



The Prevention of Childhood Lead Poisoning: Why Physicians Should Counsel on Lead and Screen for Lead Exposure

Disclosure

None of the planners, presenters, and reviewers for this educational activity have relevant financial relationships with ineligible companies to disclose.



Learning Objectives

- Describe the scope, risk factors, clinical effects, and management of childhood lead exposure
- Identify cultural risk factors for lead exposure and identify children in all socioeconomic groups who may be at risk for lead exposure
- Describe California's Childhood Lead Screening statutes and regulations, provider mandates, and the role of anticipatory guidance in preventing childhood lead exposure
- Outline health and environmental interventions for children with lead exposure
- Discuss services provided by the State of California and local Childhood Lead Poisoning Prevention Programs





Overview: Scope of the Problem

- Lead poisoning is one of the most common and preventable environmental diseases in California children.
- No blood lead level known to be without a deleterious effect.^{1,2,3}
- Prevention is the best approach, so children are not exposed.
- Screening (blood lead testing) is the best approach to early diagnosis of exposure, if it has occurred.

¹ MMWR November 2007;56(RR08):1-14:16

² Koller et al. EHP, Jun 2004: 112:987-994

³ Bellinger, Current Opinions in Pediatrics, 2008, 20:172-177

California Statutes and Regulations for Providers Caring for Children 6 Months to 6 Years of Age¹

ANTICIPATORY GUIDANCE

At each periodic assessment from 6 months to 6 years. Under California state laws and regulations, all health care providers are required to inform all parents and guardians about:

- The risks and effects of childhood lead exposure.
- The requirement that children enrolled in Medi-Cal receive blood lead tests.
- The requirement that children not enrolled in Medi-Cal who are at high risk of lead exposure receive blood lead tests.

¹https://www.cdph.ca.gov/Programs/CCDPHP/DEODC/CLPPB/Pages/titl e17_37000.aspx

California Statutes and Regulations for Providers Caring for Children 6 Months to 6 Years of Age¹

BLOOD LEAD TEST

- All children in publicly supported programs such as Medi-Cal, Women, Infants and Children (WIC), and CPE at both 12 months and 24 months of age.
- Perform a “catch up” test for children age 24 months to 6 years in a publicly supported program who were not tested at 12 and 24 months.

¹https://www.cdph.ca.gov/Programs/CCDPHP/DEODC/CLPPB/Pages/title17_37000.aspx

California Statutes and Regulations for Providers Caring for Children 6 Months to 6 Years of Age¹

ASSESS

- If child is not in a publicly supported program:

Ask: "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 remodeled?"

Blood lead test if the answer to the question is "yes" or "don't know."

¹ [Health and Safety Code, sections 105285-105286; California Code of Regulations, Title 17, Sections 37000 to 37100](#)

MCAS¹ and Lead Testing Requirements

- Managed Care Accountability Sets(MCAS) measures
 - set of performances measures that DHCS selects for annual reporting by Medi-Cal managed care health plans (MCPs)
 - ‘Require at least one capillary or venous blood lead test by child’s 2nd birthday”¹
- California mandates are different from MCAS measures: **Two** tests are required. Test at **both** 12 months and 24 months of age
 - 12 month test provides for early identification and intervention for children with lead exposure
 - 24 month test is important because blood lead levels can be high at 24 months even if not elevated at 12 months of age

¹National Committee for Quality Assurance (NCQA). [Lead Screening in Children \(LSC\)](#)

California Childhood Lead Poisoning Prevention Program 2021-2022 Statistics – Age < 6 Years²

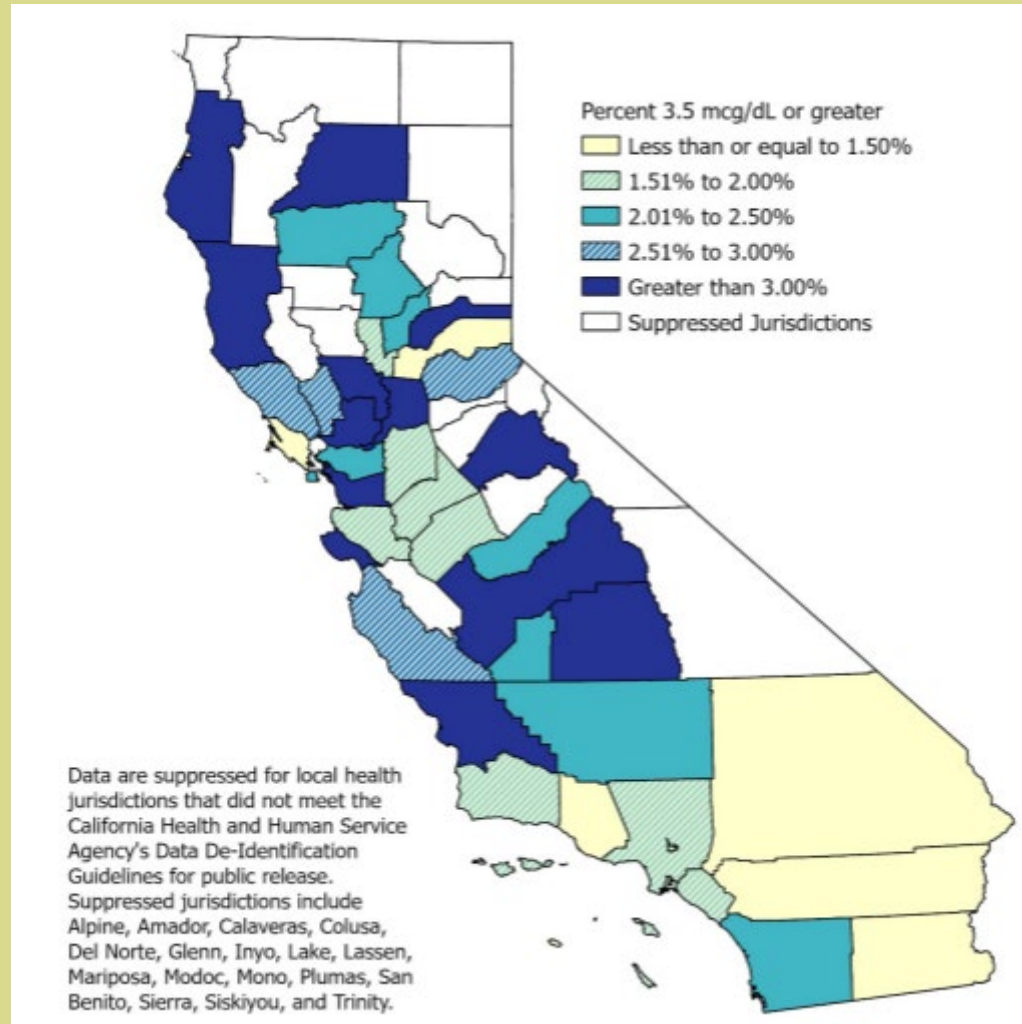
Year	Age Group (Years)	Blood Lead Level (BLL) < 3.5 n	BLL < 3.5 % (row)	BLL ≥ 3.5 n	BLL ≥ 3.5% (row)	Totals
2021	Age < 6	364,008	98.12%	6,973	1.88%	370,981
	Age 6 to < 21	35,946	95.94%	1,522	4.06%	37,468
	Age < 21	399,954	97.92%	8,495	2.08%	408,449
2022	Age < 6	368,493	98.00%	7,514	2.00%	376,007
	Age 6 to < 21	41,119	96.36%	1,555	3.64%	42,674
	Age < 21	409,612	97.83%	9,069	2.17%	418,681

*BLL = Blood Lead Level

¹BLLs 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)

² CLPPB, [Blood Lead Level \(BLL\) Data by Jurisdiction](#)

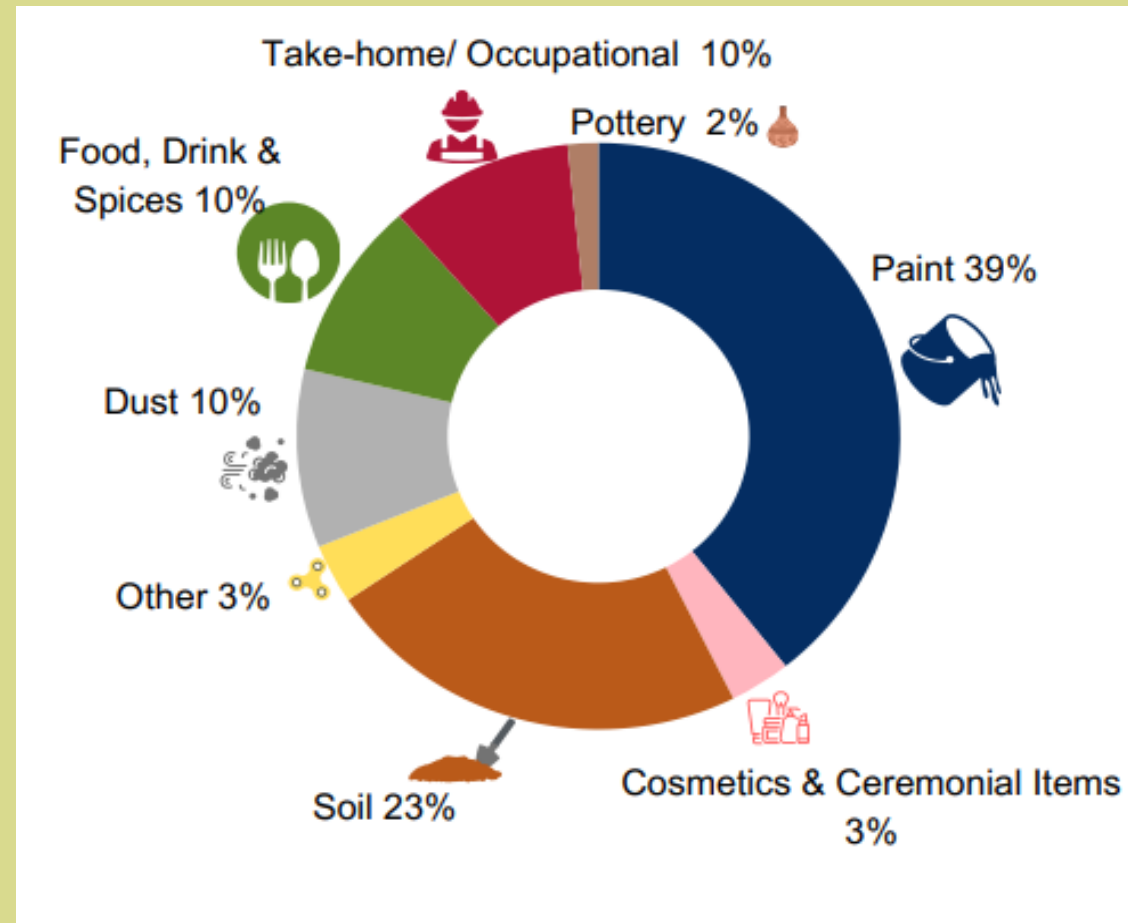
Percent of Children Age < 6 Years Screened (Tested) for Lead with a BLLs ≥ 3.5 mcg/dL by Jurisdiction, 2022



