with nourishing foods, we cannot realize our full health potential so long as we remain waste dumps for mercury, aluminum, cadmium, arsenic, lead and nickel. Even the "precious metals" gold, silver and platinum can create problems. Mix well with a dose of chloride and fluoride found abundantly in municipal water supplies and it's no wonder that so many of us are sick and tired.

Health practitioners over the past few decades have also begun seeing more and more people "glowing in the dark" because of nuclear waste and weapons. The use of so-called "depleted uranium" weapons in armed conflicts is suspected of contributing to the "Gulf War Syndrome," an array of health problems associated with the Gulf War as well as the ongoing Iraqi war and other conflicts.

Although the mental and physical problems from metal toxicity have escalated in recent years, our very language tacitly acknowledges the historic toxicity of certain metals: “Mad as a hatter” from the Civil-War-era’s crazed use of mercury sizing in hat manufacture, “gold fever” from the murderous greed of early prospectors, “lead poisoning” as black humor for “getting shot,” and, more recently, “get-the-lead-out” exhortations from trainers who would have us exercise long and hard in order to sweat out toxins and melt excess fat.

The medical establishment currently recognizes only acute metal toxicity, the type that leads to painful, sudden and severe symptoms, including cramping, nausea, vomiting, sweating, headaches, breathing difficulties, convulsions, and impaired cognitive, motor and language skills. With acute metal toxicity, the effect of consumption, inhalation, skin contact and other exposure is clear. Acute toxicities occur most often on job sites when workers are exposed to hazardous substances, though accidents occur on the home front too. Pesticide, herbicide and chemical fertilizer spills at homes and schools, for example, are some of the common reasons why previously healthy people join the ranks of the chemically sensitive and environmentally ill.

In 1986 Congress established the Agency for Toxic Substances and Disease Registry (ATSDR) of the Department of Health and Human Services in order to deal with effects of hazardous environmental substances on human health. In cooperation with the U.S. Environmental Protection Agency, the ATSDR compiles priority lists of hazardous substances each year. Out of 275 substances on the 2007 list, arsenic is number one, lead two, mercury three and cadmium seven.¹ Of these fearful four, mercury is the most studied, but all four have similar adverse effects on the body.

CHRONIC EXPOSURE

Victims of acute metal toxicity make the six o’clock news, but far more people suffer adverse effects from low-level, chronic exposure to multiple metals. Because the symptoms may develop over a period of many years and are often interchangeable with other signs of poor health, sufferers rarely recognize slowly accumulating mercury and other metals as the culprits. Thus, although nearly everyone on the planet carries some toxic load, not everyone shows obvious and distinguishing ill effects. After all, fatigue, digestive distress, aching joints and depression, to name just a few everyday complaints, are considered “normal” in our increasingly sick and aging society. Almost all chronically sick patients, regardless of their specific symptoms or diagnoses, have sustained significant exposure to toxic metals. Mercury toxicity should be assumed in anyone who has—or has had—amalgam fillings or root canals and who also chews.² Aluminum, cadmium, lead, cobalt and arsenic and other metals are rarely absent from such patients.³

Dose, duration, manner of exposure, biochemical individuality, genetic propensity, diet quality and stress levels combine to determine the degree of ill effects. Good nutrition is key because a deficiency of vital metals will lead to their replacement by toxic metals in enzyme binding sites. Lead will replace calcium, for example, cadmium will replace zinc, and aluminum and nickel will replace magnesium and manganese. These

substitutions will allow a certain degree of vital enzyme function, but in time lead to physiological dysfunction.^{4,5}

Sadly, it no longer takes decades or even years to become toxic. Babies are born toxic because mercury and other metals pass through the placenta from toxic mothers. The Environmental Working Group reports that blood samples taken from the umbilical blood of newborns show an average of 287 toxins including mercury, fire retardants, pesticides and Teflon chemicals. This is a primary reason why babies come into this world with compromised digestive and immune systems. The National Academy of Sciences (NAS) estimates that over 60,000 US children are born each year at risk for life-long problems because of dangerous blood levels of mercury in their mothers.⁶

Vaccinations containing mercury and aluminum then add to the burden, often sending an already vulnerable child over the edge into autism, ADD/ADHD, life-threatening allergies and autoimmune diseases. Thimerosal has mostly been removed from children’s vaccines. However, old batches are still given to children, if not in the US then abroad. As for new batches, even the FDA admits that they may contain trace amounts.^{7,8}

The Weston A. Price Foundation has educated parents about how to optimize their nutrition prior to conception. But unless parents also detoxify themselves of toxic metals before conception, this trend will not reverse, and we will continue to see the degeneration of our children’s health.

A LITANY OF ADVERSE EFFECTS

Evidence that toxic metals cause, contribute to or accelerate the development of chronic illness is widely available in the scientific literature. Metal toxicity adds to oxidative stress, inhibits antioxidant production and utilization, blocks enzyme functions and poisons sulfur biochemistry, adversely affecting the function of every cell, tissue, organ and system in the body. It would be wrong to blame the epidemics of fatigue, depression, anxiety, food and drug addictions, insulin resistance, diabetes, learning disabilities, allergies, asthma, digestive distress, adrenal gland exhaustion, hormonal imbalances,

memory loss and other all-too-familiar health problems solely on metal toxicity but metals certainly can play a major role in these conditions.⁹

Although symptoms of poisoning by the various metals commonly overlap, different metals tend to favor different sites. Mercury and cadmium accumulate heavily in kidneys, but cadmium doesn't cross the blood brain barrier the way mercury does. Cadmium overload is

associated more with peripheral neuropathy than central nervous system problems. Lead deposits primarily in bone, and it disrupts erythropoiesis, the formation of red blood cells, contributing to poor bone health, osteopenia and osteoporosis.¹⁰⁻¹²

