

The Prevention of Childhood Lead Poisoning: Risk Factors, Management, and the Physician's Role in Anticipatory Guidance

Jean Woo, MD, MPH, MBA, FAAP

Public Health Medical Officer

Childhood Lead Poisoning Prevention Branch

California Department of Public Health

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- Brigitte Bailey, MPH, CHES, Supervisor, Quality Improvement Department, Clinical Initiatives Team, L.A. Care Health Plan, CME Planner.
- Caroline Basil, MPH, CHES, Project Manager, Quality Improvement Department, Clinical Initiatives Team, L.A. Care Health Plan, CME Planner.
- Janet M. Scully, MPH, Program Manager, Lead Free Homes LA, Environmental Health Division, Los Angeles County Department of Public Health, CME Faculty.
- Shalonda Loyd, RN, PHN, MSN, Public Health Nurse, Childhood Lead Poisoning Prevention Program, Division of Maternal, Child & Adolescent Health, Los Angeles County Department of Public Health, CME Faculty.

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L.A. Care Health Plan 10-08-2024 Pre-Test



<https://forms.office.com/g/Xik8bTG0cx>

Overview of CDPH Childhood Lead Poisoning Prevention Program



Vision: A healthy, lead-safe environment where all children can achieve their full potential.

Mission: To eliminate childhood lead poisoning by identifying and caring for children who are lead-burdened and preventing environmental exposures to lead.



Goal 1
Program Support

Goal 2
Partnerships

Goal 3
Lead-Safe Environments

Goal 4
Data-Driven Research

Goal 5
Blood Lead Testing

Goal 6
Robust Case Management

Learning Objectives



- List three (3) risk factors for childhood lead exposure.
- Identify two (2) age groups for appropriate blood testing of at-risk children.
- Name two (2) blood lead screening methods accepted for California and appropriate circumstances for using each method when testing blood lead in at-risk children.
- Summarize three (3) potential effects of lead exposure in children under age 6.
- Recognize the scope, risk factors, clinical effects, and management of childhood lead exposure.
- Identify cultural risk factors for lead exposure and identify that children in all socioeconomic groups may be at risk for lead exposure.
- Summarize California's Childhood Lead Poisoning Prevention statutes, regulations, and provider mandates.
- Specify the role of the provider giving and documenting anticipatory guidance in preventing childhood 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 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.

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

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 and Women, Infants and Children (WIC) 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.

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:

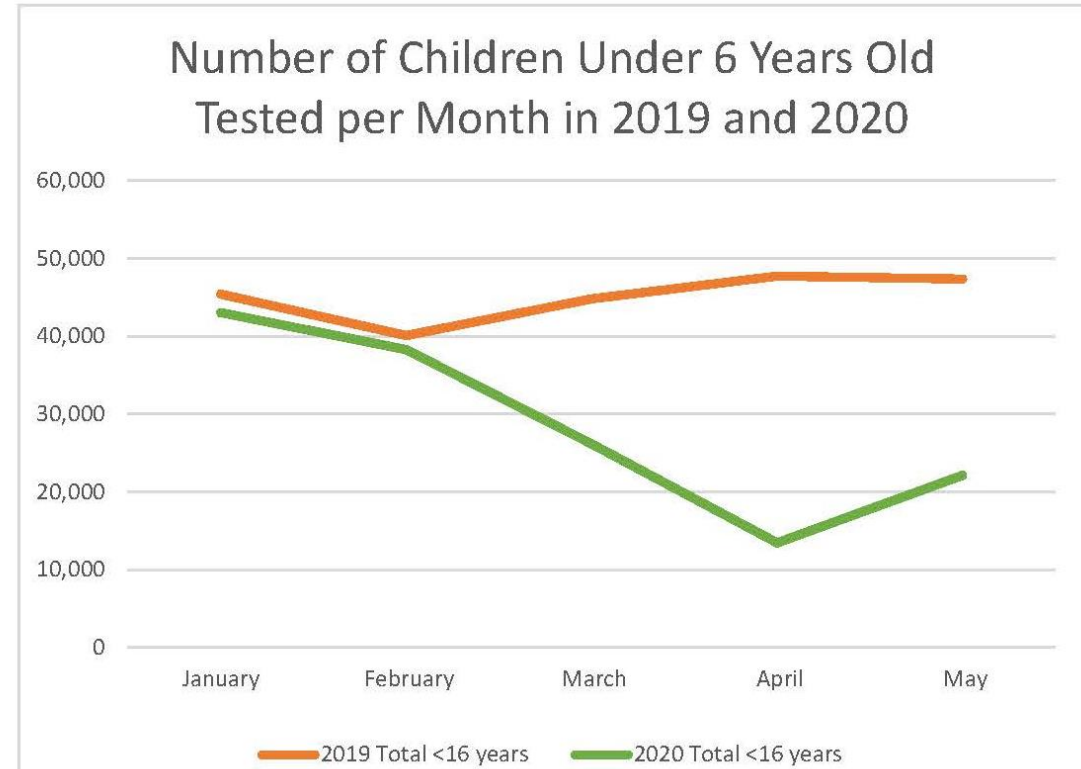
Ask: "Does your child live in, or spend a lot of time in, a place built before 1978 that has peeling or chipped paint or that has been recently remodeled?"