Data are suppressed for local health jurisdictions that did not meet the California Health and Human Service Agency's Data De-Identification Guidelines for public release.

Suppressed jurisdictions include Alpine, Amador, Calaveras, Colusa, Del Norte, Glenn, Inyo, Lassen, Mariposa, Modoc, Mono, Plumas, Sierra, Siskiyou, Trinity, Tuolumne, and Yuba.

Sources of Childhood Lead Exposure in Kern County FY 2015-2022



Blood Lead Reference Value^{1,2}

- The CDC “Level of Concern” decreased from 60 mcg/dL in 1960 to 10 mcg/dL in 1991
- In 2021, the CDC announced a change in its blood lead reference value (BLRV) from ≥ 5 mcg/dL¹ to ≥ 3.5 mcg/dL².
- The BLRV is a population-based measurement which indicates that 2.5% of U.S. children aged 1–5 years have BLLs ≥ 3.5 mcg/dL.
- It is not a health-based standard or a toxicity threshold.

¹ [CDC Response to Advisory Committee on Childhood Lead Poisoning Prevention Recommendations in “Low Level Lead Exposure Harms Children: A Renewed Call of Primary Prevention”](#)

² CDC, [Update of Blood Lead Reference Value – United States, 2021, MMWR / October 29, 2021 / Vol. 70 / No. 43](#)

CDC Recommended Actions¹

For BLLs ≥ 3.5 mcg/dL, the CDC recommends providers:

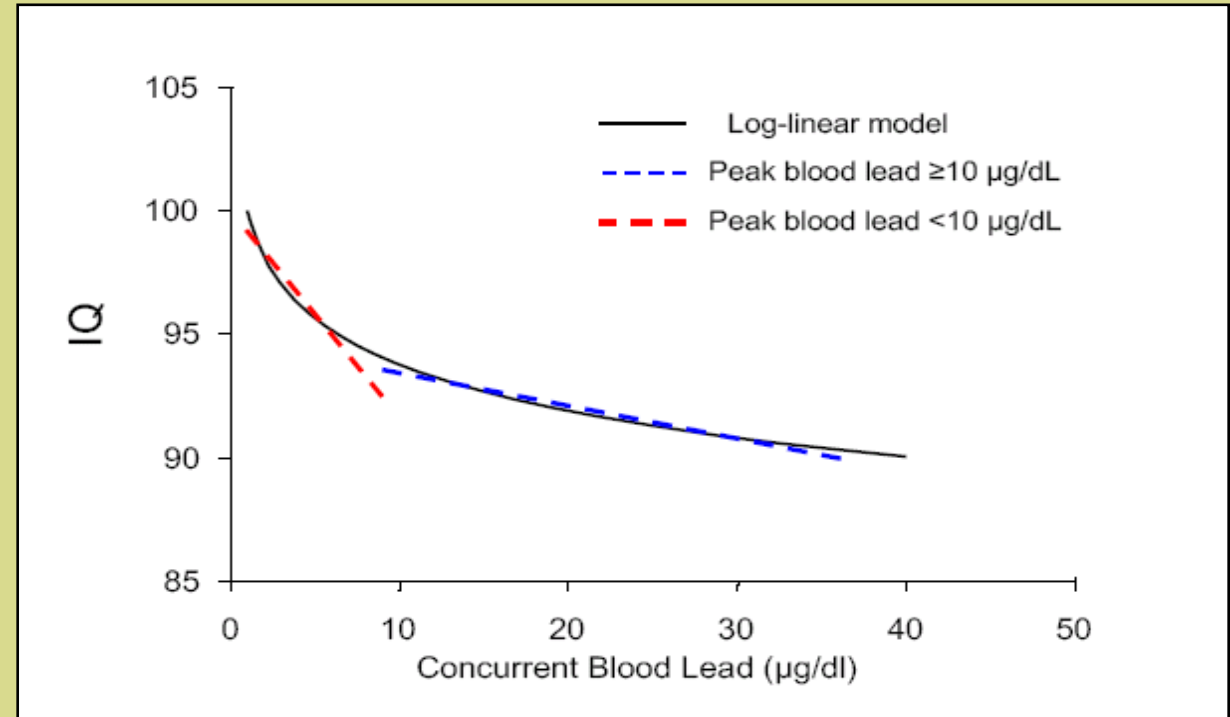
- Give anticipatory guidance about common sources of lead exposure and how to prevent exposure.
- Obtain a confirmatory venous sample for capillary results ≥ 3.5 mcg/dL.
- For children with venous BLLs ≥ 3.5 mcg/dL, provide:
 - Venous blood lead monitoring at recommended intervals
 - Follow-up based on BLL.



¹ CDC, [Recommended Actions Based on Blood Lead Level](#)

Why Is Under 10 mcg/dL of Concern?

- Levels below 10 mcg/dL are associated with lower IQ scores¹
- There is an increased rate of loss of IQ at levels less than 10 mcg/dL^{2,3}
- IQ can drop 5-8 points with a blood lead increase of 1 to 10 mcg/dL^{4,5}



¹ Canfield et al. NEJM 2003; 348(16):1517-26

² Bellinger, Current Opinions in Pediatrics, 2008; 20:172-177

³ Pooled analysis by Lanphear et al. Env Health Persp ;113(7):894-899

⁴ Confirmed by meta-analysis by Koller et al. EHP, 2004;112(9):987-994

⁵ Crump et al, Crit Rev Toxicol, 2013,43(9):785-799

Environmental Justice Issues in Childhood Lead Poisoning

- Health inequity based on race and income level contributes to increased exposure to environmental hazards, including lead^{1,2,3}
- Historically, these sites that may increase exposure to lead have been located in or near low-income housing, and areas with majority non-white populations^{4,5,6,7,8,9}
- Examples of these sites include:
 - Industrial and manufacturing sites
 - Power plants and oil refineries
 - Smelters
 - Hazardous waste and battery recycling sites
 - Freeways





Health Effects of Lead

Absorption and Storage of Lead in Children

- Main absorption in children is gastrointestinal
- Absorption is influenced by iron and calcium
- Approximately 73% of total body lead is stored in bone in children¹
 - Half-life in blood is about 1 month
 - Half-life in bone is 10-30 years

Lead lines² – dense lines at the metaphysis of growing bone. Lead inhibits osteoclasts but not osteoblasts, mainly historical and seen in infants with BLL >50 mcg/dL



¹ ToxGuide for Lead, US Department of Health and Human Services, Agency for Toxic Substances and Disease Registry (ATSDR) accessed at

<http://www.atsdr.cdc.gov/toxguides/toxguide-13.pdf>

² Gandhi D, et al, Lead Lines, Lancet, July 2003; 362:197

Known Effects of Lead Poisoning



- Anemia¹
- Neurologic System: Neurotoxic¹
 - Decreased Intelligence Quotient (IQ)
 - Adverse effects on attention and behavior

¹Bellinger DC, Int J Env Res Public Health, 2011, 8:2593-2628



Known Effects of Lead Poisoning (Cont'd)

- Learning and Behavioral Issues¹
 - Attention Deficit Hyperactivity Disorder (ADHD)^{2,3,4}
 - Behavioral Disorders^{5,6,7}
 - Violence and Aggressive Behavior^{8,9}
 - Juvenile delinquency^{10,11}
 - Elevated school drop-out rate¹²
 - Potential link to criminal behavior¹³
- Neurodegenerative Issues
 - Affects structural brain integrity in midlife with potentially greater risk of neurodegenerative diseases in later life¹⁴

Other Disorders Associated with Lead Exposure



- Developmental and Endocrine Disorders
 - Fetal Growth, Intrauterine Growth Retardation (IUGR)¹⁵
 - Growth, Height, Weight and Body Mass Index^{16,17}
 - Reproductive Disorders, Spontaneous Abortion^{18,19}
 - Delayed Sexual Maturation²⁰
- Cardiovascular Disorders
 - Link to childhood^{21,22} and adult hypertension^{23,24,25,26}
 - Atherosclerosis²⁴
 - Cardiovascular mortality^{27,28}
 - Cerebrovascular morbidity and mortality²⁸