The litany of adverse effects from exposure to mercury, lead, cadmium and arsenic is a long one. It includes physical, muscular and neurological degeneration. Toxic heavy metals can cause, contribute to or accelerate the development of Alzheimer's disease, Parkinson's disease, muscular dystrophy, multiple sclerosis, and other brain and neurological disorders.¹³

MERCURY, MERCURY EVERYWHERE

Mercury is number three on the ATSDR hazardous metal list.¹ Yet doctors and dentists routinely assure the American public that the same mercury that is so dangerous when spilled on the floor becomes mysteriously and miraculously safe in the mouth as part of silver-colored amalgam dental fillings. (Astonishingly, that is about to change thanks to a successful lawsuit against the FDA by Consumers for Dental Choice and Moms Against Mercury, which ended early in June with the FDA agreeing to change its website on the issue of mercury and to reclassify mercury amalgam fillings by June 2009. It's unlikely that the FDA will forbid the use of amalgam fillings, but this is clearly the beginning of the end for the decades-long cover up between the American Dental Association and FDA. The government website has already been changed and reads "Dental amalgams contain mercury, which may have neurotoxic effects on the nervous systems of developing children and fetus."²)

The average American also takes in mercury through FDA-approved over-the-counter contact lens solutions, nasal sprays and hemorrhoid remedies, prescription drugs and vaccinations, especially flu shots. Mercury exposure is also ongoing from contaminated water supplies, commercial crops grown from seeds treated with mercurial fungicides, agricultural soil polluted with mercurial pesticides and fertilizers, and air contaminated from a variety of industrial sources, including coal-burning power plants and crematorium smokestacks, which spew mercury vapors from the amalgam fillings contained in corpses. Mercury thermostats in the World Trade Center towers would have spewed mercury all over New York and the east coast.³⁻⁵

Pregnant women and others at high risk from mercury exposure are rightly warned to avoid tuna, swordfish and other seafood. What happens is that mercury in the water—either because of natural volcanic explosions and off gassing from the earth's crust or unnaturally because of industrial pollution—is methylated by algae and bacteria in the water, then goes up the food chain into fish and seafood.

Even the FDA warns of this danger, and online calculators at www.oceana.org and www.gotmercury.org can help visitors figure their personal danger from a long list of fish. The figures for all of us, pregnant or not, are frightening, with a single serving of ahi sushi exceeding a week's safe dose. Many commonly eaten fish are surprisingly low in mercury, especially North Atlantic small fish, as opposed to the large predatory ones or the estuary bottom dwellers. Fortunately, mercury accumulates in the protein portion of fish, not the oil, so we need not—and should not—avoid cod liver oil.

Unfortunately, the FDA and other agencies exploit the fear of fish to distract the American public from the dental issues. The Environmental Protection Agency (EPA) identifies dental amalgam as the primary source of mercury exposure, and the World Health Organization and Health Canada acknowledge that the mercury burden from multiple amalgam fillings far exceeds that in people who eat a lot of fish. More than ten years ago the *New England Journal of Medicine* indicated that amalgam fillings pose a far greater danger than fish.⁶⁻¹⁰

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REDUCING ENVIRONMENTAL EXPOSURE

COOKWARE: Glass, cast iron, carbon steel, titanium and lead-free crock pots (slow cookers) and enamels are best. Obtain Material Safety Data Sheets (MSDS) data from the manufacturers for evaluation if possible, especially in the case of enamels and slow cookers.¹ The FDA alleges that the risks from lead in slow cookers are acceptable, but consumers may want to find products that have been proven lead free and not just meeting “FDA standards.” Hamilton-Beach claims its crockpot is lead free. Aluminum and teflon are well known for their health dangers. Less known is the fact that stainless steel exposes people to accumulations of carcinogenic nickel, and often cobalt and chromium, as well. Although some high-grade stainless steels are supposed to be risk free, they may be so only in water at near-neutral pH. None of the 300 and 400 series stainless steels evaluated are stable in tomato acids and salt.² Series 316 corrosion-resistant stainless steel is the best (used in Saladmaster brand cookware). It is resistant to tomato juice and vinegar, but corrodes with exposure to citric acid and salt (so add salt after cooking). Sadly, Corning glassware is no longer in production, but eBay is a good source. There are many high-end enamel cookware products, including Le Creuset .

RESTAURANTS: As the FDA requires restaurants to use stainless steel pots and vats, minimize restaurant patronage, especially at buffets where salty and acidic food, like tomato sauces and pastas sit out in stainless warming trays for extended periods of time.

THERMOSES AND WATER CONTAINERS: Avoid stainless steel thermoses. The old-fashioned glass-lined thermoses are best. For water containers, avoid the newly chic and sanitary aluminum and stainless versions. Glass would be perfect, except for the breakage factor.

PERSONAL CARE PRODUCTS AND COSMETICS: Some cosmetics have aluminum bases. “Natural” mineral powders may contain bismuth, an all-natural but dangerous mineral. Antiperspirants are a primary source of aluminum, and they prevent us from sweating the carcinogenic metal toxins out through the skin, a situation that amplifies the risk for women who are also getting exposed to nickel from sweating while wearing underwire bras.

JEWELRY: Those very sensitive to metals will need to limit jewelry to special occasions. The nickel found in cheap costume jewelry is especially dangerous. at least for the posts, hooks, and other fastenings that come in direct contact with the skin. Earrings as well as the rings and studs used in body piercing should be avoided or worn sparingly if one can not verify their origin and metal composition with confidence. Again pure titanium is preferred for maximum safety.

