BLOOD LEAD TEST AND ANTICIPATORY GUIDANCE

RATIONALE

No level of lead (Pb) in the body is recognized as safe. Lead toxicity is associated with impaired cognitive, motor, behavioral, and physical abilities. In 2012, the Centers for Disease Control and Prevention (CDC) recognized a risk of neurodevelopmental sequelae at blood lead levels (BLLs) below 5 micrograms of lead per deciliter of blood (mcg/dL) and replaced the former blood lead "level of concern" (10 mcg/dL) with a "reference level" of 5 mcg/dL.[1]

The Childhood Lead Poisoning Prevention Branch (CLPPB) of the California Department of Public Health (CDPH) is more protective in defining increased lead exposure. It interprets the reference level to include all BLLs equal to or greater than 4.5 mcg/dL.*

Lead is a common environmental contaminant present in all areas of the United States, and all children are at risk for lead's toxic effects. Within the United States approximately half a million children ages 1-5 years have blood lead levels greater than 5 mcg/dL.[2] Lead exposure is one of the most common and preventable environmental diseases among California children.

Many common items are associated with lead poisoning, either as the primary source or as part of the child's cumulative exposure. Some of these have received a good deal of public attention. However, exposure to deteriorated lead-based paint and lead-contaminated dust and soil remain the major causes of childhood lead poisoning in California.

Drinking water can contain lead, although it has not been found to be a major source of lead exposure in our state. Other sources of lead include occupational and "take-home exposure." Workers (including teens) can be exposed on the job and can bring lead home on their skin, clothes, shoes, and vehicles. Lead can readily pass to the fetus in utero, and to a lesser extent, through breast milk.

High levels of lead have been found in many consumer products. It is the primary component of leaded fishing sinkers and bullets. Lead has been found in some: jewelry; toys; water dispensers; old, handmade, or imported pottery; imported food, including fried grasshoppers (chapulines); turmeric and other spices; and vinyl, especially if deteriorated. Lead has also been found in some: traditional remedies; Chinese and ayurvedic medicines; and substances applied to the skin (such as surma, kohl, and sindoor) for cosmetic, religious, or cultural reasons.

* CDPH CLPPB also does this for other BLLs reported in decimals, e.g. CLPPB interprets 9.5 mcg/dL to be equivalent to 10 mcg/dL and 14.5 mcg/dL to include 15 mcg/dL, etc.

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All children who are receiving services through Child Health and Disabilities Program (CHDP) and other publicly funded programs for low-income children, as well as children living or spending a lot of time in a place built before 1978 with deteriorated paint or recent renovation, are deemed to be at high risk of lead poisoning and, under California regulations, must be blood lead tested at one and two years of age.[3] Refugees and other children who have lived in or spent time in another country may also be at increased risk.[4] Although all children are at risk for lead exposure, poor and minority children are disproportionately affected. Lead exposure is at once a by-product of poverty and a contributor to the cycle that perpetuates and deepens the state of being poor.[5]

The only way to know if a child is lead poisoned is to order a BLL. Young children from six months to six years (particularly those at one and two years) are at greatest risk. Under California regulations[3] providers must give anticipatory guidance on lead poisoning prevention at each periodic health assessment from the age of six months up to 72 months. The provider must order BLLs at the ages of one and two years and whenever a child under six years is identified as having missed the required tests, a change in circumstances has put the child at risk, or if requested by the parent or guardian. Refugees must be screened upon arrival and at specified times thereafter.[4]

Once a child has become exposed to lead, it is crucial to identify and remove the sources of exposure. CLPPB and its local programs can help identify lead sources and collaborate in a treatment response, as well as provide educational materials and technical knowledge. There is a Childhood Lead Poisoning Prevention Program (CLPPP) in most counties and some cities. The local programs (or the CLPPB in counties without a local CLPPP) offer a range of supportive interventions for the family of a child or young adult up to the age of 21 years. For children with BLLs meeting eligibility criteria, these also include home visits by a Public Health Nurse (PHN) and investigations by an environmental professional. There is no charge to the family for these services; eligibility is based on BLLs, not income or insurance status.

SCREENING REQUIREMENTS

California Regulations Regarding Lead Assessment and Screening[3]

These apply to every primary health care provider in California (medical doctor or mid-level practitioner), whether in a public program or private practice.