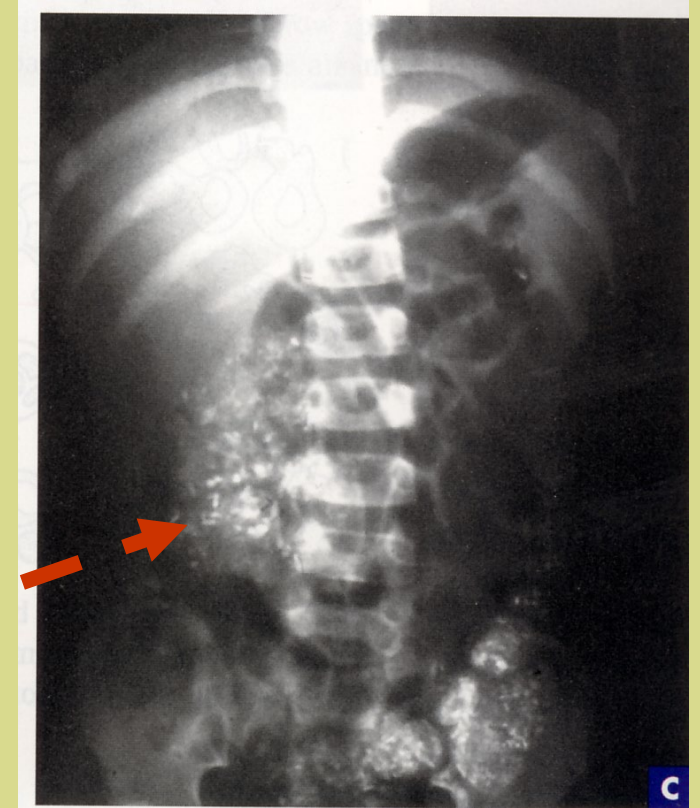
Other Disorders Associated with Lead Exposure (Cont'd)

- Immunologic Effects²⁹
- Renal Disorders
 - Lead nephropathy^{24,29}
- Adverse dental effects²⁹
 - Dental caries (children)
 - Tooth loss (adults)
- Probable Human Carcinogen^{29,30}

Most Children Today Don't Have Overt Clinical Symptoms

- Earliest clinical signs and symptoms
 - Anemia
 - Anorexia, loss of appetite
 - Abdominal discomfort¹
 - Constipation²
 - Irritability
 - Behavioral Changes

Consider abdominal x-ray (KUB) for radiopacities if BLL over 15 mcg/dL and particulate lead exposure is suspected^{3,4}



Case reports:

¹ Cabb, Toxic Remedy, Clin Ped 2008;47(1):77-79

² Smith, Constipation, Clin Ped 2007;46(1):83-85

³ Pediatric Environmental Study Group (PEHSU) AAP. Recommendations on Medical Management of Childhood Lead Exposure and Poisoning, June 2013 Update

⁴ American Academy of Pediatrics, Policy Statement, Council on Environmental Health, Prevention of Childhood Lead Toxicity, May 2016, Ped 138(1):1-15, doi: 10:1542/peds.201-1493.

Effects of Lead on the Hematopoietic System

- Iron deficiency anemia often associated with elevated blood lead level¹
- Iron insufficiency leads to more lead absorption

¹ Wright, et al, J Pediatr, 2003;142:9-14



Effects of Lead on the Neurologic System

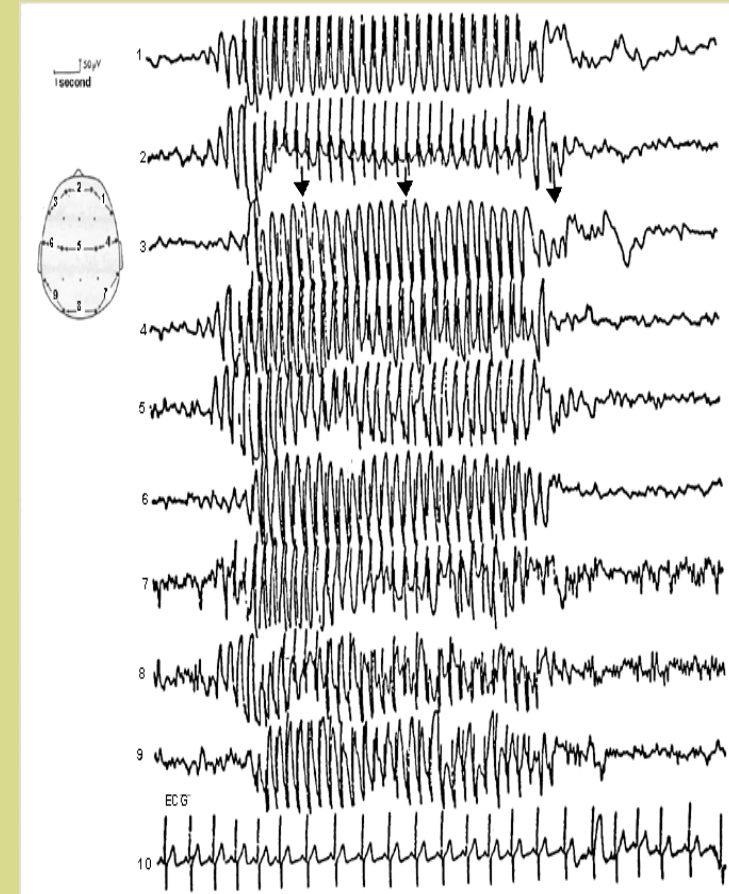
- Substitutes for calcium in the brain and impairs neurotransmitter and receptor development and function
- Neurologic toxicant
 - Affects mobility and differentiation of neurons during development
 - Creates oxidative stress, alters gene expression
 - Affects early development of blood-brain barrier¹
 - Increases the risk of toxicants crossing the blood brain barrier
 - Affects critical periods of early brain development
- Reduces development of neurons in first 2 years of life



¹Sanders, T, et al, Rev Env Health; 2009;24(1):15-45

Toxicity - Rare Clinical Signs and Symptoms

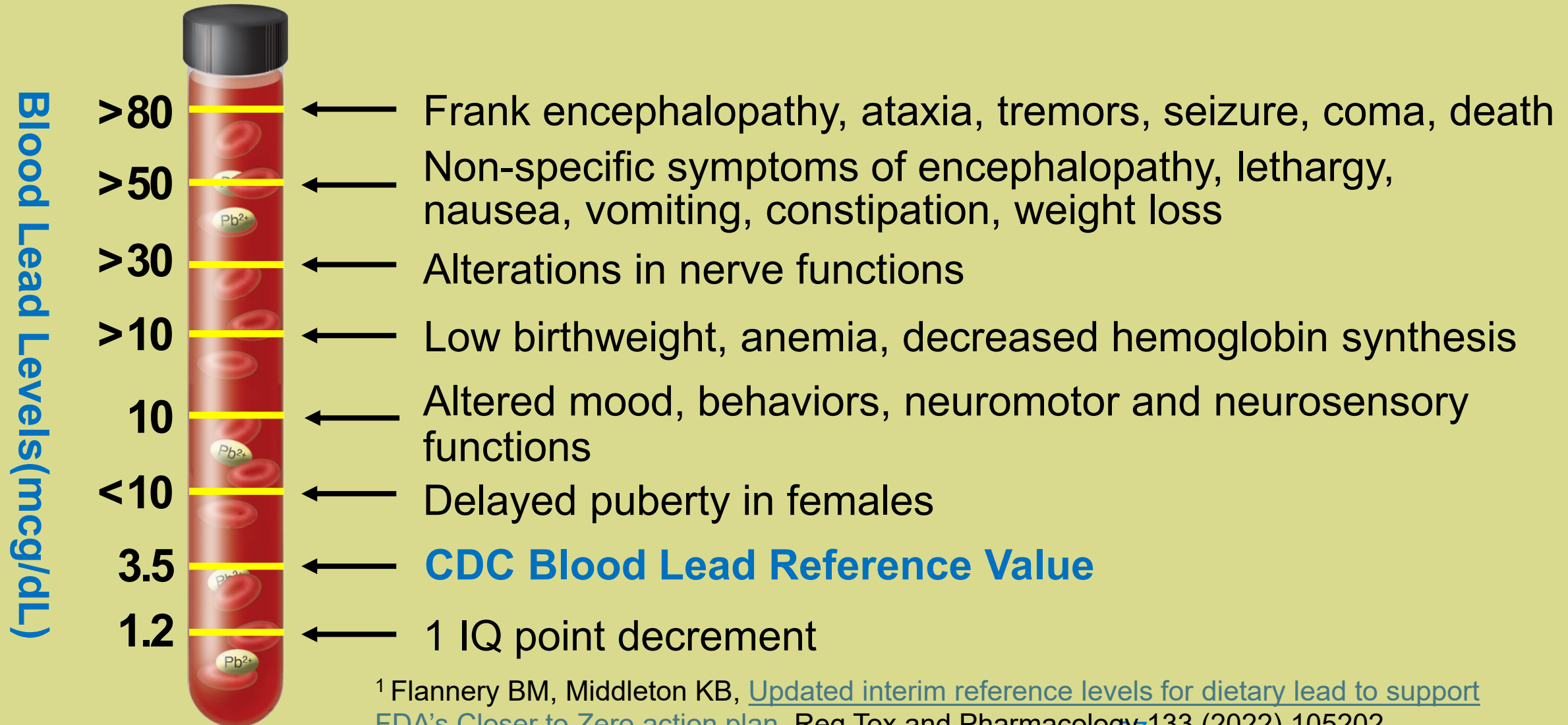
- Blood lead over 70 mcg/dL
 - Changes in mentation
 - Encephalopathy
 - Confusion, ataxia
 - Seizures
 - Coma
 - **Death**