ORTHODONTICS AND SURGERY: Many orthodontists and surgeons use stainless steel (which contains nickel) for braces, wires, palate wideners, etc. This is especially unfortunate because exposure 24/7 in a hot environment wet with saliva is a formula for metal toxicity. Sadly, many of the products promoted as “titanium” are actually mixes of titanium and stainless. It’s now illegal for dentists and surgeons to use dental implants, body replacement parts and mesh made of nickel, but doctors may still leave carcinogenic stainless staples in patients after surgery. For most people titanium is a safe choice, though a small number of people have reacted to that metal as well, perhaps reflecting problems with purity.

Toxic metals also contribute to the plague of female reproductive system problems such as menstrual difficulties, infertility, miscarriage, pre-eclampsia, pregnancy-induced hypertension and premature births. Toxic metals have also been linked to increased breast cancer risk. A recent study out of Georgetown University showed that the metals mercury, copper, cobalt, nickel, lead, tin, chromium and vanadate activated estrogen receptor alpha sites in human breast cell cancer lines in ways similarly to the human estrogen estradiol. The metals also altered gene expression, perturbed hormonal balance

and accelerated the proliferation of the breast cancer cells.¹⁴

Mercury and other toxic metals further contribute to cancer development and growth by preventing the biosynthesis and functioning of vitalethine, an endogenous regulator of key metabolic pathways necessary for a “vital” immune system. Adequate natural vitalethine controls immune responses, probably to all types of cancer and to infectious agents like AIDS. Evidence is accumulating that vitalethine is also crucial for proper cholesterol metabolism, red blood cell production and diabetes prevention.¹⁵ For our bodies to make natural vitalethine, we need the sulfur-containing amino acid, L-cysteine along with vitamin D-pantothenic acid.¹⁶ However, if high-quality, usable protein and cysteine become deficient because of poor diet or poisoning by metals, our bodies will try to compensate by making cysteine from the essential amino acid, methionine through the

VACCINATIONS: There are many reasons not to vaccinate, including the injection of mercury and aluminum additives directly into the bloodstream.

NATURAL MEDICINES: The toxicity of pharmaceuticals is well known, but natural medicines don't get off the hook. Colloidal silver has caused consumers to turn blue-gray from silver poisoning. Colloidal mineral toddlers have left people with heavy metal toxicity as well as toxic levels of needed macro or trace minerals. Some Ayurvedic, Tibetan and Chinese preparations have proved to be high in mercury, lead and arsenic, either because of alleged medicinal values for such substances or unintentional contamination.³⁻⁷ Herbs picked from areas near highways are often contaminated with cadmium, lead and manganese.

SMOKING: Don't smoke or expose yourself to second hand smoke unless you want cadmium poisoning.

DENTAL WORK: Amalgam fillings may contain cadmium, zinc, tin, copper and silver in addition to mercury. Metal crowns are a problem with any metal, even expensive gold. Porcelain crowns may have metals hiding beneath. Root canals, implants, partials and dentures all contain potentially problematic ingredients. With dentistry, there are no truly good solutions, only ones that are less dangerous.⁸ The worst of this is, of course, the amalgams. They should be removed, but not during pregnancy or lactation, and only by a holistic dentist trained in safe removal. Removal of amalgams must be performed using the dental protocol established by the International Academy for Oral Medicine and Toxicology (IAOMT).

HOUSEHOLD CLEANING PRODUCTS: Think green products by reputable companies such as Seventh Day, Mrs Meyer's and others. Beware of numerous unethical companies that have been jumping on the "green" bandwagon.

INSECTICIDES: Beware of suggestions that you keep it simple and natural by using Borax. Never expose yourself to boron-containing solutions repeatedly or for extended periods of time. People have died from overexposure to boric acid, including the boric acid douches recommended by some doctors for yeast infections.

Readers may find this a grim and alarming list of "no's." However, many of the suggestions are do-able, especially if we take "baby steps" and change one habit at a time. And although ill people need to dramatically reduce exposure and stay as non toxic as possible, most of us need not worry about perfection so long as we closely follow a Weston A. Price style diet and regularly detoxify as explained elsewhere in this article. In other words we can enjoy life as long as we eat well and "eat dirt."

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toxic intermediate homocysteine. Problematic metal toxins in the body may bind and interfere with the conversion of homocysteine, trapping it so that it accumulates metabolically.¹⁷⁻¹⁹

High homocysteine levels are markers of cardiovascular problems, cancer and other diseases of industrial societies, and also of poor and premature aging. They are associated with arterial plaque, neoplasia, tumors and a long list of metabolic imbalances.²⁰⁻²² Homocysteine levels are higher in most vegetarians because of inadequate dietary protein and B vitamins (especially B₁₂) in general or excess soy in particular.²³⁻²⁶ Soy is marketed as a "perfect protein" because it contains all the essential amino acids, but "contains all" is not the same as contains optimum—and usable—levels and ratios. In terms of helping the body to handle metal poisoning, soy is an especially inferior protein because its cysteine content is tied up in

and largely made unavailable by protease inhibitors.^{27,28}

Thirty percent of elderly persons (both male and female) have elevated homocysteine levels. Twenty nine percent of vegetarians have elevated homocysteine levels (caused by the relative lack of methionine and vitamin B₁₂ in their diets and/or excess soy consumption) compared to just five percent of omnivores. Among symptomatic atherosclerosis patients 13 to 47 percent (possibly more) have elevated homocysteine levels.²⁹ Although supplemental B₆, B₁₂ and folic acid are an inexpensive, often-lifesaving way to

lower homocysteine levels, highly toxic people sometimes become deathly ill from them, most probably because the absorption of B vitamins triggers this metabolic homocysteine pathway and results in a massive release of associated metal toxins into the bloodstream.³⁰

BIG FAT PROBLEM

To metabolize fat we need lipoic acid, which is yet another critical vita-nutrient that is poisoned by toxic metals. Failure to properly digest fat is an increasingly common problem and one of the key reasons some people decide that a traditional high-fat diet is “not for them.” Although loss of the ability to digest fat may follow from years on a low-fat diet, this isn’t a simple question of “use it or lose it.” People who stuff themselves with bad fats or seek to avoid all fats are more likely to accumulate toxic metals, which, in turn, will affect their ability to properly digest, assimilate and utilize fats. Loss of lipoic acid to metal toxicity interferes with energy production, toxin cleanup operations, blood sugar regulation and maintenance of a healthy weight.³¹

PRO OXIDANTS AND ANTIOXIDANTS

Mercury, cadmium, arsenic, lead and other toxic metals promote the formation of hydrogen peroxides, lipid peroxides and hydroxyl radicals and interfere with critical antioxidant processes. The body is thus depleted of critical protective agents.