- From the time the child begins to crawl until 72 months of age provide oral or written anticipatory guidance to a parent or guardian of the child, including, at a minimum, the information that children can be harmed by exposure to lead, especially deteriorating or disturbed lead-based paint and the dust from it, and are particularly at risk of lead poisoning. Perform this anticipatory guidance at each periodic health assessment, starting at 6 months of age and continuing until 72 months of age.

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- Order blood lead levels at both 12 and 24 months or at any time up to age 72 months if not done at the specified ages, if:

    - The child receives services from a publicly funded program for low-income children, such as CHDP, because the child is deemed to be at risk of lead poisoning.

    - The child does not receive services from a publicly funded program for low-income children, but a parent or guardian answers "yes" or "don't know" to the question, "Does your child live in, or spend a lot of time in, a place built before 1978 that has peeling or chipped paint or that has been recently renovated?" [The question is a minimum, based on the prevalence of lead in pre-1978 housing, which is the date lead was markedly restricted in residential paint. Other sources should be explored, as well.]

- Order a blood lead level at any time a change in circumstances has put the child at risk or if requested by the parent or guardian.

Early and Periodic Screening, Diagnostic, and Treatment (EPSDT) and Head Start

- Head Start programs must comply with California regulations[3] and the EPSDT requirements for lead screening.[7]

- The Centers for Medicare and Medicaid (CMS) require that all children eligible for Medicaid (Medi-Cal) receive a screening blood test at 12 months and 24 months of age.

- Children between the ages of 36 to 72 months must also have a screening blood test if a lead toxicity screening has not been previously conducted.

- For cases where a blood "finger stick" test result is equal to or greater than 5 mcg/dL, the result must be confirmed through a venous blood draw. [California practice is to include all BLLs equal to or greater than 4.5 mcg/dL in this requirement.]

CDC Recommendations for Post-Arrival Lead Screening of Refugees [4]

- Check the BLL of all refugee children six months to 16 years of age upon their arrival in the United States (generally within 90 days, preferably within 30 days of arrival).

- Within 3 to 6 months post resettlement, a follow-up blood lead test should be conducted on all refugee children aged 6 months to 6 years of age, regardless of the initial screening BLL result.

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- Malnourished children may be at increased risk for lead poisoning, likely through increased intestinal lead absorption mediated by micronutrient deficiencies.

- The best studied micronutrient deficiency related to lead levels is iron deficiency. Iron deficient children are at increased risk of developing lead poisoning.[8] Within 90 days of their arrival in the United States, children aged 6 months to 6 years of age should also undergo nutritional assessment and testing for hemoglobin or hematocrit levels with one or more of the following: mean corpuscular volume (MCV) with the red cell distribution width (RDW), ferritin, transferrin saturation, or reticulocyte hemoglobin content. A routine complete blood count with differential is recommended for all refugees following their arrival in the United States, and these red cell parameters are included in this testing.

- A daily multivitamin with iron should be ordered for all refugee children aged six months to six years of age.

Blood Lead Testing

- The type of draw for a BLL is crucial and should be specified on the requisition and report (as well as the child's name, address, telephone, birthdate, gender, employment information if applicable, and the provider's contact information). Both venous and capillary blood samples are acceptable for initial lead screening. Arterial or umbilical line specimens are as reliable as venous ones and may be used whenever a reference is made to a "venous" specimen. Use of a heel stick instead of a finger stick to obtain a capillary specimen is recommended in children under one year of age.

- Particular care must be taken to prevent sample contamination when taking a capillary sample. Venous blood specimens are less likely to be contaminated by ambient lead and should be used for all testing done to confirm or follow up a BLL. Every child with a screening BLL equal to or greater than the CDC reference level of 5 mcg/dL needs additional follow up, including a venous specimen analyzed by a reference laboratory. [California practice is to include all BLLs equal to or greater than 4.5 mcg/dL in this requirement.]

- Note that California requires all laboratories to report, to the CLPPB, the results of all blood lead analyses they perform on specimens drawn in California.[6] Health care providers using a point-of-care device are considered laboratories and must report. Other health care providers are not required to report, but are welcome to contact CLPPB with questions.

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Bright Futures*
Additional information on lead risk assessment and testing can be found at Bright Futures/American Academy of Pediatrics (AAP) Recommendations for Preventive Pediatric Health Care Periodicity Schedule Early Childhood Tools.

Please Note: California regulations and guidance, which are more protective on lead testing, should be followed when there is discrepancy with recommendations in Bright Futures.