Lead Metabolism in Children is Different Than in Adults

	Children and Adolescents	Adults Age 21 and up
GI Absorption ^{1,2}	50%	10%
Blood-Brain Barrier	Still developing in infancy and early childhood	Fully formed by adulthood
Bone Storage ³	~73%	~94%
Bone Resorption	Periods of rapid growth ⁴ Adolescent pregnancies ⁵ Periods of bone remodeling such as fractures, prolonged bedrest ⁶	Pregnancy ⁷ Breastfeeding Osteoporosis, Menopause ⁸ Periods of bone remodeling Accelerated bone turnover (e.g., bone disease, thyrotoxicosis)

Updated Health Effects of Lead to Support FDA's Closer to Zero Action Plan 2022¹



¹ Flannery BM, Middleton KB, [Updated interim reference levels for dietary lead to support FDA's Closer to Zero action plan](#), Reg Tox and Pharmacology 133 (2022) 105202

Children at Higher Risk for Lead Exposure

- Toddlers 1-2 years old due to increased hand-mouth behavior
- Children in publicly funded programs for low-income children
 - Medi-Cal
 - Children's Presumptive Eligibility (CPE)
 - Special Supplemental Nutrition Program for Women, Infants, and Children (WIC)
 - Supplemental Nutrition Assistance Program (SNAP)
 - Head Start
- Children living in or spending a lot of time in pre-1978 buildings



Children and Teens at Risk

Children and teens with:

- Pica
- Sibling, playmate or other close contact with an increased lead level
- History of living in or visiting country with high levels of environmental lead
- Hobby or occupational exposure to lead, including take-home lead
- Suspected lead exposure



Routes of Exposure



- Oral and Hand-to-Mouth
- Respiratory
- Transplacental & Breast Milk
- Dermal
- Retained Bullets

Other Risk Factors for Increased Lead Exposure

- Children with neurodevelopmental or other medical conditions that are associated with behaviors that increase lead exposure risk
 - Developmental delay
 - Autism/Autism Spectrum Disorder (ASD)
 - Sickle cell disease
- May need blood lead testing/monitoring even after 24 months of age

The background of the slide is a vibrant floral pattern. It features large, stylized flowers in shades of orange, peach, and light green, set against a darker green background. The flowers have prominent stamens and are arranged in a repeating pattern. A large, white, rounded rectangular box is centered on the slide, containing the title text.

Sources of Lead

The Common Sources of Lead are Environmental

- Deteriorated lead-based paint
 - Cracking, flaking, peeling
- Lead-contaminated dust
- Lead-contaminated soil
- Dust and soil lead from use of leaded gasoline, paint and other airborne sources



Leaded Gasoline



- Lead removed from gasoline for on-road vehicles in the 1990s in the U.S.
- Leaded gasoline still used for small aircraft (avgas)^{1,2}
- USEPA declares endangerment finding for lead emissions in aircraft engines operating with leaded fuel³

¹ Federal Register, 40 CFR Part 80, Sect 1C, Vol 61, No. 23, February 2, 1996 pg 3834, [govinfo.gov/content/pkg/FR-1996-02-02/pdf/96-2231.pdf#page=6](https://www.govinfo.gov/content/pkg/FR-1996-02-02/pdf/96-2231.pdf#page=6) accessed 4-08-2021

² Federal Aviation Administration (FAA), [Aviation Gasoline: About Aviation Gasoline](#)

³ USEPA, <https://www.epa.gov/newsreleases/epa-proposes-endangerment-finding-lead-emissions-aircraft-engines-operate-leaded-fuel> Oct 7, 2023

Lead in Drinking Water

- Pre-1986 housing more likely to have lead in pipes, fittings, solder, fixtures and faucets¹
- Lead and Copper Rule (1991) prohibited lead pipe for residential use and set a federal action level of 15 ppb for drinking water²
- EPA is considering long term revisions to the Lead and Copper Rule³



¹ US EPA, [Safe Drinking Water Act \(SDWA\): A Summary of the Act and Its Major Requirements, pg 12](#)

² US EPA, [Lead and Copper Rule](#)

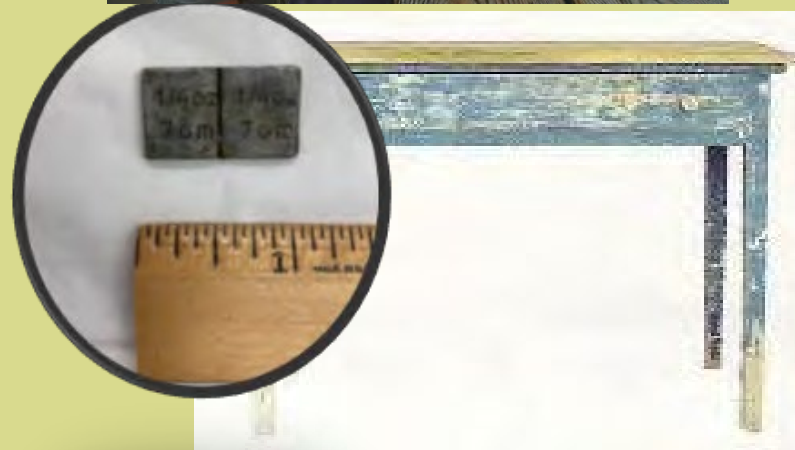
³ US EPA, [Lead and Copper Rule Long-Term Revisions](#)

Lead in Water in Schools and Child Day Care Centers

- [AB2370](#) – Requires licensed child day care centers in buildings constructed before January 1, 2010 to have drinking water tested for lead.
 - [Written directive issued July 28, 2021](#)
 - California Action Level for lead in water at child care centers set at 5 ppb.
 - Testing requirements do not apply to Family Child Care homes.
 - [Child care provider information about AB 2370](#)
- [AB746](#) – Community water systems must test for lead in educational buildings constructed before January 1, 2010 prior to January 1, 2019.
 - [California Division of Drinking Water - Lead Sampling of Drinking Water in California Schools](#)

Some Activities or Hobbies That May Increase Risk of Lead Exposure

- Furniture painting/refinishing
- Glazing, pottery making
- Soldering
- Fishing (lead sinkers)
- Collectibles
- Firearms
- Stained glass
- Jewelry making
- Balancing tires (lead wheel weights)



Lead in Ceramic Water Crock

Water: less than 5 ppb lead before placed in crocks



- After 24 hours in crock:
 - Lead level 438 ppb
 - Equal to 105 mcg in 240 ml*



- After 24 hours in crock:
 - Lead level 1,800 ppb
 - Equal to 432 mcg in 240 ml*

* Amount of water needed for one 8 oz bottle of formula

Results per CDPH, Environmental Health Laboratory Branch 38

Aluminum Cookpots as a Source of Lead Exposure in Afghan Refugee Children Resettled in the United States^{2,3}

Purchased in United States*



- Leachate after:
 - 15 minutes boiling
 - 3.5 mcg/250 ml
 - 24 hours in pot after boiling
 - 530 mcg/250 ml

Purchased Online*



- Leachate after:
 - 15 minutes boiling
 - 71 mcg/250 ml
 - 24 hours in pot after boiling
 - 1,943 mcg/250 ml

*Photos Courtesy: Stephen G. Whittaker, Katie M. Fellows,
Hazardous Waste Management Program, King County, WA

Lead in Consumer Products



Evermore Surprise Eggs—
98,350 sold nationwide at
7Elevens



Yaomiao Children's Jewelry Sets
6,900 sold on Amazon



100,000s of faucets sold on Amazon

Check for recalls at:

- [Consumer Products Safety Commission \(CPSC\)](https://www.cpsc.gov/)



Stanley Jr Kids Wheelbarrow and
7piece Garden Sets
459,200 sold at Costco

Delsot Snap Children's
Hair Clips- 3,800 sold
on Amazon



Lead in Folk Remedies



Pay-loo-ah
up to 21,000 ppm
(example)

- Azarcon and Greta in the Latin American community
- Some Ayurvedic medicines
- Bright colored powders (e.g., pay-loo-ah) in South Asian community
- Some herbal remedies
- Some patent remedies in the Chinese community



Azarcon, Greta
up to 900,000 ppm lead
(example)



Ayurvedic medicines
330,000 ppm lead
(example)

[Learn About Lead in Folk Remedies](#)

Lead in Traditional Creams and Cosmetics



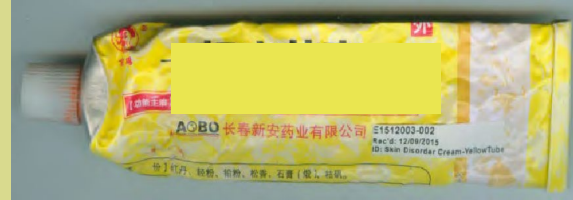
Kohl, Surma, Kajal

- Up to 870,000 ppm lead
- Applied to eyes in children
- May be applied to umbilical stump



Surma Rock

- 517,000 ppm lead
- Ground up to make surma



Facial Cream from China

- 97,000 ppm lead
- Applied to mother and transferred from mother to child



Vietnamese Diaper Cream

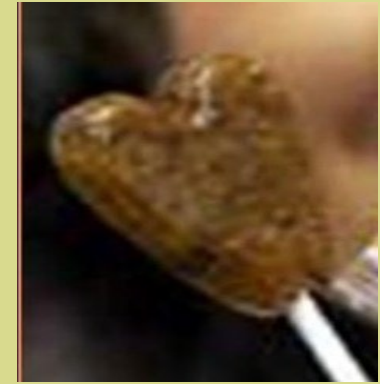
- Up to 9670 ppm lead
- Two cases identified by Oregon Health Authority Jan 2023
- FDA recall Feb 2023