Glutathione is one of the body’s primary intracellular antioxidants. When toxic metals such as mercury or cadmium bind with glutathione, both the toxic metals and the glutathione may be excreted from the body in the bile. While it’s good that the toxic metals leave the body, the process depletes cells of glutathione. This is akin to throwing the baby out with the bathwater!³²⁻³⁴

Making matters even worse, mercury inhibits the activities of glutathione reductase and glutathione synthase, the two key enzymes critical to glutathione metabolism, and interferes with the function of superoxide dismutase, another enzyme needed by the body for antioxidation.³⁴⁻³⁷

ANTIBIOTICS AND TOXIC METALS

Recently, another toxic metal issue has emerged: *Candida albicans* and other resistant pathogenic organisms that accumulate because of antibiotic use. These microorganisms are capable of diverting methyl groups (CH₃-)—needed for immune and other bodily functions—for their own diabolical purposes. This not only means that toxic homocysteine doesn’t get converted to nutritious and safe methionine, but also that elemental or ionic mercury is converted into the far more toxic, methylated mercury. Methylated mercury has far greater affinity for fatty tissues, and is far more difficult to remove from the body.³⁸⁻⁴⁰

Researchers at the Heart Disease Foundation in New York found that antibiotics used to treat infection were not effective in the presence of heavy metals such as mercury and lead. These metals coexisted with infections such as *Chlamydia trachomatis* and *Herpes simplex*, as well as with cytomegalovirus and other microorganisms, including viruses associated with cancer.⁴¹

Tragically, the study of toxic metals is largely overlooked in the training of both doctors and nutritionists, even though knowledge of their adverse effects could provide the answers to many puzzling clinical case studies.

So where do we start with this seemingly insurmountable problem of toxic metal overload? First and foremost, we must avoid exposure, at least to the best of our abilities. Since total avoidance is well nigh impossible, we need to also actively detoxify or else the build up of toxins in our bodies will continue. The two main areas to clean up are diet and environment. Over diet, at least, we have considerable control.

A PROTECTIVE DIET

A Weston A. Price Foundation diet is protective against toxic metals for two reasons: it minimizes exposure, and it contains the nutrients needed to aid with detoxification.

First of all, we need good quality animal protein from meat, poultry, fish and egg yolks. These contain plenty of L-cysteine and L-cystine, the sulfur-containing amino acids necessary for detoxification, immune support and antioxidant protection. Good quality protein is also high in zinc, which not only protects us from the toxic metal cadmium but also is critical to many metabolic pathways. Buffalo meat is especially high in cysteine and cystine.

We also need plenty of taurine, which is found in significant amounts only in animal foods. While it’s true that our bodies can produce taurine from cysteine and methionine metabolism, that presumes we get enough cysteine, methionine and B vitamins to begin with, and that we are healthy enough to produce it. Taurine serves as an important water-soluble antioxidant and is also needed to excrete toxic metals via the bile.

Animal proteins are also our best sources of pantothenic acid (B₅), a key nutrient in many detoxification protocols. Liver is especially high in pantothenic acid and other critical B vitamins.

Don’t be afraid of red meat. People who purposely avoid red meat tend to eat more fish. Although fish contains healthy fat-soluble activators and EPA and DHA fatty acids, people who consume more than two fish meals per

week tend to show very high serum levels of mercury. This is especially true if they consume a lot of tuna, swordfish or shark. Tuna, codfish and haddock also concentrate cadmium. Oysters do contain large amounts of cadmium but also large amounts of zinc, which serves to protect us against cadmium toxicity.

Meats need to be free-range and organic. The livers and kidneys of factory-farmed animals usually contain significant amounts of cadmium.

Good quality fats promote overall good health and ongoing detoxification. Although many popular books advise us to avoid animal fats because poisons accumulate in them, the same fat will help us rid the body of those toxins. However, it is obviously best to consume free-range and organic animal products that are low in poisons to begin with. It's also important to remember that many of the poisons in pesticides, herbicides and fertilizers used on commercial crops are water-soluble, not fat-soluble.

The fats found in processed, packaged and fast foods add to metal toxicity, particularly nickel toxicity. Partially hydrogenated fats are manufactured by taking cheap and usually rancid oils from soy, corn, canola and cottonseed and mixing them with particles of nickel oxide. The combination of oil with the nickel catalyst is then subjected to hydrogen in a high-pressure, high-temperature reactor. Traces of nickel always remain in the finished product.

In contrast, good fats are vital for detoxification. Acylglycerols, like the monolaurin in

coconut oil, reportedly are fat-soluble chelating agents for methyl mercury, and perhaps even dimethylmercury. They serve as a unique oil-based chelating agent.⁴²

Cultured and fermented foods such as beet kvass, kimchi, sauerkraut, clabbered milk, pima cream and homemade yogurt contain beneficial microorganisms that contribute to gastrointestinal health. People with healthy gut flora are better able to handle the inevitable exposure to toxic metals, including the mercury found in fish. In contrast, people who do not have healthy gut flora are more prone to candida and other pathogenic bacterial and fungal overgrowth that change inorganic mercury into the more toxic methylated and dimethylated mercury, thus increasing the potential for fat-soluble retention and damage.

