

## Guidance on Treatment of Lead Toxicity:

Recommendations from the Michigan Regional Poison Control Center with updates from the Michigan Department of Health and Human Services 4/4/16

Lead toxicity occurs from the ingestion and inhalation of lead, not from skin exposure. Children less than six years old are particularly at risk when the exposure comes from ingestion because they absorb far more swallowed lead than older children and adults, and the younger brain and nervous systems are still developing. Lead may be found in specific places around the home, and children can get elevated blood lead levels from ingesting lead from multiple sources at the same time. Lead can be found in the water from water faucets, older pipes containing lead, and lead solder used in older plumbing. Lead is found in the soil and dusts around homes, especially around homes with lead-containing paint that chipped or was sanded off, and in soils near highways from leaded gas used before the 1990s. Industrial sources, such as metal smelters, have also added lead to soil. Paint contained lead until 1978 and, unless leaded paint has been removed safely or encapsulated from older homes, the lead from a single paint chip is enough to poison a small child. Other sources of lead include ceramics and paint pigments from toys; usually inexpensive ones made in other countries. People who are exposed to lead at work, cast lead bullets, or shoot at ranges can contaminate their homes or cars from bringing home lead dust on their shoes or clothes, leading to exposure in family members. Certain medications, Ayurvedic and folk remedies, and spices from other countries can contain large amounts of lead (e.g., "Lozeena", "Azarcon", and "Jin Bu Huan").

When a child is at risk, a blood sample is obtained to measure the blood lead level. Lead screening can be done by a blood sample from the fingertip. The blood lead result from a finger stick is not reliable and should only be used to indicate that a blood sample from the brachial vein (venous sample) is needed when the level is equal or greater than 5 micrograms per deciliter (mcg/dL).

Lead has no benefit in the body, and the goal is for all blood lead tests to have non-detectable results. The NHANES report annually reviews and quantifies environmental contaminants within the US population. Based on the 97.5% percentile of children less than six years of age, in 2012, the action level for lead of 5 mcg/dl adopted by the Centers for Disease Control and Prevention (CDC) based on recommendations from its Advisory Committee. Previously, 10 mcg/dL was defined as the "level of concern". These recommendations were based on studies documenting behavioral effects at BLLs less than 10 mcg/dL, including attention-related behaviors and academic achievement, and newer studies suggesting that adverse health effects extend beyond cognitive function to include cardiovascular, immunological, and endocrine effects. Children with lead levels above 45 mcg/dL are at particular risk for a number of neurological problems, and levels greater than 70 mcg/dL can lead to coma, seizures and death.

The Michigan Department of Health and Human Services recommends blood lead testing, treatment and environmental assessment for children based on guidance from the American Academy of Pediatrics and the CDC.

(See [http://www.michigan.gov/documents/lead/ProviderQuickReference\\_Sept2015\\_501803\\_7.pdf](http://www.michigan.gov/documents/lead/ProviderQuickReference_Sept2015_501803_7.pdf))

The action level for lead in blood in Michigan is 5 mcg/dL. If the test was a capillary test, the child should be retested with a venous draw. If the confirmatory test is 5 mcg/dL or greater, this means that the child is in an environment where there is lead exposure. The child's caregiver will need education on how to reduce lead in the environment, and the home should be inspected for lead exposure sources. The best treatment of elevated lead levels is to remove the sources of lead. Diet is an important tool in combating lead exposure, particularly for at-risk children. The child should be encouraged to eat foods with calcium, iron and vitamin C. Many children need iron supplementation so a multivitamin with iron may be recommended by a healthcare provider.