CONSIDERATIONS FOR REFERRAL TREATMENT AND/OR FOLLOW-UP

- Evaluate blood lead laboratory test results and assess clinical conditions which may be associated with elevated blood lead including, but not limited to, iron deficiency, anemia, developmental delay, unexplained seizures or neurologic symptoms, abdominal pain, behavioral problems, hearing loss, and learning deficits.

- Retest and refer for medical care management of children with elevated BLLs as outlined in Table 1.

- Provide appropriate nutritional guidance as the co-existence of iron or calcium deficiencies may enhance the uptake of lead from the gastrointestinal tract. Infants and children who are well nourished and eat frequently absorb less lead. Refer children less than five years of age to the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) for supplemental foods and nutritional counseling and education.

- Consider referring children with BLLs equal to or greater than 20 mcg/dL to California Children's Services (CCS) for authorization of services, such as nutritional assessment, education, and other interventions, as part of their treatment plan.

- Refer Medi-Cal eligible children who are not eligible for CCS to the local Medi-Cal Field Office to obtain authorization for medical nutritional therapy services.

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References

1. CDC. Low level lead exposure harms children: a renewed call for primary prevention: report of the Advisory Committee on Childhood Lead Poisoning Prevention of the Centers for Disease Control and Prevention. Atlanta, GA: US Department of Health and Human Services, CDC; 2012. https://www.cdc.gov/nceh/lead/ACCLPP/Final_Document_030712.pdf

2. Centers for Disease Control Blood Lead Levels in Children Aged 1-5 Years — United States, 1999–2010. MMWR Morb Mortal Wkly Rep 2013;62:245–248. http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6213a3.htm?s_cid=mm6213a3_e

3. California Code of Regulations, Title 17, §§ 37000-37100.

4. CDC, www.cdc.gov/immigrantrefugeehealth/guidelines/lead-guidelines.html.

5. Centers for Disease Control and Prevention (CDC), http://www.cdc.gov/nceh/lead/.

6. California Health and Safety Code § 124130.

7. 42 Code of Federal Regulations §441.50 and §441.55 – 441.60

8. Wright RO, Tsaih SW, Schwartz J, Wright RJ, Hu H. Association between iron deficiency and blood lead level in a longitudinal analysis of children followed in an urban primary care clinic. *J Pediatr*. 2003;142:9-14.

*American Academy of Pediatrics (AAP) materials linked to with permission for reference only. Use of these materials beyond the scope of these guidelines must be reviewed and approved by the AAP, who can be reached at marketing@aap.org.

Resources

California Childhood Lead Poisoning Prevention Branch, 850 Marina Bay Parkway, Bldg P, 3rd Floor, Richmond, CA 94804-6403, (510) 620-5600, www.cdph.ca.gov/programs/CLPPB,.

CDC, (800) 232-4636, http://www.cdc.gov/nceh/lead/.

CDC, Blood Lead Levels in Children Fact Sheet, http://www.cdc.gov/nceh/lead/acclpp/lead_levels_in_children_fact_sheet.pdf.

CDC, *Report of the Advisory Committee on Childhood Lead Poisoning Prevention*, January 4, 2012,. http://www.cdc.gov/nceh/lead/acclpp/final_document_030712.pdf

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CDC, *Response to the Advisory Committee on Childhood Lead Poisoning Prevention Recommendations* in "Low Level Lead Exposure Harms Children: A Renewed Call of Primary Prevention"**,** June 7, 2012, http://www.cdc.gov/nceh/lead/acclpp/cdc_response_lead_exposure_recs.pdf.

CDC, *Guidelines for the Identification and Management of Lead Exposure in Pregnant and Lactating Women*, http://www.cdc.gov/nceh/lead/publications/LeadandPregnancy2010.pdf.

Advisory Committee on Childhood Lead Poisoning Prevention, *Guidelines for Measuring Lead in Blood Using Point of Care Instruments,* https://www.cdc.gov/nceh/lead/acclpp/20131024_pocguidelines_final.pdf

Pediatric Environmental Health Specialty Unit Network (PEHSU), (844) 734-7899, http://www.pehsu.net/.

Poison Control Center (PCC), (800) 222-1222, http://www.aapcc.org/.

U.S. Environmental Protection Agency, (800) 424-5323, http://www.epa.gov/lead.