Bone broth offers a time-tested way to heal the gut of “leaky gut syndrome.” A gut lining with integrity will better succeed in keeping out toxic metals. Broth is high in the amino acid glycine, which along with cysteine and glutamic acid is a component of glutathione, which the body must manufacture in order to detoxify toxic substances.⁴³⁻⁴⁵

Kombucha tea is sparkling fermented beverage that contains D-saccharic (D-glucaric) acid, which not only binds and pulls toxic metals out of the body, but inhibits glucuronidase, an enzyme that would otherwise hydrolyze the glucuronides of fat-soluble toxins. This prevents them from being recycled back into the fat, instead of being excreted.⁴⁶ No wonder kombucha has a reputation as a longevity elixir!

A diet low in grains—particularly gluten- and gliadin-containing grains—has helped many people restore their gut health. However, traditional preparations including soaking, will lessen the likelihood of ill effects from any of the grains.

Foods high in B₆, B₁₂ and folic acid are especially important. These B vitamins are critical for keeping homocysteine levels in the normal range. When inadequate in the diet, the body cannot convert the amino acid methionine to cysteine through the homocysteine intermediate as needed. This results in homocysteine build-up, which will make metal toxicity worse. True vitamin B₁₂ usually is found in animal products. The best foods for B₆ also come from animals and include beef, poultry, eggs,

NOT THE BRIGHTEST IDEA

Even as the old mercury-containing glass thermometers have quietly disappeared from the marketplace, a new home mercury danger has emerged in the form of “energy efficient” supposedly “green” CFL fluorescent bulbs. Broken CFL bulbs release mercury vapors and can turn your home into an environmental hazard zone. The EPA has a web page dedicated to the clean-up of broken CFL bulbs, but packaging contains neither warnings nor special handling instructions.

Although the amount of mercury released by one of these little spiral bulbs can exceed U.S. federal guidelines for chronic exposure, environmentalists continue to recommend them as though the energy-saving benefits for the planet outweigh the considerable personal risks. (These bulbs actually save very little in terms of overall home energy usage.) Most people do not even know that the bulbs contain mercury, but are somehow expected to exercise “common-sense caution,” such as not using compact fluorescents in table lamps that could be knocked over by children or pets.¹⁻³

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sardines and mackerel. Some sources of folate are meat, fish, poultry, milk, liver, beans, sunflower seeds and many vegetables.

For many it is helpful to avoid casein, especially as found in fractionated food products such as shake powders. Although some people react even to the casein that is a natural component of whole raw milk, butter and cheese, the worst problems seem to come from manufacturing processes involved in fat removal and pasteurization. The ingredient casein is a fractionated milk protein product with elevated methionine levels and extremely low levels of the amino acid cysteine. This stimulates the body to make cysteine through the toxic intermediary homocysteine, worsening any effects of metal toxicity.

To avoid toxic metal buildup, we must avoid processed foods. Processed foods contain many unwanted metals. Sodium aluminum phosphate, for example, is used as an emulsifier in processed cheese and potassium alum is used to bleach flour. Alum is also a “spice” in commercial pickles. Cadmium is used as plating material in food processing plants. Processed foods and drinks also contain chloride, fluoride, aluminum and other harmful compounds from municipal water supplies, not to mention the remains of excreted pharmaceutical drugs. Processed foods also remove protective zinc and calcium in the refining process, making people more vulnerable to the toxic effects of cadmium, which is not removed during the milling process.

To make matters worse, many processed food products are packaged in aluminum foil. Take-out items can “take out” our health because of aluminum containers. Beer and soft drink cans come from aluminum. Solders used to seal some cans are a common source of cadmium.

Fruits, vegetables, beans and grains should be organic. Rice and wheat grown in soil contaminated by sewage sludge or super phosphate fertilizers may be toxic in cadmium.

Commercial seeds are treated with mercurial fungicides. Antioxidants from fresh, locally produced foods, that have not been sitting around oxidizing for weeks or months, can help to minimize the oxidation and solubility of the toxic metals.

Chlorella is widely sold as a “green drink” or supplement to health-conscious individuals trying to detoxify mercury and other metals. The chemistry may support the claims. These are known as porphyrin-like products because once the healthy magnesium of the chlorophyll is assimilated, a porphyrin-like ring is left to bind and help neutralize and eliminate metal toxins. Blue-green algae, spirulina, chlorella, and barley greens are similarly sold as “superfoods.” On the downside, these greens may contain analogues of B₁₂ that worsen cases of B₁₂ deficiency, putting people at risk for accumulating higher homocysteine levels. So if you use these products, be sure to eat organic liver as well.

Finally, it is important to drink clean water. Tap water typically contains aluminum, fluoride, chlorine—not to mention pharmaceutical drug residue and other contaminants. In some parts of the country well water is contaminated with lead or other metals, and nitrates and other chemicals from fertilizers.

LABORATORY ASSESSMENT

Hair mineral analysis offers a valid and inexpensive way to test someone’s toxic metal status, as well as provide insights into nutritional status. The growing hair follicle is well supplied by the blood vessels, and blood transports both essential and toxic elements present in the body. These elements are incorporated and stored in the hair proteins, which are evaluated in the test. Hair tests can evaluate someone’s toxic metal and nutritional status over the past three months.^{47,48} Analytical Research Laboratory (ARL) in Phoenix and Biochemical Laboratories in Edgewood, New Mexico are labs with good experience in hair testing, although there are many other good labs around the country.