CDC, MMWR, [Childhood Lead Exposure Associated with the Use of Kajal, an Eye Cosmetic from Afghanistan — Albuquerque, New Mexico, 2013](#)

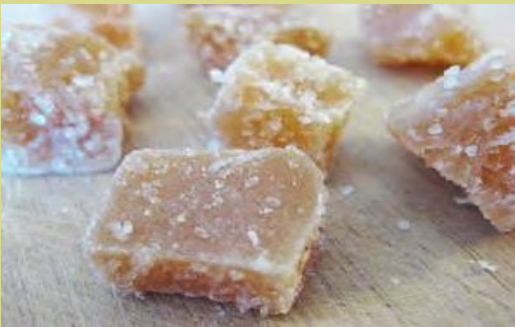
FDA, [Shop Me Ca Recalls “Diep Bao Cream” Because of Possible Health Risk](#)

California: Lead in Candy

- Maximum allowable lead in candy in California is 0.1 ppm. (AB121, 2005)
- CCR Title 27, Section 28500 established a naturally occurring level of lead in candy flavored with chili and/or tamarind of 0.02 ppm.
- Results from California Food and Drug Branch (FDB) testing available at: CDPH, FBD, [Lead in Candy](#)



Tamarind Candy⁴



Crystallized Ginger¹



Dried Plum Candy²



Candy with Chili Powder^{3,5}

Imported Spices and Other Foods May Contain Lead⁵

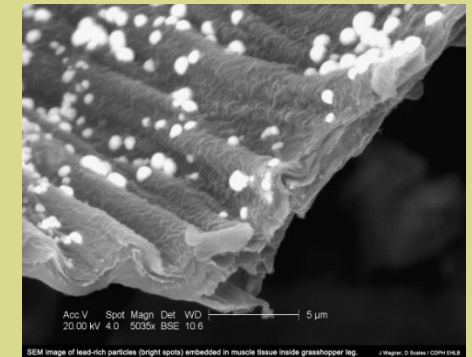
- Turmeric
 - up to 11,000 ppm lead
- Khmeli Suneli¹ – Georgian Spice
 - over 20,000 ppm lead
- Chapulines^{2,3}
 - up to 6,400 ppm lead



Turmeric



Khmeli Suneli



4

¹ CDPH, [CDPH Warns Consumers not to Eat Khmeli Suneli Spice Blends sold in Certain Stores in Los Angeles County](#)

² Handley MA, et al, AJP 2007;97(5):900-906

³ Villalobos, M, et al, Sci Total Environ. 2009;407(8):2836-2844

⁴ Photomicrograph Courtesy: Jeffrey Wagner, EHLB

⁵ Results per CDPH, Environmental Health Laboratory Branch

Other Potential Sources for Older Children and Teens

- Working or spending time at a firing range
- Working in an auto shop with older model cars
- Working in painting or construction
- Hobbies such as sharpshooter, stained glass, pottery, painting, jewelry making



- Pica – Eating items such as pots, dirt, chalk, plaster, clay, or leaded pottery glazes



Case Studies

- Three-week-old infant brought to local ED
- Signs and symptoms included apnea and eye-rolling episodes
- Infant with VBLL 46 mcg/dL
- Mother's VBLL also 46 mcg/dL
- History of maternal pica (ingestion of imported clay pots during pregnancy)
- Lead readily crosses the placenta during pregnancy



Case Studies

- Child with known ADHD
- Mother complained about behavior
- Venous BLL ordered months before, but child not tested
 - VBLL 58 mcg/dL
 - Prior VBLL 7 mcg/dL
 - Abdominal x-ray positive for leaded fishing sinkers, other metal objects
 - Hospitalized for GI clean-out
 - Fishing sinker in appendix
 - Surgery required for removal
 - Unknown how long metal objects had been in child's GI tract



Fishing sinkers are typically 94%-95% lead

Case Studies

- Teen with autism and developmental delay
- Abdominal pain, vomiting for 2 weeks, possible dehydration
- Sent to local ED for evaluation, intravenous (IV) hydration
- Labs: normal except elevated liver function tests (LFTs), no BLL ordered; patient sent home
- Parent consulted online physician; BLL ordered
- VBLL 112 mcg/dL
- Source: traditional remedy containing lead
- Inquire about traditional medicines and supplements when taking history
- Consider lead in your differential diagnosis of a child with multisystemic signs and symptoms



BLL Screening Caveats

- Measured on whole blood; reported in micrograms per deciliter (mcg/dL)
- Venous blood sample is the gold standard
- Capillary draw acceptable as initial screen
 - [Follow recommendations for best practices when collecting a capillary blood sample for lead testing](#) (poster)
 - [Mission Unleaded: How to test children for lead with maximum accuracy](#) (video)
 - CDC recommends venous confirmation of capillary BLLs ≥ 3.5 mcg/dL
- Venous sample sent to a reference lab required for follow-up testing
- CLPPB: [Blood Lead Testing fact sheet](#)
- CDC: [LeadCare® Expanded Recall \(October 2021\) Questions & Answers](#)

AB 2326 Laboratory Reporting

- **These changes apply to all laboratories including POC laboratories, in California.**
- *Blood lead results greater than or equal to the most recent CDC reference level is required to be reported within 3 working days of analysis and if the result is less than the CDC reference level, the result is required to be reported within 30 calendar days of analysis.*
- Beginning July 1, 2023, HSC Section 124130: The analyzing laboratory shall report all of the following:
 - The test results in micrograms of lead per deciliter. The testing methodology used for blood lead analysis specified as point of care, inductively coupled plasma mass spectrometry, graphite furnace atomic spectroscopy, or other.
 - The name, birthdate, address of the person tested, including zip code and telephone number, sex, race and ethnicity, and pregnancy status.

AB 2326 Laboratory Reporting¹ (Cont'd)

- The name, address, telephone number, and National Provider Identifier (NPI) of the health care provider that ordered the analysis.
- The name, address, telephone number, Clinical Laboratory Improvement Amendments (CLIA) number, and NPI of the analyzing laboratory. The name, address, telephone number, and CLIA number of the referring laboratory, if any.
- The accession number and the date the specimen was drawn. The date the analysis was performed. The source of the specimen, specified as venous, capillary, arterial, cord blood, or other.
- The person's Medi-Cal client identification number (CIN) or, for other health plans, the name of the health plan and the medical plan identification number.
- The name, address, telephone number of the person's employer, if any.

¹ [Bill Text: AB 2326](#)

- California Management Guidelines:

- # California Management Guidelines for Health Care Providers
- No individual in the blood is known to be safe. The US Centers for Disease Control and Prevention (CDC) established in 2001 a new reference value (13.5 mcg/dL) for lead in blood (PbB) for blood lead levels (PbB) in children (ages 0-6 years) who have not been exposed to lead. California Department of Health (CDHS) Child Lead Poisoning Prevention Training (CLPPT) (01) 605-6046 (<http://www.cdph.ca/leadpoisoning>) for additional information about childhood lead toxicity.
- | PbL ¹ | EVALUATION AND TESTING | MANAGEMENT |
|--|------------------------|------------|
| <p><3.5 mcg/dL</p> <p>Screening PBL may be required for children at risk for iron deficiency (CDHS, 2010) (1) (2) (3) (4) (5) (6) (7) (8) (9) (10) (11) (12) (13) (14) (15) (16) (17) (18) (19) (20) (21) (22) (23) (24) (25) (26) (27) (28) (29) (30) (31) (32) (33) (34) (35) (36) (37) (38) (39) (40) (41) (42) (43) (44) (45) (46) (47) (48) (49) (50) (51) (52) (53) (54) (55) (56) (57) (58) (59) (60) (61) (62) (63) (64) (65) (66) (67) (68) (69) (70) (71) (72) (73) (74) (75) (76) (77) (78) (79) (80) (81) (82) (83) (84) (85) (86) (87) (88) (89) (90) (91) (92) (93) (94) (95) (96) (97) (98) (99) (100) (101) (102) (103) (104) (105) (106) (107) (108) (109) (110) (111) (112) (113) (114) (115) (116) (117) (118) (119) (120) (121) (122) (123) (124) (125) (126) (127) (128) (129) (130) (131) (132) (133) (134) (135) (136) (137) (138) (139) (140) (141) (142) (143) (144) (145) (146) (147) (148) (149) (150) (151) (152) (153) (154) (155) (156) (157) (158) (159) (160) (161) (162) (163) (164) (165) (166) (167) (168) (169) (170) (171) (172) (173) (174) (175) (176) (177) (178) (179) (180) (181) (182) (183) (184) (185) (186) (187) (188) (189) (190) (191) (192) (193) (194) (195) (196) (197) (198) (199) (200) (201) (202) (203) (204) (205) (206) (207) (208) (209) (210) (211) (212) (213) (214) (215) (216) (217) (218) (219) (220) (221) (222) (223) (224) (225) (226) (227) (228) (229) (230) (231) (232) (233) (234) (235) (236) (237) (238) (239) (240) (241) (242) (243) (244) (245) (246) (247) (248) (249) (250) (251) (252) (253) (254) (255) (256) (257) (258) (259) (260) (261) (262) (263) (264) (265) (266) (267) (268) (269) (270) (271) (272) (273) (274) (275) (276) (277) (278) (279) (280) (281) (282) (283) (284) (285) (286) (287) (288) (289) (290) (291) (292) (293) (294) (295) (296) (297) (298) (299) (300) (301) (302) (303) (304) (305) (306) (307) (308) (309) (310) (311) (312) (313) (314) (315) (316) (317) (318) (319) (320) (321) (322) (323) (324) (325) (326) (327) (328) (329) (330) (331) (332) (333) (334) (335) (336) (337) (338) (339) (340) (341) (342) (343) (344) (345) (346) (347) (348) (349) (350) (351) (352) (353) (354) (355) (356) (357) (358) (359) (360) (361) (362) (363) (364) (365) (366) (367) (368) (369) (370) (371) (372) (373) (374) (375) (376) (377) (378) (379) (380) (381) (382) (383) (384) (385) (386) (387) (388) (389) (390) (391) (392) (393) (394) (395) (396) (397) (398) (399) (400) (401) (402) (403) (404) (405) (406) (407) (408) (409) (410) (411) (412) (413) (414) (415) (416) (417) (418) (419) (420) (421) (422) (423) (424) (425) (426) (427) (428) (429) (430) (431) (432) (433) (434) (435) (436) (437) (438) (439) (440) (441) (442) (443) (444) (445) (446) (447) (448) (449) (450) (451) (452) (453) (454) (455) (456) (457) (458) (459) (460) (461) (462) (463) (464) (465) (466) (467) (468) (469) (470) (471) (472) (473) (474) (475) (476) (477) (478) (479) (480) (481) (482) (483) (484) (485) (486) (487) (488) (489) (490) (491) (492) (493) (494) (495) (496) (497) (498) (499) (500) (501) (502) (503) (504) (505) (506) (507) (508) (509) (510) (511) (512) (513) (514) (515) (516) (517) (518) (519) (520) (521) (522) (523) (524) (525) (526) (527) (528) (529) (530) (531) (532) (533) (534) (535) (536) (537) (538) (539) (540) (541) (542) (543) (544) (545) (546) (547) (548) (549) (550) (551) (552) (553) (554) (555) (556) (557) (558) (559) (560) (561) (562) (563) (564) (565) (566) (567) (568) (569) (570) (571) (572) (573) (574) (575) (576) (577) (578) (579) (580) (581) (582) (583) (584) (585) (586) (587) (588) (589) (590) (591) (592) (593) (594) (595) (596) (597) (598) (599) (600) (601) (602) (603) (604) (605) (606) (607) (608) (609) (610) (611) (612) (613) (614) (615) (616) (617) (618) (619) (620) (621) (622) (623) (624) (625) (626) (627) (628) (629) (630) (631) (632) (633) (634) (635) (636) (637) (638) (639) (640) (641) (642) (643) (644) (645) (646) (647) (648) (649) (650) (651) (652) (653) (654) (655) (656) (657) (658) (659) (660) (661) (662) (663) (664) (665) (666) (667) (668) (669) (670) (671) (672) (673) (674) (675) (676) (677) (678) (679) (680) (681) (682) (683) (684) (685) (686) (687) (688) (689) (690) (691) (692) (693) (694) (695) (696) (697) (698) (699) (700) (701) (702) (703) (704) (705) (706) (707) (708) (709) (710) (711) (712) (713) (714) (715) (716) (717) (718) (719) (720) (721) (722) (723) (724) (725) (726) (727) (728) (729) (730) (731) (732) (733) (734) (735) (736) (737) (738) (739) (740) (741) (742) (743) (744) (745) (746) (747) (748) (749) (750) (751) (752) (753) (754) (755) (756) (7</p> | | |

2023 Blood Lead Testing and Anticipatory Guidance.pdf (ca.gov)

Other Indications for a Blood Lead Test¹

- Parental request
- Sibling, playmate, or other close contact with an increased blood lead level
- Suspected lead exposure ([see possible sources of exposure](#))
- History of living in or visiting country with high levels of environmental lead

¹ Not currently in regulations but also should be considered

Potential Sources of Lead: Educating Families to Prevent Childhood Lead Exposure	
Potential Sources of Lead	Guidance for Families
Old paint inside or outside the home Most lead paint is in homes built before 1978	• Move cribs, high chairs, and playpens away from cracked or peeling paint. • Do not allow children to chew on windowsills or other painted surfaces. • Call local lead poisoning prevention program about testing paint for lead.
Dust on windowsills, floors, and toys	• Wet mop floors and wet wipe windowsills and other surfaces. • Wash toys often. • Wash children's hands before eating and sleeping.
Dirt outside the home	• Cover bare dirt with stones, grass, plants, or gravel. • Wipe shoes or take them off BEFORE going in the house.
Drinking Water	• For cooking or drinking, let water run until cold before using. • Do not use a water crock unless it has been tested and found to be lead free.
Take-home exposure from shoes/clothing/hair if family member works around lead or performs auto repair at home	Shower and change clothes BEFORE coming home from work, if possible, and BEFORE holding children. Remove work clothes and shoes and store them in a plastic bag. Wash work clothes separately from other clothes.
Some dishes or pots that are worn or antique, from a discount or flea market, made of crystal, handmade, or made outside the USA	Call local lead poisoning prevention program for more information about testing dishes and pots for lead.
Traditional remedies, such as: • Azarcon and Greta — orange or yellow powder • Paylooaah — red powder • Some Ayurvedic remedies • Some traditional Chinese remedies	Do not let anyone give "natural" or traditional remedies to your child without talking to your health care provider first.
Some traditional cosmetics & other substances applied to the skin, such as: • Surma • Kohl • Sindoor	• Do not use these products on children. • Call local lead poisoning prevention program about testing traditional cosmetics, ritual powders, and other substances applied to the skin.
Altars for religious ritual containing: • Ritual powders • Brass and some other metal, ceramic, or painted items	• Place altars with these types of items in areas not accessible to children. • Don't let children handle or mouth these items. • Use separate cleaning supplies to clean these items.
Some costume jewelry, amulets, and keys	Do not allow young children to play with, mouth or touch these items.
Some foods and spices, such as: • Some candies (especially imported) • Chapulines (grasshopper snacks) • Some imported spices, such as turmeric, chili powder, Khmeli Suneli • Game meat containing lead shot	• Be aware of foods and spices that might contain lead. • Offer children meals and snacks including a variety of vegetables, fruit, legumes, seeds, nuts, whole grains, unprocessed meats, and dairy products or dairy substitutes without added sugar.
Other items, such as: • Fishing sinkers, bullets, pellets, and solder • Some art supplies and sewing chalk	• Keep these items away from children. • Wash hands well after touching these items. • Do not heat, melt, cast or file any metal items at home.
Spends time at firing ranges	• Children who spend time at firing ranges should be tested for lead. • Use lead free ammunition. • Do not eat or drink at a firing range. • When finished shooting, immediately wash your hands and face with soap and water. • Change clothes and shoes before going home and wash those clothes separately.
Retained bullets and shrapnel	Consult with your healthcare provider about ongoing testing and monitoring.
Lives near: • Major roadways or freeways • A former or current lead or steel smelter • A foundry or industrial facility that historically emitted or currently emits lead • A general aviation airport used by small aircraft	• Tell your healthcare provider if your children live or spend time near these types of roadways or facilities. • Do not let children play or spend time near these types of roadways or facilities.
Download patient brochures and other childhood lead poisoning resources at: https://www.cdph.ca.gov/Programs/CCDPHP/DEOD/CLPPB/Pages/prov.aspx	
For additional information about lead poisoning contact: Childhood Lead Poisoning Prevention Branch Tel. (510) 620-5600	
2019 Page 2	

Re-testing timelines by BLL¹ < 3.5 mcg/dL (Current CDC BLRV)

Tests and Retests

- | | |
|--|--|
| <ul style="list-style-type: none">● Screening BLLs may be either capillary (CBLL) or venous (VBLL).● Filter paper blood lead tests are not accepted by the State of California. | <ul style="list-style-type: none">● If tested before 12 months, re-test in 3-6 months as risk increases with increased mobility.● VBLL test anyone birth to 21 years when indicated due to known or suspected lead exposure.● Follow-up with VBLL in 6-12 months if indicated. |
|--|--|

¹ California regulations require testing at **both** ages 12 months and 24 months (up to 72 months if not tested at 24 months) if child is in a publicly funded program for low-income children, spends time at a pre-1978 place with deteriorated paint or that has been recently renovated, or has other lead exposure risks.

Re-testing timelines by BLL

3.5*–9.4 mcg/dL

Retesting for Initial CBLL	Retesting for Initial VBLL	VBLL monitoring once declining
● Obtain confirmatory VBLL within 3 months. ● Retest based on range of confirmatory VBLL.	● Obtain 2-4 follow-up VBLLs. ● First venous retest within 3 months. ● Then 1-3 subsequent venous retests every 3 months.	● VBLL retest every 6-9 months and thereafter based on VBLL trend.

*Per CDC BLRV

Re-testing timelines by BLL

9.5–14.4 mcg/dL

Retesting for Initial CBLL	Retesting for Initial VBLL	VBLL monitoring once declining
● Obtain confirmatory VBLL within 1 month. ● Retest based on range of confirmatory VBLL.	● Obtain 2-4 follow up VBLLs. ● First venous retest within 1-3 months. ● Then 1-3 subsequent venous retests every 1-3 months.	● VBLL retest every 3-6 months and thereafter based on VBLL trend.