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Table 1: Recommendations on Medical Management of Childhood Lead Exposure

No level of lead in the blood is known to be safe. In 2012, the Centers for Disease Control and Prevention (CDC) established a new "reference value" of 5 micrograms per deciliter (mcg/dL) for blood lead levels (BLLs), thereby lowering the level at which evaluation and intervention are recommended.[1] **Contact the California Department of Public Health, Childhood Lead Poisoning Prevention Branch (CLPPB), (510) 620-5600, www.cdph.ca.gov/programs/CLPPB, for additional information about childhood lead toxicity**.

BLL[2]	EVALUATION AND TESTING	MANAGEMENT
< 5 mcg/dL Initial BLL and routine retest may be capillary (CBLL) or venous (VBLL)[3, 4] **Retest for identified risk must be venous[3]** **< 5 mcg/dL**	**General** • Perform routine history and assessment of physical and mental development. • Assess nutrition and risk for iron deficiency. • Consider lead exposure risks. **Blood Lead Levels** • California regulations require testing at ages 1 and 2 years (up to 6 years if not tested at 2 years) if child is in a publicly funded program for low-income children, spends time at a pre-1978 place with deteriorated paint or recently renovated, or has	• Comply with California regulations mandating a standard of care under which the health care provider, at each periodic health care visit from age 6 to 72 months, must give oral or written anticipatory guidance to a parent or guardian including at a minimum that children can be harmed by lead, are particularly at risk from the time they crawl until 72 months old, and can be harmed by deteriorating or disturbed paint and lead-contaminated dust.[5] • Discuss hand to mouth activity, hand washing, and sources of lead: e.g. lead-contaminated paint, dust, and soil (particularly near busy roads), plumbing, a household member's lead-related work, bullets, fishing sinkers; and also some: remedies, cosmetics, foods, spices, tableware, cookware, batteries, jewelry, toys and other consumer products.

[1] CDC, www.cdc.gov/nceh/lead/acclpp/blood_lead_levels.htm, accessed 8/3/2016. This reference level is to be periodically reevaluated.
[2] BLLs are rounded to the closest whole integer. (5 includes 4.5 mcg/dL,10 includes 9.5 mcg/dL, 15 includes 14.5 mcg/dL, etc.)
[3] Capillary lead specimens are easily contaminated. They are acceptable for screening but all retests on BLLs ≥ 5 mcg/dL should be venous. Consider arterial or umbilical cord specimens as if venous. A heel stick may be used to obtain a capillary specimen in children under one year. LeadCare® analyzers should not be used for VBLLs. https://www.fda.gov/MedicalDevices/Safety/AlertsandNotices/ucm558733.htm
[4] Analyzing laboratories must report results of all BLLs drawn in California to the state. California Health and Safety Code, section 124130.

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BLL[2]	EVALUATION AND TESTING	MANAGEMENT
(continued) Initial BLL and routine retest may be capillary (CBLL) or venous (VBLL) [3,4] **Retest for identified risk must be venous[3]**	other lead exposure risks.[5] • If screened early (before 12 months), retest in 3-6 months as risk increases with increased mobility. • Test anyone birth to 21 years when indicated by changed circumstances, identification of new risks, or at the request of a parent or guardian. • Follow-up with VBLL in 6-12 months if indicated. • See federal guides for Head Start[6] or refugees.[7]	• Discuss BLLs with family. Counsel on any risk factors identified. • Encourage good nutrition, especially iron, vitamin C, and calcium. Consider referral to the Supplemental Nutrition Program for Women, Infants, and Children (WIC). • Encourage participation in early enrichment activities. • **Chelation is not recommended in this BLL range.**
5-9 mcg/dL Initial BLL may be capillary or venous **Every retest must be venous[3]**	**General – Evaluate as above AND** • Take an environmental history to identify potential sources of exposure and provide preliminary advice on reducing/eliminating them. • Test for iron sufficiency (CBC, Ferritin, and CRP). • Perform structured developmental screening evaluations at periodic health visits as lead effects may manifest over years. • Evaluate risk to other children and pregnant and lactating women in the home.	**Manage as above AND** • Counsel on nutrition, iron, vitamin C, and calcium. Encourage taking high-iron and high-vitamin C foods together. Refer to WIC. • Treat iron insufficiency per AAP guidelines. Consider starting a multivitamin with iron. • Add notation of elevated BLL to child's medical record for future neurodevelopmental monitoring. • Refer to an early enrichment program, e.g. Early Start or Head Start. • Consider medical referral and testing for other children and pregnant and lactating women in the home. • Coordinate with local Childhood Lead Poisoning Prevention Program (CLPPP) or state CLPPB for outreach, education, and other services. See www.cdph.ca.gov/programs/CLPPB for

[5] California Code of Regulations, Title 17, sections 37000-37100.
[6] Head Start, https://eclkc.ohs.acf.hhs.gov/physical-health/article/lead-poisoning-prevention, accessed 7/27/2017.
[7] CDC, http://www.cdc.gov/immigrantrefugeehealth/guidelines/lead-guidelines.html, accessed 8/30/2016.