The downside to hair analysis is that laboratory reports can be difficult to read and evaluate correctly, and there is some controversy about how to do the assays and what constitutes normal ranges of toxins and nutrients. In most cases, the first test will show low levels of toxic metals. Aluminum typically shows up in the first test, sometimes with low levels of mercury and arsenic. However, to correctly interpret the test, it is necessary to look at the overall levels and ratios of macro and trace minerals. In all probability, there will be evidence of “hidden” toxicity. This means that the body in its wisdom has stashed mercury and other very dangerous metals as deeply out of the way as possible.⁴⁹

If a client follows the first hair test with an effective detoxification program, follow-up hair tests will typically reveal not only higher levels of the metals present in the initial analysis but also the emergence of other, more deeply buried ones, such as cadmium and lead.⁵⁰

Cadmium and lead rarely show up on the first hair mineral test because the body binds them very tightly and keeps them deeply stored in the liver, joints and bones. For example, ionized elements that are nearly the same size as calcium (e.g., some radioactive elements) and magnesium (e.g., nickel) often are found in the bone where they can poison and damage the stem-cell-producing bone marrow. Often clients require months on a detoxification program before they begin excreting cadmium and lead. Lead may take as long as a year or more to show up. Making matters more complicated, lead might show

up in the hair after release from one storage site, decline on a subsequent test but later rise again as it is released from yet another site. For these reasons, hair mineral analysis testing needs to be performed as an ongoing process.⁵¹

Nickel is a growing problem because of partially hydrogenated fats in the “Standard American Diet,” the popularity of nickel-containing jewelry and the widespread usage of stainless steel in the processing of foods, beverages and pharmaceuticals. Unfortunately, nickel rarely shows up in hair even when present at toxic levels elsewhere in the body. For nickel, it is better to analyze sweat, which is one way the body attempts to get rid of this carcinogenic metal. (The other way is excretion via the bowels.) Nickel also causes hyperviscous and hypocoagulable blood so a clotting profile of the blood analyzed by a Sonoclot™ or similar diagnostic is another useful test. Nickel toxicity should be suspected if there are symptoms such as tiny blisters or reddish rashes where nickel touches the skin (as with eyeglasses or jewelry) or at sites of sweating (such as the palms of the hand, hairline, or feet). In addition to “sensitizing dermatitis,” stubborn symptoms that might be the result of nickel toxicity include allergic asthma, acid reflux, insomnia and snoring.⁵²

Another shortcoming with hair tests is that gold, silver, uranium and other metals usually are not included as part of most laboratories’ standard hair tests. Luckily, the same detoxification programs that round up and remove the usual toxic metal suspects will usually help to eliminate or deal with these others as well.

The biggest problem with hair tests is not the test itself but the fact that far too many people—including doctors and other health practitioners—misread the initial hair tests and take the low levels in the initial readings at face value.

Conventional doctors prefer blood tests to determine metal toxicity. Such tests have little diagnostic value unless they follow recent acute exposure because the body keeps the blood clean at all costs.⁵³ Urine samples aren’t much better unless potentially dangerous systemic, oral or intravenous chelating agents are given, followed by a 24-hour collection. In such tests, mercury or another metal is “provoked” out of the tissues

and organs and attaches itself to the chelating agent, which is then expelled through the urine or feces. As discussed below, this causes a toxic rush into the bloodstream that can result in painful and difficult detoxification symptoms with a possible worsening of overall health—and sometimes even death.

A better urine test to identify metal and environmental toxicity is a porphyrins profile such as the one offered by Metametrix Laboratory. The porphyrin metabolic pathway is responsible for the formation of hemoglobin and other energy-producing compounds, as well as molecules essential for detoxification. Toxic metals and chemicals present in the body interrupt this pathway, producing specific porphyrins, which become elevated in the urine. This test can differentiate specific toxic metal exposure and potential biochemical damage caused by that exposure. The test can help clinicians evaluate the effects of mercury amalgam fillings, the wanted and unwanted effects of chelation therapy and the toxicity of certain pharmaceutical drugs.^{54,55}

For newborns, meconium analysis can detect fetal exposure to lead, mercury, cadmium and other toxic metals, DDT and pesticide exposure as well as alcohol, tobacco use and illicit drug use. Meconium is the greenish mix of bile, amniotic fluid, bile pigments, epithelial cells, mucus, blood and other substances found in the first stool of a newborn. Meconium testing is offered at many hospitals but commonly used only when cocaine or other maternal illegal drug use is suspected.^{56,57}

A DIRT CHEAP SOLUTION

Until we can clean up the planet and our act, we fortunately do have a “dirt cheap,” stop-gap way of coping with metal toxicity. That solution is diatomaceous earth. Dr. Knight has extensively tested a product produced by Perma-Guard that is also available through WisdomWays in Edgewood, Colorado.⁵⁸ Diatomaceous earth comes from fossilized shells of freshwater diatoms and is found in vast deposits all over the earth. Made up of silicone and trace minerals, diatomaceous earth can, according to the scientific literature, absorb methyl mercury, *E. coli*, endotoxins, viruses (including poliovirus), organophosphate pesticide residues, drug residue, and protein, perhaps even the proteinaceous toxins produced by some intestinal infections.^{59,60}

The only caveat is that diatomaceous earth used for human or animal detoxification must be food grade. People and other mammals should never use the coarse, crystalline form of diatomaceous earth sold for use in swimming pool filters or as insecticides, or sources of diatomaceous earth contaminated with toxins like arsenic and the metal toxins. If inhaled, the crystalline form can cause a disabling lung disease called silicosis and upon ingestion might puncture the lining of the alimentary tract. Food-grade diatomaceous earth binds metals and other toxins, gently siphoning or leaching them out of storage areas and passing them innocuously out of the body.⁶¹

Microscopic live cell analyses of blood taken from individuals who have detoxed using food-grade diatomaceous earth for many months display little evidence that the particles make their way intact into the blood. Hair analyses of these individuals display normal or even slightly

low amounts of silica. This evidence, combined with a very low trace and toxic mineral content (usually in parts per million), supports the concept that diatomaceous earth works by removing toxins that poison the immune and regulatory functions, rather than by adding trace minerals that support these processes.⁶²

To detoxify with diatomaceous earth, dissolve less than one teaspoon to one tablespoon for every 100 pounds of body weight in a glass of pure water and drink before bed over a period of months or years. Taken this way, its metal-binding capacity is unlikely to hinder the absorption of needed minerals such as calcium, magnesium and zinc, which we take in from our food at mealtimes or from supplements during the day.

