

## **TOXIC METALS, NEUROLOGICAL FUNCTION, AND MENTAL HEALTH**

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*{amended very slightly by Dr. Braun}*

The term "heavy metals" refers to elements of specific weight characteristics. Toxic heavy metals are, unfortunately, present in our air, water, soil, and food supply as a byproduct of our industrialized society. In fact, contamination is so pervasive in our environment that it is no longer a question of whether one has been exposed to toxins, but rather *the level* of exposure, and the source, so that it may be avoided.

People who have acute toxicity from heavy metals – such as lead, mercury, arsenic, and cadmium – may exhibit obvious and classical symptoms of poisoning. But toxicity from *chronic low-level* exposure is much more insidious in its presentation. Chronic low-level exposure can lead to a wide array of problems, ranging from *neuropsychiatric disturbances such as aggressive behavior, memory loss, depression, irritability, and learning deficits*, to physical manifestations such as *liver and kidney dysfunction, heart disease, fatigue, infertility, gout, hypertension, headache, chronic infections and candida (yeast) superinfections*, rashes, and so on.

Even though some minimal efforts are under way to curb the output of toxins and heavy metals into the environment, the problem is far from being resolved, and it appears to be worsening faster than any degree of resolution is "curbing". Today, in the United States, China and developing countries, thousands of tons of toxic industrial wastes, including heavy metals, are dumped into the environment every year. We are left with a legacy of years of industrial pollution and toxic substance use that haunts us to this day. *{Dr.B.: see the article on toxic waste as fertilizer.}* Perhaps the two most widespread and significant heavy metal toxins are mercury and lead.

### **LEAD**

It is estimated that about 64 million homes in the United States still contain lead paint and that 5 to 15 million of these have been identified as "very hazardous" by the U.S. Department of Housing and Urban Development. According to the EPA, an estimated 1.7 million children are currently affected by lead toxicity in United States, and almost 900,000 of all children affected are under the age of six. This statistic is very important because the symptoms of lead poisoning in children are strikingly similar to several psychiatric "diseases" which are on the rise in the U.S.

Children with high lead levels can exhibit lower IQ scores, learning disabilities, hyperactivity, aggressive or disruptive behavior, and difficulty maintaining attention. A child exhibiting this type of behavior today would likely be sent to a doctor's office, diagnosed with attention deficit disorder (ADD), and promptly started on Ritalin or other psychoactive drugs. Children with high lead levels are much more likely to drop out of school, have reading disabilities, and exhibit criminal behavior.

Herbert Needleman, M.D., a professor of psychiatry and pediatrics at the University of Pittsburgh, conducted a study of nearly 2,000 children in Boston. He found that girls with elevated levels of lead were more likely to be dependent, to be poor at concentration, and to "display an inflexible and inappropriate approach to tasks," while boys were more likely to have difficulty with simple directions and sequences of directions. Dr. Needleman concluded: *"...Our findings would appear to add to the weight of evidence that even a lower level of exposure to lead, or its correlates, place children at increased risk of difficulties in school."*

And of course, childhood exposure to lead can result in adverse effects well into adulthood. A study by Stokes, et. al., showed that a group of 281 young adults who had been exposed to lead as children showed significant adverse neurobehavioral effects 20 years after environmental exposure. While lead has been eliminated from the nation's gasoline supply, the major source of contamination is lead-based paint, which was composed of up to 50% lead. Flakes and microscopic dust from the paint continue to contaminate homes for many years, and can be released in larger amounts during renovations. Additional sources of lead include water pipes, pesticides, factory emissions, cosmetics, and some folk remedies.

*{Dr. B.: tetra-ethyl-lead was added to gasoline in 1926, not removed until 1986, and in the interim contaminated the ground via rain, so that fruits and vegetables, and grazing grasses are now found to be*

*contaminated with toxic levels of lead - and other toxic metals. Sustainable methods of agriculture may reduce this uptake by the plants, but will not eliminate it. Commercial edibles have been shown in several studies to contain more heavy metals than organic edibles - despite claims of the commercial growers to the contrary.}*

Lead can be absorbed through the gastrointestinal tract and also inhaled as small particles. Chronic exposure to lead can result in significant accumulation in the brain, soft tissue, and bones. Lead that has accumulated in the skeleton can remain there for many years, releasing lead slowly back into the bloodstream over an extended period of time. In bones it is related to the epidemic of osteoporosis.

