

# TerranearPMC Safety Share

## Week of March 21, 2016– Chelation Therapy

I doubt that there isn't a single person in the country that has not heard about the lead contamination problems in Flint Michigan. The cause for this concern was due to a decision to switch the water supply, which caused corrosion to the water pipes that supply water to the local residents. This, in turn, resulted in lead, of which the underground plumbing was constructed, to dissolve into the water supply of homes where the local residents, including children, became susceptible to lead contamination. Once the lead pipes became damaged due to the poor water supply, the condition of the plumbing could not be reversed and now, the only option is to stop drinking water from the domestic supply and use bottled water until the plumbing (lead pipes) are removed.

The health effects associated with lead contamination are numerous. The most prevalent conditions for adults include high blood pressure, abdominal pain, constipation, joint and muscle pains, numbness or tingling of the extremities, headache, memory loss, mood disorders, and miscarriage or premature birth in pregnant women. For children, signs and symptoms may include many of the symptoms exhibited in adults plus developmental delay, learning difficulties, loss of appetite, sluggishness and fatigue and hearing loss. Of particular concern is slowed growth and learning difficulties which are the greatest concerns to women that are pregnant and have ingested lead-contaminated water.

While prevention is always the best option to avoid health hazards, in the case of Flint Michigan, contact with the tainted water supply was an issue before preventative measure could be applied. Therefore, at this point health agencies need to step in and determine how much lead has been ingested by the residents. The most common diagnoses to determine lead accumulation is through blood sampling. According to the Centers for Disease Control and Prevention (CDC), a reference level of 5 micrograms per deciliter (5  $\mu\text{g}/\text{dL}$ ) is used to identify children with elevated blood lead levels. This is based on the U.S. population of children ages 1-5 years who are in the highest 2.5% when tested for lead in their blood (*note: the occupational blood lead level per OSHA regulations 29 CFR 1910.1025 (General Industry) and 29 CFR 1926.62 (General Construction) is 50  $\mu\text{g}/\text{dL}$  for which workers need to be removed from lead-exposure activities*). Having these elevated blood-lead levels does not automatically mean that a child will suffer an adverse health effect; however there is a substantially higher risk of such a condition.

So when a person's blood test does indicate an elevated blood-lead concentration, how can one "get the lead out?" At this point, lead in the blood can now enter the various biological systems in the body including muscle tissue and organs. The most susceptible organs are the kidneys, liver and brain. Obviously lead must be removed. Holistic remedies include the use of some natural foods like cilantro and chlorella to naturally remove lead from the body. However, the traditional medical community neither supports nor opposes these assertions. Instead, the accepted medical approach to remove metals (such as lead) from the body involves the treatment of "chelators" [KEY-lay-ters]. These medicines bind to metals in the blood stream; this metal-chelator compound is then eliminated during urination. While chelators are valuable drugs, they have side effects which limit their use to severe conditions of heavy metal toxicity, especially those due to lead, mercury, arsenic, and iron.



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It was in 1893 when Alfred Werner proposed the theory of metal-ligand binding ("the pincer-like fashion"), which provided the foundation for modern chelation chemistry and development of treatment. This resulted in Alfred Werner being awarded the Noble Prize.

Chelation therapy was first used during the First World War by Great Britain to counteract exposures from arsenic-based poison gas. Armies used an organic sulfur compound which combined with arsenic in the bloodstream. However, the results were less than favorable as the treatment caused nephrotoxicity and hypertension, leading to the death of several soldiers.

It was in the 1930s, when the current popular chelating agent, EDTA, was used – not as a medical treatment – but as an industrial process in the textile business to remove calcium during the manufacturing process. EDTA (the actual chemical name is ethylene diamine tetraacetic acid) was first patented in Germany in 1935.

It was during the Second World War, that dimercaprol (also named British Anti-Lewisite or BAL), an organic dithiol (double-sulfur) compound, was developed as an experimental antidote against the arsenic-based poison gas Lewisite. After World War II, mass lead poisoning was observed in large number of navy personnel due to their jobs of repainting the hulls of ships. This introduced the medical use of EDTA as a lead chelating agent.

Today, EDTA is a prescription medicine, given by injection into the vein (intravenously) or into the muscle (intramuscularly), to treat lead poisoning and brain damage caused by lead poisoning as well as poisonings of radioactive materials such as plutonium, thorium, uranium, and strontium. EDTA has also been used to remove copper in patients with Wilson's disease and for treating high levels of calcium.

In addition to EDTA, there are a host of other chelating agents and include succimer, dimercaprol (BAL), edetate calcium disodium, deferoxamine, and penicillamine. But while these materials can provide valuable medical treatment, they may have serious side effects as they are non-specific in which metals they may bind and therefore can bind to essential "trace" metals in the body, such as copper and zinc. This includes calcium, which can cause symptoms similar to those related to their deficiency. Unfortunately, there are even cases where children have succumbed to myocardial (heart muscle) necrosis (tissue death) leading to brain death, resulting from low blood calcium from the administration of chelation therapy. This is alarming as it is the children of Flint, Michigan, where the health concern due to lead ingestion remains highest.

In 2007, the National Center for Health Statistics reported that 111,000 adults said they used chelation therapy, along with 72,000 children under the age of 18. If chelation therapy is the only treatment for the people of Flint, and possibly other communities across the country, it seems apparent that rather than relying on such medicinal care, maintaining our water supply within healthful limits should be a national priority.

**All life is an experiment. The more experiments you make the better.**

Ralph Waldo Emerson