### Recommendations for testing and treatment are as follows:

- For levels between 5 and 14 mcg/dL, the child's lead level should be repeated in one to three months to ensure the BLL is not rising. The home should be checked and cleaned.
- For lead levels between 15 and 44 mcg/dL, the lead level should be repeated every month until levels are less than 15, and then repeated every 1-3 months until levels are less than 5. The home must be inspected and all sources of lead should be removed.
- At a lead level of 45 mcg/dL or higher, the provider should consider chelation to remove lead from the blood. Contact the Poison Center (800-222-1222) to discuss this on a case-by-case basis. Providers should consider an abdominal X-Ray looking for a potential lead source, such as paint chips.
- For all levels of 5 mcg/dl or greater, caregivers should be given educational materials on nutrition and safe cleaning. Referrals to the local health department or Medicaid Health Plan should be made for in-home nursing case management and environmental investigation.

Since the pills (Chemet™) used for chelation can make lead poisoning worse if the child is still exposed to lead while taking the medication, a child who needs to be chelated will be admitted to the hospital. The house must be checked and cleared before the child can safely return to the home, and siblings and pregnant women should also be checked for lead.

Chelation is **not** appropriate for children with lead levels **below 45 mcg/dL**. Chelation has side effects and it should not be done unless there is clear evidence to show that it is effective. Chelation for lead levels less than 45 mcg/dL has not been shown to prevent or reduce the developmental, cognitive and behavioral changes associated with lead poisoning. For lead levels less than 45 mcg/dL, studies show removing the lead from the child's environment has the same effect as treating with medication and is far safer.

Parents are advised not to use over-the-counter medications such as Thorne Research's Captomer or Captomer-250, which are dietary supplements sold to reduce or detoxify heavy metal (lead) contamination. Additionally, parents should also avoid practitioners outside of established hospital facilities who advertise that they can remove the lead from the child's body with various medications. These medications are only approved for children's lead levels greater than 45 mcg/dL. The medications can be dangerous if not used under a physician's guidance and they are a waste of money. Chelators can

cause damage to the kidney and liver and in some people they can cause the red blood cells to break apart. They also can remove nutrients in a child's body that are essential to the child's normal growth and development.

Adults with lead exposures may also have health effects at lower blood lead levels. Medical guidelines for screening and treatment of adults have been developed by the Council for State and Territorial Epidemiologists and Association of Occupational and Environmental Clinics, and are posted under the healthcare provider tab at [www.michigan.gov/flintwater](http://www.michigan.gov/flintwater) or at [www.cdc.gov/niosh/topics/ables](http://www.cdc.gov/niosh/topics/ables). Chelation in adults is not considered below blood leads of 50 mcg/dl. The Michigan Poison Control Center does not recommend chelating adults until the level is > 70 mcg/dL **and** the person has symptoms such as nerve damage resulting in wrist or ankle drop, lead colic (severe abdominal pain not referable to another diagnosis), severe lead related anemia or kidney damage, trying to or inability to become pregnant (male or female partners), and changes in the person's neurological status such as coma or seizures. Chelation in adults for lead levels less than 50 mcg/dL has not been shown to prevent or reduce the neurological, cardiovascular or kidney effects that have been reported in adults with lower blood lead levels. The Poison Control Center will chelate at lower levels if there is evidence of end organ toxicity or pregnancy. Pregnant women with elevated blood lead levels are at high risk because of the developing fetus and need to be followed by their obstetrician in conjunction with a medical toxicologist.

### Summary: Screening and Treatment of Children

1. Screening capillary blood test equal to or greater than 5 mcg/dL: Confirm with venous sample
2. Confirmed test 5-14 mcg/dL: Retest within 1-3 months. Collect environmental history; provide nutritional counseling, refer for case management and environmental assessment.
3. BLL 15-44 mcg/dL: Retest monthly until levels are less than 15, then repeat every 1-3 months until levels are less than 5. Home requires inspection and dietary changes need to be made. Refer to the local health department or Medicaid Health Plan for in-home nursing case management and environmental investigation. Child is at high risk
4. BLL equal to or greater than 45 mcg/dL: Child requires evaluation and treatment at a specialized center treating lead poisoned children. Home requires inspection, and child cannot return to the home until it is considered safe. Contact the Michigan Poison Center (800-222-1222) for guidance.

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