Moderation and patience is advised, as taking more than one tablespoon can create some very uncomfortable side effects. An overeager dentist, for example, took an estimated 12 tablespoons overnight in a foolish attempt to quickly rid his body of years of accumulated mercury. He may have let go of some quicksilver all right, but he also developed a bad case of bowel inflammation that mimicked constipation so completely that he feared his gut was turning into concrete!

Even at low levels of under one teaspoon per day, detoxification may trigger the discomfort known as a “healing crisis.” This discomfort may be nothing more than inflammation caused by a reawakening immune system as it detoxifies and begins to attack previously unaddressed chronic infections and/or stores of toxic metals. Increasing the amount slowly from less than one teaspoon to a rounded tablespoon over a few days or weeks may help to avoid this situation. One does want to remove the toxins as fast as the body wants to release them, however, and as much as two percent dry weight in the diet or about a tablespoon per 100 pounds is appropriate if the body weight is not outrageous. Even so, individuals suffering from perforations of the alimentary tract (such as bleeding ulcers, colitis, leaky gut syndrome and advanced lupus) *always* should exercise caution and use diatomaceous earth only under the care of a doctor or other health practitioner.⁶³

Many health practitioners report good results with other dirties such as bentonite clay and zeolites, as well as assorted mineral toddies, colloidal mineral products, “magnetic” clays and other allegedly miraculous down-and-dirty cure-alls. Typically, these are advertised as offering many benefits without adverse effects. Many may work as advertised. However, anecdotal evidence and our own personal experience indicate that some cause diarrhea and other alimentary tract disturbances. We haven’t come close to testing all of them, but hair mineral analysis tests on people who have regularly taken some of these products have indicated major imbalances of macro and trace minerals and unexpectedly high levels of some toxic metals, especially aluminum. Although presence of the latter might indicate that removal is underway, the other out-of-whack ratios point to a body out of homeostasis and struggling with the detoxification process.

Purity may also be an issue. There are more than 200 types of bentonite clay, most of which have an aluminum content of anywhere from 15 to 75 percent, and some products in the marketplace have been manufactured with harmful, commercial emulsifiers. Zeolites are hydrated aluminosilicate minerals from a family of microporous solids known as

“molecular sieves” that supposedly can selectively sort molecules on the basis of size. More than 150 naturally occurring types exist, most of which are not pure and are contaminated to varying degrees by other minerals, metals and quartz, as well as the aluminum.

Many of these detox products are advertised as having the ability to get inside bodily cells. While patented “nanotechnology” or whatever to accomplish this might sound like a “plus value,” we must ask about untold and as yet unknown effects upon mineral and energy metabolism, such as pulling toxins *into* the cells and body rather than out of them. These concerns may eventually prove unfounded, but for now we are sticking with the proven safety of diatomaceous earth.

The only thing better might be diatomaceous earth combined with inositol as in the product ToxiClenz from WisdomWays.⁶⁴ Yes, inositol is the core of phytate, an antinutrient found in grains, beans and soy, among other plant foods. And, yes, the Weston A. Price Foundation has been very active in warning people about the need to properly soak and prepare these foods in order to inactivate phytate so it will not interfere with absorption of calcium, zinc and other minerals. After all, people in third world countries (who eat plant-based diets out of necessity) as well as people in developed countries (who favor them for alleged health benefits or because of vegetarianism beliefs), often develop serious phytate-induced mineral deficiencies. On the plus side, phytate-containing products such as unleavened breads or coarse porridges have been used in many cultures to detoxify, though usually only on a once per year basis.⁶⁵

Given our toxic world and the toxic loads of those in health crisis, we may need to use this type of product more often, since the hexaphosphate ringed inositol can bind up and help to neutralize the metal toxins, perhaps even helping to transport them to the diatomaceous earth for elimination. To minimize damage and maximize benefit, take care to include optimum levels of minerals through a nourishing traditional diet combined with a program of laboratory testing to determine and monitor appropriate nutritional mineral supplementation.

CHELATION THERAPY; NEITHER NATURAL NOR WISE

Chelation is a process by which toxic metals, such as mercury and lead, are bound to a chelating agent (a chemical that chelates or “grabs on” to them) and then are eliminated from the body. In theory, once the metals are removed, they can no longer exert their toxic effects and the individual’s health improves. In practice, the results of oral, intravenous or other routes of chelation with agents such as EDTA (ethylene diamine tetraacetic acid), DMSA (dimercaprosuccinic acid, also known as succimer), DMPS (dimercaptopropanesulfonic acid) and penicillimine are far from safe.

The body in its wisdom sequesters toxic metals as far away from vital functions as possible. It is therefore not wise to “provoke” the body to rapidly dump mercury, lead and other toxic metals out of their hidey holes deep within the cells and tissues. As the metals enter the blood stream to be passed out of the body in urine or bile, they can damage brain and nervous tissue, depress immunity and disrupt other needed bodily functions.¹

There’s nothing natural about intravenous chelating agents. They are drugs, drugs that were initially developed by and for the military to treat acute mercury, lead and other poisonings of World War II army and navy personnel.^{2,3} Their use for the removal of chronic levels of toxic metals is off label and controversial.