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BLL[2]	EVALUATION AND TESTING	MANAGEMENT
5-9 mcg/dL (continued) Initial BLL may be capillary or venous **Every retest must be venous[3]**	**Blood Lead Levels** • Retest in 1-3 months to be sure BLL is not rising. • Then retest in 3 months and thereafter based on VBLL trend. • If retest is in another range, retest per that range.	state and local contact information • **Chelation is not recommended in this BLL range.**
10-14 mcg/dL Initial BLL may be capillary or venous **Every retest must be venous[3]**	**General – Evaluate as above** **Blood Lead Levels** • Retest in 1-3 months to be sure BLL is not rising. • To determine eligibility for full public health case management, retest after interval of 30 days (eligible if persistent in or above this range). • If BLLs are stable or decreasing, monitor initially with VBLLs every 3 months and thereafter based on VBLL trend. If retest is in another range, retest per that range.	**Manage as above AND** • If BLL is persistent in or above this range (30 days or more), contact the local CLPPP (or, if no local program, the state CLPPB) for full case management services, without charge or means test, for children aged birth to 21 years (nurse case management, environmental investigation, and recommendations for remediation of lead sources). • The state CLPPB is available for further consultation: (510) 620-5600. See footnote for other lead-knowledgeable agencies.[8] • **Chelation is not recommended in this BLL range**.

[8] Pediatric Environmental Health Specialty Unit Network, (888) 347-2632.
CDC, www.cdc.gov/nceh/lead/default.htm. Poison Control Center, (800) 222-1222.

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BLL[2]	EVALUATION AND TESTING	MANAGEMENT
15-19 mcg/dL Initial BLL may be capillary or venous **Every retest must be venous[3]**	**General – Evaluate as above AND** • Consider abdominal X-ray if possible ingestion of leaded materials or history of pica/excessive mouthing. **Blood Lead Levels** • Retest in 1-4 weeks to be sure BLL is not rising. • Then, if stable or decreasing, monitor initially with VBLLs every 1-3 months and thereafter based on VBLL trend. • If retest is in another range, retest per that range.	**Manage as above AND** • Consider gut decontamination if foreign bodies consistent with lead are visualized on X-ray. • If a single VBLL in this range, contact the local CLPPP (or, if no local program, the state CLPPB) for full case management services for children aged birth to 21 years. • Any treatment of BLLs in this range should be provided in consultation with the state CLPPB: (510) 620-5600. See footnote 8 for other lead-knowledgeable agencies. • **Chelation is not recommended in this BLL range.**
20-44 mcg/dL Initial BLL may be capillary or venous **Every retest must be venous[3]**	**General – Evaluate as above** **Blood Lead Levels** • Retest in 1-4 weeks to be sure BLL is not rising (the higher the BLL, the sooner the retest). • Then, if stable or decreasing, monitor initially with VBLLs every 2-4 weeks and thereafter based on VBLL trend. • If retest is in another range, retest per that range.	**Manage as above AND** • Consider referral to California Children Services (CCS). Requires confirmed venous BLL equal to or greater than 20 mcg/dL.[9] • Consider referral for medical nutrition therapy.[10] • **Chelation is not typically initiated in this BLL range.**

[9] California Code of Regulations, Title 22, section 41518.9.
[10] Academy of Nutrition and Dietetics, http://www.eatrightpro.org/resource/practice/getting-paid/who-pays-for-nutrition-services/mnt-vs-nutrition-education