Re-testing timelines by BLL

14.5–19.4 mcg/dL

Retesting for Initial CBLL	Retesting for Initial VBLL	VBLL monitoring once declining
● Obtain confirmatory VBLL within 1 month. ● Retest based on range of confirmatory VBLL.	● Obtain 2-4 follow up VBLLs. ● First venous retest within 1-3 months. ● Then 1-3 subsequent venous retests every 1-3 months.	● VBLL retest every 3-6 months and thereafter based on VBLL trend.

Re-testing timelines by BLL

19.5–44.4 mcg/dL

Retesting for Initial CBLL	Retesting for Initial VBLL	VBLL monitoring once declining
● Obtain confirmatory VBLL within 2 weeks. ● Retest based on range of confirmatory VBLL.	● Obtain 2-4 follow up VBLLs. ● First venous retest within 1-4 weeks (the higher the BLL, the sooner the retest). ● Then 1-3 subsequent venous retests every 2-4 weeks.	● VBLL retest every 1-3 months and thereafter based on VBLL trend.

Re-testing timelines by BLL

BLL	Confirmatory VBLL	VBLL monitoring
44.5-59.4 mcg/dL	WITHIN 48 HOURS	● 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.
59.5-69.4 mcg/dL	WITHIN 24 HOURS	
≥ 69.5 mcg/dL	IMMEDIATELY	

Additional Considerations for BLLs ≥ 44.5 mcg/dL

- **Expedite confirmatory VBLL** to validate accuracy of initial BLL.
- If initial CBLL ≥ 44.5 mcg/dL and confirmatory VBLL < 3.5 mcg/dL, a repeat VBLL in 2-4 weeks is recommended. Sooner if symptomatic or probable lead exposure, in order to rule out possible false negative.
- Obtain confirmatory VBLL result, obtain KUB, and complete other medically appropriate actions BEFORE initiating chelation.
- Consult with a medical toxicologist or pediatric hematologist experienced in managing chelation regarding initiation of chelation before confirmatory test result is available in a symptomatic child.
- If child symptomatic with altered mental status, seizing or appears toxic, do not withhold chelation therapy awaiting confirmatory VBLL.
- Consider modifying protocol if VBLLs are not decreasing as expected or remain chronically elevated, e.g., from a retained bullet.

Evaluation and Management

< 3.5 mcg/dL (Current CDC BLRV)

Evaluation	Management
● Perform routine history and assessment of physical and mental development. ● Assess nutrition. ● Assess risk for iron deficiency. ● Consider lead exposure risks.	● Mandated anticipatory guidance at each periodic visit age 6 to 72 months. ● Discuss hand to mouth activity, pica, hand washing, sources of lead. ● Counsel on any risk factors identified. ● Encourage good nutrition, especially iron, vitamin C, and calcium. ● Consider referral to WIC. ● Encourage participation in early enrichment programs and activities. ● Chelation is not recommended in this BLL range.

Evaluation and Management for VBLL 3.5-9.4 mcg/dL

Evaluation	Management
● Evaluate as for < 3.5 mcg/dL AND ● Take an environmental history. ● Test for iron sufficiency (CBC, Ferritin, CRP). ● Perform structured developmental screening at periodic health visits.	● Manage as for < 3.5 mcg/dL AND ● Counsel on nutrition, iron, Vitamin C, and calcium. ● Treat iron insufficiency per AAP guidelines. ● Consider starting a multivitamin with iron. ● Add notation of elevated BLL to child's medical record.

Evaluation and Management for VBLL 3.5-9.4 mcg/dL (Cont'd)

Evaluation	Management
● Evaluate risk to other children and pregnant and lactating individuals in the home.	● 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 individuals in the home. ● Refer to WIC, if eligible. ● Coordinate with local CLPPP or state CLPPB for outreach, education, and other services.¹ ● Chelation is not recommended in this BLL range.

¹ www.cdph.ca.gov/programs/CLPPB

Evaluation and Management for VBLL 9.5-14.4 mcg/dL

Evaluation	Management
● Evaluate as for 3.5-9.4 mcg/dL ● To determine eligibility for full public health case management, retest with a VBLL. ● Eligible if persistent in or above this range.	● If BLL is persistent in or above this range, contact the local CLPPP (or, if no local program, the state CLPPB)¹. ● If eligibility confirmed, family will receive full public health case management services, including nursing visit, environmental investigation, and follow-up for children age birth to 21 years. ● Chelation is not recommended in this BLL range.

¹ www.cdph.ca.gov/programs/CLPPB

Evaluation and Management for VBLL 14.5-19.4 mcg/dL

Evaluation	Management
● Evaluate as for 9.5-14.4 mcg/dL AND ● Consider abdominal X-ray if suspected ingestion of leaded materials, history of pica or excessive mouthing.	● Manage as for 9.5-14.4 mcg/dL AND ● Consider gut decontamination if foreign bodies are seen on abdominal X-ray. ● If 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 or for questions about clinical management.¹ ● Chelation is not recommended in this BLL range. ● The state CLPPB is available for further consultation (510-620-5600). See footnote for other knowledgeable agencies.²

¹ www.cdph.ca.gov/programs/CLPPB

Evaluation and Management for VBLL 19.5-44.4 mcg/dL

Evaluation	Management
● Evaluate as for 14.5-19.4 mcg/dL ● Consider abdominal X-ray to check for lead-based paint chips and other radiopaque foreign bodies.	● Manage as for 14.5-19.4 mcg/dL¹ AND ● Consider referral to California Children's Services (CCS). Requires VBLL $\geq$ 20 mcg/dL.³ ● Consider referral for medical nutrition therapy.⁴ ● Chelation is not recommended in this BLL range.

¹ www.cdph.ca.gov/programs/CLPPB

Evaluation and Management for VBLL 44.5-69.4 mcg/dL - URGENT

Evaluation	Management
● Evaluate as for 19.5-44.4 mcg/dL AND ● Obtain abdominal X-ray.	● Manage as for 19.5-44.4 mcg/dL AND ● Consider chelation. ● Refer to CCS. ● Consult with a physician experienced in managing chelation. ● Evaluate whether hospitalization is needed to reduce lead exposure and achieve compliance with treatment protocols. ● If admitted, child must be discharged to a lead-safe environment. ● Immediately notify local CLPPP or state CLPPB.¹

¹ www.cdph.ca.gov/programs/CLPPB

Evaluation and Management for VBLL $\geq$ 69.5 mcg/dL – MEDICAL EMERGENCY

Evaluation	Management
● Evaluate as for 44.5-69.4 mcg/dL AND ● Obtain abdominal X-ray. CAUTION: Depending on BLL, high index of suspicion, and/or clinical status, initiating management prior to receiving confirmatory VBLL result may be indicated.	● Manage as for 44.5-69.4 mcg/dL AND ● If BLL is confirmed, hospitalize to stabilize, chelate, reduce lead exposure and monitor progress. ● Consult with a medical toxicologist or pediatric hematologist experienced in managing chelation. ● Perform gut decontamination, if indicated, BEFORE chelation. ● Immediately notify local CLPPB or state CLPPB.¹ ● Child must be discharged to a lead-safe environment.

¹ www.cdph.ca.gov/programs/CLPPB



Chelation Therapy

- Consult with a medical toxicologist or pediatric hematologist experienced in managing chelation.
- Not usually indicated below 44.5 mcg/dL.^{5,6}
- Perform gut decontamination, if indicated, **BEFORE** chelation.

CDC Initial BLL Testing Recommendations for Newly Arrived Refugees

- Initial lead exposure screening with blood test:
- All refugee infants and children ≤ 16 years of age
- Refugee adolescents > 16 years of age if there is a high index of suspicion, or clinical signs/symptoms of lead exposure
- All pregnant and lactating women and girls



CDC Refugee Follow-up BLL Testing Recommendations

- Retest 3-6 months after initial testing:
 - All refugee infants and children ≤ 6 years of age, regardless of initial screening result.
 - Refugee children and adolescents 7–16 years of age who had BLLs ≥ 3.5 mcg/dL.
 - For any child older than 7 years of age who has a risk factor (e.g., sibling with BLL ≥ 3.5 mcg/dL, environmental exposure risk factors) regardless of initial test result.
 - Pregnant or lactating adolescents (<18 years of age) who had BLLs ≥ 3.5 mcg/dL at initial screening.
 - California guidelines for all children up to age 21 mandate repeat BLL if initial BLL ≥ 3.5 mcg/dL.