Although some physicians and parents report stunning success, chelation treatments are risky, especially to autistic and other highly vulnerable children and to extremely toxic adults. Following chelation therapy, many autistic children have shown seriously weakened immune systems, extreme fatigue, bowel disturbances such as diarrhea and flatulence, and a marked worsening of gut flora.^{4,5}

Some patients show improvement in autistic symptoms initially, but regress soon after, as chelation therapy does nothing to support or heal the body’s own detoxification pathways. Indeed, chelation drugs have the potential to radically alter the homeostasis of all our biochemical pathways that involve sulfur chemistry. DMSA is an analogue of many intermediates in the Krebs or citric acid cycle, a central pathway for the metabolism of fats, carbohydrates, and amino acids. Penicillamine is structurally similar to vitaletheine, cysteine, cystamine and beta-aletheine, all of which have vital roles in immune and other functions. DMPS is an analogue of dihydrolipoic acid, a powerful antioxidant vital to mitochondrial health, and to fat metabolism and other cellular processes.

Chelation therapy can lead to hypocalcemia, a severe lowering of blood calcium levels with disastrous effects upon humoral immunity.⁶ We also have reports of comas and blood cell rupturing due to chelation therapy. The FDA now requires that the chelator EDTA include calcium salts to prevent the death of humoral immunity.⁷

Several deaths have occurred because of a medication error involving a “look-alike, sound-alike substitution” drug. Instead of the chelating agent edetate disodium calcium (CaNa₂EDTA), which is used for treating lead or other heavy metal poisoning, the doctors used edetate disodium (Na₂EDTA), intended only for extreme and rare medical emergencies involving life-threatening excesses of calcium.^{8,9}

Even when chelation is done properly, doctors need to monitor their patients’ kidney and liver health and blood composition. Patients may show high levels of transaminases, enzymes in the blood that indicate liver damage or neutropenia and thrombocytopenia from bone marrow suppression. Finally, chelation is contraindicated in people with kidney problems.¹⁰⁻¹² As with any drug therapy, some patients are more sensitive and vulnerable to damage than others.

Aggressive chelation can also seriously deplete needed metals such as zinc, magnesium, calcium, selenium, manganese, chromium, vanadium and molybdenum. As a result, chelation protocols generally recommend an extensive supplement regimen during the course of treatment.¹³

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A COMPLETE NUTRITIONAL THERAPY PROGRAM

To be truly effective, a detoxification program using diatomaceous earth must be part of a complete nutritional therapy program that includes:

- ♦ Removal of toxin sources from food, air, water and the environment as much as possible;
- ♦ A program to remove candida infections and other parasites;
- ♦ Enhancement of cellular energy production through optimum diet and supplements;
- ♦ Nourishment of the immune system;
- ♦ Support of eliminative organs, including skin, liver, kidneys, and bowels.

SOME CAUTIONS

Appropriate treatment regimens vary significantly from person to person, depending upon multiple dietary and lifestyle factors, specific medical conditions and the circumstances of exposure. One-size-fits-all regimens found in popular books and on internet sites may or may not work. Worse, they may pose dangers. It's far beyond the scope of this article to discuss the pros and cons of the myriad supplements and herbs singly and in combination that have been proposed as metal detoxifiers, but here are two examples of potential hazardous "natural remedies" that need attention.

First, megadoses of vitamin C can be counterproductive, though appropriate amounts of a natural vitamin C replete with its complementary bioflavonoid components are very much needed for effective detoxification.

Secondly, an unexpectedly dangerous compound to avoid is N-acetylcysteine (NAC), a high-priced product heavily recommended by alternative medical doctors and other health practitioners. NAC is a form of cysteine often recommended as a more powerful form of the much-needed amino acid L-cysteine or in lieu of glutathione, an antioxidant that is rarely effective in supplement form.⁶⁶ Although dozens of journal articles support its short-term use as immunity booster and detoxifier, evidence is mounting of potential long-term harm. The NAC form of cysteine conceivably can poison vitalethine, a vital component needed to activate humoral immunity.⁶⁷⁻⁶⁹

In brief, we cannot emphasize enough the importance of individualized treatment regimens based on laboratory assessment. While a Weston A. Price style diet plus diatomaceous earth is a safe and effective maintenance regimen for healthy people, those with major health problems or even minor challenges are best served by a custom tailored and comprehensive regimen.

MAKING WISE POLITICIANS

In conclusion, we propose to treat the cause and not just the symptoms of heavy metal toxicity. To wit, this election year, we vote for detoxification with diatomaceous earth for politicians as well as all those in elective and appointed offices, including judges, police officers and FDA officials.

If candidates were required by law to be free of mercury, cadmium, lead and other metal toxicities that affect their mental capacities, we could have more confidence in their leadership and appropriate use of power. Sanity regarding environmental and dietary exposure to toxic metals would, could and should become an inalienable right.

At the very least, it would be great to have an election where candidates avow to get the "dirt into" themselves and not dish "dirt on" their opponents! 

ABOUT THE AUTHORS

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Galen D. Knight, PhD, is a biochemist who has carried out pioneering research on the role of vitalethine in humoral immunity and cancer development. To learn more about his work, visit his website www.vitaletherapeutics.com, E-mail him at galenvtp@highfiber.org or call 505-884-8644.

On February 19, 2008, Dr. Daniel and Dr Knight joined Sally Fallon, Mary Enig PhD, and Kilmer McCully MD, in submitting a 65-page petition to the FDA in which we presented massive evidence as to why this "consumer protection agency" should retract its soy-prevents heart disease health claim.

Both authors will speak at Wise Traditions 2008 in San Francisco.

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