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BLL[2]	EVALUATION AND TESTING	MANAGEMENT
45-69 mcg/dL Initial BLL may be capillary or venous **Every retest must be venous[3]**	**URGENT** **General – Evaluate as above AND** • **OBTAIN ABDOMINAL X-RAY**. **Blood Lead Levels** • **Confirm initial BLL with repeat VENOUS BLL**: – **WITHIN 48 HOURS if BLL is 45-59 mcg/dL.** – **WITHIN 24 HOURS if BLL is 60-69 mcg/dL.** • Confirmatory venous BLL and other medically appropriate actions must occur **BEFORE** initiating chelation. • Monitor response to chelation with VBLLs. • Follow-up with VBLLs every 2-4 weeks (more frequently if status requires) until trend is downward or stable or as trend indicates. • Consider modifying protocol if VBLLs are not decreasing as expected or remain chronically elevated, e.g. from a retained bullet. • If retest is in another range, retest per that range.	**URGENT** **Manage as above AND** • Consider chelation. • Evaluate whether hospitalization is needed to reduce lead exposure and achieve compliance with treatment protocols. • Immediately notify local CLPPP or state CLPPB. **Chelation Therapy** • **Consult with a physician experienced in managing chelation.** • Perform gut decontamination, if indicated, **BEFORE** chelation. • Consider one of two chelating agents: – Succimer per outpatient protocol; give on inpatient basis if compliance or exposure reduction cannot otherwise be assured, – **OR** CaNa2EDTA per hospital protocol. *** CAUTION: USE ONLY <u>CALCIUM</u> Na^2EDTA.** [11] • Very high BLLs have been associated with renal tubular dysfunction. If using potentially nephrotoxic chelating agents (e.g. $CaNa^2EDTA$), **TEST RENAL FUNCTION BEFORE AND DURING TREATMENT**.[12] • Repeat treatment cycles may be needed due to blood lead rebound.

[11] CDC-MMWR, Deaths Associated with Hypocalcemia from Chelation Therapy—Texas, Pennsylvania, and Oregon, 2003-2005, March 3, 2006; 55(08):204-207. www.cdc.gov/mmwr/preview/mmwrhtml/mm5508a3.htm. Accessed 8-30-1206.

[12] Preventing Lead Poisoning in Young Children: A Statement by the Centers for Disease Control, October 1991, US Department of Health and Human Services, Pharmacology of Chelating Agents, Chapter 7, pg 56 https://www.cdc.gov/nceh/lead/publications/books/plpyc/Chapter7.htm

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BLL[2]	EVALUATION AND TESTING	MANAGEMENT
≥ 70 mcg/dL Initial BLL may be capillary or venous **Every retest must be venous[3]**	**MEDICAL EMERGENCY** **General – Evaluate as 45-69 range.** • **OBTAIN ABDOMINAL X-RAY.** **Blood Lead Levels** • **IMMEDIATELY confirm initial BLL with repeat VENOUS BLL.** • Confirmatory venous BLL and other medically appropriate actions must occur **BEFORE** initiating chelation. • Monitor response during chelation with VBLLs. • Follow-up with VBLLs every 2-4 weeks (more frequently if status requires) until trend is downward or stable or as trend indicates. • Consider modifying protocol if VBLLs are not decreasing as expected or remain chronically elevated, e.g. from a retained bullet. • If retest is in another range, retest per that range.	**MEDICAL EMERGENCY** **Manage as above AND** • **If BLL is confirmed**, hospitalize to stabilize, chelate, reduce lead exposure, and monitor progress. • Immediately notify local CLPPP or state CLPPB. **Chelation Therapy** • **Consult with physician experienced in managing chelation.** • Perform gut decontamination, if indicated, **BEFORE** chelation. • **CAUTION:** If using CaNa^{2}EDTA with dimercaprol (BAL) for chelation: – **Use only CALCIUM Na^{2}EDTA**.[11] – **Assess for peanut allergy** (BAL is suspended in peanut oil). • Very high BLLs have been associated with renal tubular dysfunction. If using potentially nephrotoxic chelating agents (e.g. CaNa^{2}EDTA), **TEST RENAL FUNCTION BEFORE AND DURING TREATMENT**.[12] • Repeat treatment cycles may be needed, due to blood lead rebound.

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Suggested Reading:

Etzel RA, Balk SJ, *Pediatric Environmental Health*, 3rd edition. American Academy of Pediatrics, 2012, pgs. 440-454.

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Levin R, Brown MJ, Kashtock ME, Jacobs DE, Whelan EA, Rodman J, Schock MR. Padilla A, Sinks T, Lead Exposures for U.S. Children, Implications for Prevention, *Environmental Health Perspectives*, 2008; 116(10):1285-1293.