Nutritional Changes Can Reduce Lead Absorption

- Ingested lead is much more bioavailable when fasting than after a meal
- Lead is absorbed via the same pathways as dietary iron and calcium
- Children absorb significantly more lead than adults via the GI tract^{1,2}
- Good nutrition, especially iron, vitamin C, and calcium, can help decrease lead absorption
- Refer low-income families to WIC, when appropriate



¹ Zeigler EE, et al, [Absorption and retention of lead by infants](#). Ped Res, 12:29-34, 1978

² Alexander FW, [The uptake of lead by children in differing environments](#), Env Health Perspect, May 1974, p 155-159

Malnourished Children

- Malnourished children (such as newly arrived refugees) are at greater risk for lead poisoning
 - Micronutrient deficiencies can increase absorption of lead
 - Especially if dietary iron or calcium deficiency
 - Zinc deficiency may also increase a child's risk¹
- CDC recommends providing daily pediatric multivitamins with iron to all refugee children aged 6 months to 6 years of age and multivitamins with iron and calcium for refugee women and girls who are pregnant or breastfeeding²



¹ Bhutta ZA, [Micronutrient needs of malnourished children](#), Current Opinion in Clinical Nutrition and Metabolic Care 2008, 11:309–314

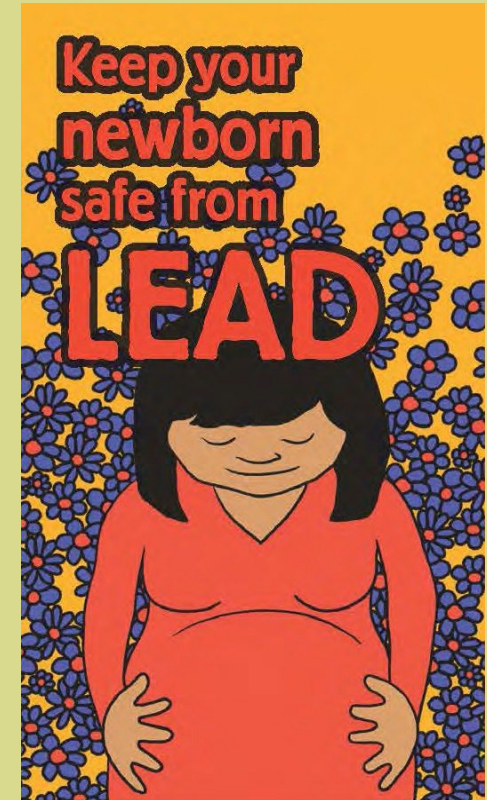
² CDC, [Screening for Lead during the Domestic Medical Examination for Newly Arrived Refugees](#)

Lead in Pregnancy and Breastfeeding



Lead During Pregnancy

- Lead crosses the placenta.
- If maternal VBLL is ≥ 5 mcg/dL
 - Mother will require more frequent testing.
 - Infant's cord blood should be tested at birth.
 - Infant BLL at birth is proportional to and close to maternal BLL.
 - Provide 2000 mg calcium per day in divided doses during pregnancy and lactation to reduce bone resorption.¹
 - Maternal BLL will decrease in the second trimester due to physiologic increase in blood volume – continue to test during pregnancy, at delivery, and at least one month post-partum



¹ American College of Obstetrics and Gynecology, Committee Opinion No. 533, Aug 2012, Committee on Obstetric Practice, [Lead Screening During Pregnancy and Lactation](#)

CDC Guidance on Breastfeeding When Mother Has an Elevated BLL

- Breast milk lead is approximately 3% of maternal VBLL but can be as high as 7.5%.¹
- Breast milk lead concentration increases in a non-linear fashion as the maternal blood lead level increases above 40 mcg/dL.
- For breastfed infants whose BLLs are rising or failing to decline by 5 mcg/dL or more, environmental and other sources of lead should be evaluated.¹

¹ Ettinger A, [Guidelines for the Identification and Management of Lead Exposure in Pregnant and Lactating Women](#), CDC, 2010:84-85,99-101

CDC Recommendations on Lead Levels with Regard to Breastfeeding (Cont'd)

- If no external source of lead exposure is identified, and maternal BLLs are ≥ 20 mcg/dL and infant BLLs are ≥ 5 mcg/dL
 - Breast milk may be the source.
 - Consider temporarily pumping and discarding the breast milk until maternal BLLs are lower.
- Mothers with BLLS ≥ 40 mcg/dL should pump and discard their breast milk until maternal BLLs are lower.
- CDC guidance on testing and follow-up of pregnant and breastfeeding women with BLLs ≥ 5 mcg/dL and testing and follow-up of their infants can be found at: CDC, [Lead and Pregnancy.](#)

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Services Provided by California Childhood Lead Poisoning Prevention Programs

State Case Definitions: Age < 21 Years

- Basic case criteria are:
 - BLL $\geq$ 3.5 mcg/dL, not meeting full case criteria.
 - Receive outreach and education, and graded services up to full case management and Environmental Professional (EP) services if indicated and as resources allow.
- Full state case criteria are:
 - One VBLL $\geq$ 14.5 mcg/dL or
 - Two BLLs $\geq$ 9.5 mcg/dL
 - The second BLL must be venous.
 - There may be lower BLLs in-between.
 - Receive PHN home visits, case management and EP services.
- All follow-up tests must be venous for children meeting basic or full state case definition.

State Case Definitions

- Children with blood lead levels ≥ 3.5 mcg/dL to 9.4 mcg/dL are considered basic state cases.
- Full State Cases
 - Children with a single venous BLL ≥ 14.5 mcg/dL OR
 - Children with two BLLs ≥ 9.5 mcg/dL; the second BLL must be venous
 - Receive PHN home visits, case management and Environmental Professional services
- All follow-up testing must be venous for children meeting basic or full state case definition.

Public Health Services For Full State Cases

- Public Health Nurse (PHN) Case Management
 - PHN visits
 - Outreach and education
 - Nutrition assessment and neurodevelopmental screening
 - Coordination with health care providers and referrals to public health services
 - Monitoring and follow-up
- Assessment by an Environmental Professional
 - Environmental assessment of home
 - Enforcement of lead remediation and abatement



Take-Home Messages

Prevention is the Goal

- Prevention is the best approach to lead exposure
- Low levels of lead can cause developmental delay and organ damage
- Anticipatory guidance is mandated for all children from age 6 months to 6 years at every well child check
- Young children in publicly funded programs and those who live in or spend time in older buildings and housing are most at risk and are mandated to be tested
- Refugees and recent immigrants are also at risk and should be tested



Prevention is the Goal (cont'd)

- Low levels of lead that don't cause overt symptoms can have adverse effects on neurocognitive and neurobehavioral development.
- Pediatric exposure can have long term consequences.
- Consider lead in your differential diagnosis for children with cognitive or behavioral deficits, anemia, and nonspecific constitutional symptoms.



Most Common Exposure Sources

- Most common exposure is from lead-contaminated paint, dust, or soil
- Other sources need to be considered
 - Occupational take-home
 - Lead containing:
 - Foods and spices
 - Consumer products
 - Remedies and cosmetics
 - Hobbies



Take-Home Messages

- **Testing at-risk children** is the best method of early detection
- **Pediatric exposure** can have long term consequences



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- 661-321-3000
- <https://www.kernpublichealth.com/healthy-community/infants-children/lead-poisoning-prevention>

The background of the slide is a repeating pattern of stylized flowers in shades of orange, pink, and green. A large, white, rounded rectangular box is centered on the slide, containing the text. The text is in a bold, dark green, sans-serif font.

Resources and Additional Slides

Provider Guidelines

- [California Management Guidelines on Childhood Lead Poisoning for Health Care Providers](#)
- [Standard of Care Guidelines on Childhood Lead Poisoning for California Health Care Providers](#)
- [Blood Lead Testing Guidance](#)



To Order Patient or Provider Materials

- **Patient materials:**

<https://www.cdph.ca.gov/Programs/CCDPHP/DEODC/CLPPB/Pages/edmatls.aspx>

- **Provider materials:**

<https://www.cdph.ca.gov/Programs/CCDPHP/DEODC/CLPPB/Pages/prov.aspx>

- **To order any of these materials, contact the Branch at:**

CLPPB_Provider_Materials@cdph.ca.gov



CDC Guidance on Capillary Blood Testing

- [CDC guidance on capillary blood lead testing](#)
- The CDC instruction poster, [Steps for Collecting Finger Stick Capillary Blood Using a Microtainer®](#)
- [CDC Capillary Lead Testing Video](#)



State and County Resources

- California Lead Poisoning Prevention Branch

<https://www.cdph.ca.gov/programs/clppb>

- County Childhood Lead Poisoning Prevention Program

<https://www.cdph.ca.gov/Programs/CCDPHP/DEODC/CLPPB/Pages/CLPPPIndex.aspx>

- Lead Related Construction Program

<https://www.cdph.ca.gov/Programs/CCDPHP/DEODC/CLPPB/Pages/LRC.aspx>

- Occupational Lead Poisoning Prevention Program

<https://www.cdph.ca.gov/Programs/CCDPHP/DEODC/OHB/OLPPP/Pages/OLPPP.aspx>



State and County Resources cont'd

- Medi-Cal –
<http://www.dhcs.ca.gov/services/medi-cal/Pages/default.aspx>
- California Children's Services – CCS
<http://www.dhcs.ca.gov/services/ccs/pages/default.aspx>
- Head Start - <http://www.caheadstart.org>
- CHDP – Child Health and Disability Prevention Program
<http://www.dhcs.ca.gov/services/chdp/Pages/default.aspx>
- WIC -
<https://www.cdph.ca.gov/Programs/CFH/DWICSN/Pages/Program-Landing1.aspx>



Federal Resources

- CDC - <http://www.cdc.gov/nceh/lead/>
- EPA - <http://www.epa.gov/lead/>
- EPA - Lead in drinking water
[EPA Guidance on lead in drinking water](#)
- US Consumer Product Safety Commission
www.cpsc.gov
- US Food and Drug Administration –
<http://www.fda.gov/Food/GuidanceRegulation/GuidanceDocumentsRegulatoryInformation/ChemicalContaminantsMetalsNaturalToxinsPesticides/ucm077904.htm>



State Food and Drug Resources

- California Food and Drug Branch – Lead in Candy

<https://www.cdph.ca.gov/Programs/CEH/DFDCS/Pages/FDBPrograms/FoodSafetyProgram/LeadInCandy.aspx>

- California Safe Cosmetics Program
<https://www.cdph.ca.gov/Programs/CCDPHP/DEODC/OHB/CSCP/Pages/CSCP.aspx>



The background of the slide is a vibrant floral pattern. It features large, stylized flowers in shades of orange, peach, and light green, set against a darker green background. The flowers have prominent stamens and are arranged in a repeating pattern. A large, white, rounded rectangular box is centered on the slide, serving as a backdrop for the title.

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