In addition to being a cellular toxin, lead competes with calcium in the body, which can cause various malfunctions in calcium metabolism. First lead blocks the action of Vitamin D in the bones and leads to loss of calcium - osteoporosis - in both men and women. One study in 2007 found that the average person has 400 times the lead in the bones as was there in 1900 (from study of skeletons in graves) another study found 783 times as much. And worse, the major medical journals in *early 2003* repeatedly stressed that bone levels of lead today are *1000 times* that of only 100 years ago. Each of us has at least 400 times the 1900 level and some have 1000 times the level.

The calcium-lead interference creates a release and blockade of calcium channels and thus a decrease in the chemicals that relay messages along nerve cells-- neurotransmitters. The central nervous system appears to be affected to a great degree by lead toxicity, and this can explain the many neuropsychiatric symptoms associated with exposure to this heavy metal.

**NEUROPSYCHIATRIC SYMPTOMS OF CHRONIC LEAD EXPOSURE INCLUDE:**

Headaches Insomnia Poor memory Inability to concentrate Attention deficit Aberrant behavior	Temper Tantrums Fearfulness Irritability Lowered IQ Difficulty with the reading, writing, language, visual and motor skills
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Why are some people more susceptible to heavy metal toxicity than others? One must always remember that each individual has a unique physiology, and may have an inherently strong or weak detoxification system to handle heavy metal exposure. But even those born with perfect detoxification systems may suffer damage with one excessive load of pollution and even gradual damage is cumulative, so that one born normal, can become ill and toxic. In addition, poor nutrition, such as iron or calcium deficiency, has been shown to exacerbate the symptoms of lead exposure. Most children today have poor nutrition, as do their parents.

Lead should be removed by IV CaEDTA chelation.

**MERCURY**

Mercury is considered by the EPA (environmental protection agency) and many scientists to be even more toxic than lead. Although mercury is poorly absorbed from the gastrointestinal tract, *{Dr. B.: until it is changed by the bowel bacteria!}* mercury vapor is easily taken in through the lungs and readily passes into the brain. Once in the body, mercury also concentrates in the nerves, liver, and especially the kidneys. Mercury is a potent cellular toxin and is known to decrease neurotransmitter production, disrupt important processes within the nerve cells, and decrease important hormones such as thyroid, corticoids from the adrenals and testosterone.

"Silver" amalgam fillings are the major source of inorganic (inorganic means that it does not contain carbon) mercury exposure in humans, while seafood and fish constitute our largest exposure to organic mercury compounds. Amalgam fillings actually contain 50%-to-52% metallic mercury, and they continuously release mercury vapor during chewing, brushing, or when drinking hot beverages. Studies have shown that exhaled air of subjects with amalgam filling contains a significantly higher level of

mercury than subjects without amalgams, and there is a direct correlation to the number of amalgam fillings and the level of mercury found in both blood and urine.

Although the presence of higher levels of mercury in people with amalgam fillings is not in dispute, there continues to be an intense debate regarding the health effects of this finding. While groups such as the FDA and the American Dental Association steadfastly maintain that amalgam fillings are safe, a growing number of physicians and researchers are convinced that mercury from amalgam fillings poses a significant health hazard.

In addition to amalgam fillings, common sources of mercury include sea food and fresh water fish, vaccines, pesticides, laxatives, batteries, paper and pulp products manufacturing, drinking water, dry wall plaster, cement, paint products, mildew inhibitors, forest fires, volcanoes, and lignite-coal-urning plants that generate electricity.

**NEUROPSYCHIATRIC SYMPTOMS ASSOCIATED WITH MERCURY TOXICITY INCLUDE:**

Headache	Drowsiness
Insomnia	Emotional instability
Nervousness	Depression
Hallucinations	Poor cognitive function
Memory loss	Anxiety
Dizziness	Irritability

**DIAGNOSIS OF HEAVY METAL TOXICITY**

The diagnosis of heavy metal toxicity must take into account the exposure history, clinical signs and symptoms, and laboratory tests. While the CDC (Center for Disease Control) has steadily dropped the "allowable level" of lead in the blood over the last fifteen years, and continues to do so in 2008, there *remains a problem with using blood levels in the first place*. Blood levels do not accurately reflect the total body burden of toxic metals. High blood levels are usually only found in *acute toxic metal exposure*, or in people exposed to *high levels of toxins over a long period of time*, in after a 5 day work week in a toxic environment that is clear in the blood and urine by 2 days away from the exposure site. So in chronic low level exposure the blood levels may actually be low due to gradual and daily redistribution of the toxins throughout the body, while bone and other tissue levels increase daily and remain high.

Hair analysis is another method of determining toxin exposure that is popular with many clinicians. Hair **can be** a good indicator of exposure because it grows slowly and incorporates toxic metals into its structure over a long period of time, and therefore may be a better measure of actual tissue levels. There are arguments over the accuracy of hair analysis due to the possibility of contamination from hair dyes, shampoo, and other factors: however, this is easy to assess by simple questions and all labs do tests and use chemical free washes before assaying! The lead in Grecian formula does stay in the hair. Selenium from Selsun-Blue and other dandruff shampoos is retained in the hair.

The problem with hair is that a **low level in the hair has little significance**, as the most ill people are not able to excrete it into the hair. This has been shown by autistic children and by adults with Alzheimer's disease. They may start with low or minimal levels and as they get well, they do excrete large amounts into the hair. Sometimes the level appears so alarming one would think a massive new exposure had occurred.

A more accurate method for evaluating toxic metal burden is to do a urine and stool challenge test with a "chelating" agent. Chelating agents bind to heavy metals throughout the body, and then are excreted in the urine and stool, taking the heavy metals with them. In the challenge test, a chelating agent is administered and then urine and stool are collected and analyzed to determine the amount and type of toxic metals that are excreted.

### TREATMENT

There are many different protocols used for heavy metal detoxification, and several different chelating agents. Information on detoxification protocols and testing will follow. The good news is that effective treatments are available for heavy metal toxicity. Suffice it to say for now, that DMPS has been safely used in Europe for massive and life threatening mercury exposure, and is so used in the US even without FDA official sanction. While DMSA, an FDA-approved chelating agent, seems useful in cases of mercury exposure (it is also approved for lead toxicity in children), expert opinions now suggest that it interferes with energy production in the mitochondrial and DMPS is actually to be Preferred. <sup>[1]</sup> EDTA is particularly useful for lead toxicity. EDTA also shows great levels of mercury in the urine and stool, contrary to the doctrines of the 1930's, but it is felt this is NOT bound by EDTA, but by the vitamin C given in the same IV. Vitamin C is a weak chelator of mercury and can be expected to “drop” the mercury before it is chelated, thus pose the risk of body residual mercury. It should be noted that both of these agents remove other toxic metals in addition to lead and mercury.

### SUMMARY

Toxic heavy metals are found in the air we breathe, the food we eat, and the houses we live in. Toxic metal exposure can result in a wide array of common mental health disorders that can mimic many psychiatric “diseases” and thus lead to psychoactive prescription drug use or other unnecessary treatments. Unfortunately, the majority of clinicians dealing with patients who have mental health issues are *unlikely to suspect* heavy metal toxicity as a cause of their patient’s problems due to a general lack of knowledge of this subject in the medical community. Unique biochemical, genetic, and nutritional factors can make certain people more susceptible to the effects of toxic heavy metals, thus each case must be handled on an individual basis. Fortunately, the number of professionals trained in “functional” or “orthomolecular” medicine is on the rise, and these doctors are very familiar with the diagnosis and treatment of problems associated with heavy metal toxicity.

End notes:

[1] See Gary Gordon / Buttar paper.