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

Gaps in Childhood Blood Lead Testing During COVID-19 Pandemic



- During the COVID-19 pandemic in 2020, 28% fewer California children under 6 years old were tested compared to 2019.
- Children who missed mandated blood lead testing need catch-up testing.



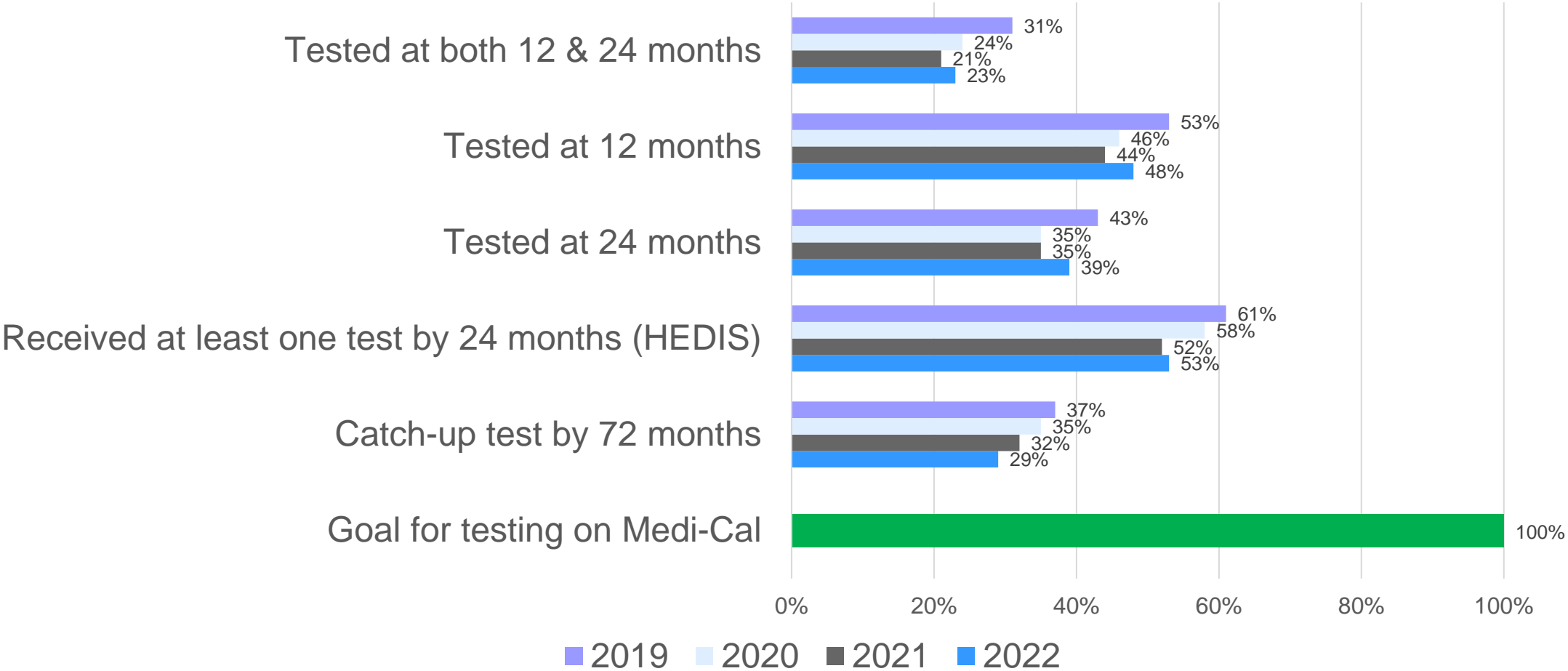
¹ CLPPB, [California's Progress in Preventing and Managing Childhood Lead Exposure](#), 2022

² CLPPB, [Strategies to Address Declining Blood Lead Screening Rates During COVID-19](#), 08/2020

HEDIS¹ and Lead Testing Requirements

- Health Care Effectiveness Data and Information Set (HEDIS) measures:
 - Standardized performance measures applied to federally funded Medi-Cal HMOs.
 - ‘Require at least one capillary or venous blood lead test by child’s 2nd birthday”.¹
- California mandates are different from HEDIS 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.

Percent of Medi-Cal Children Blood Lead Tested Age < 6 Years 2018-2022



Source: <https://www.dhcs.ca.gov/dataandstats/reports/Documents/CA2022-23-Preventive-Services-Report.pdf>

California Children Tested 2021 & 2022 With BLL \geq 3.5 mcg/dL

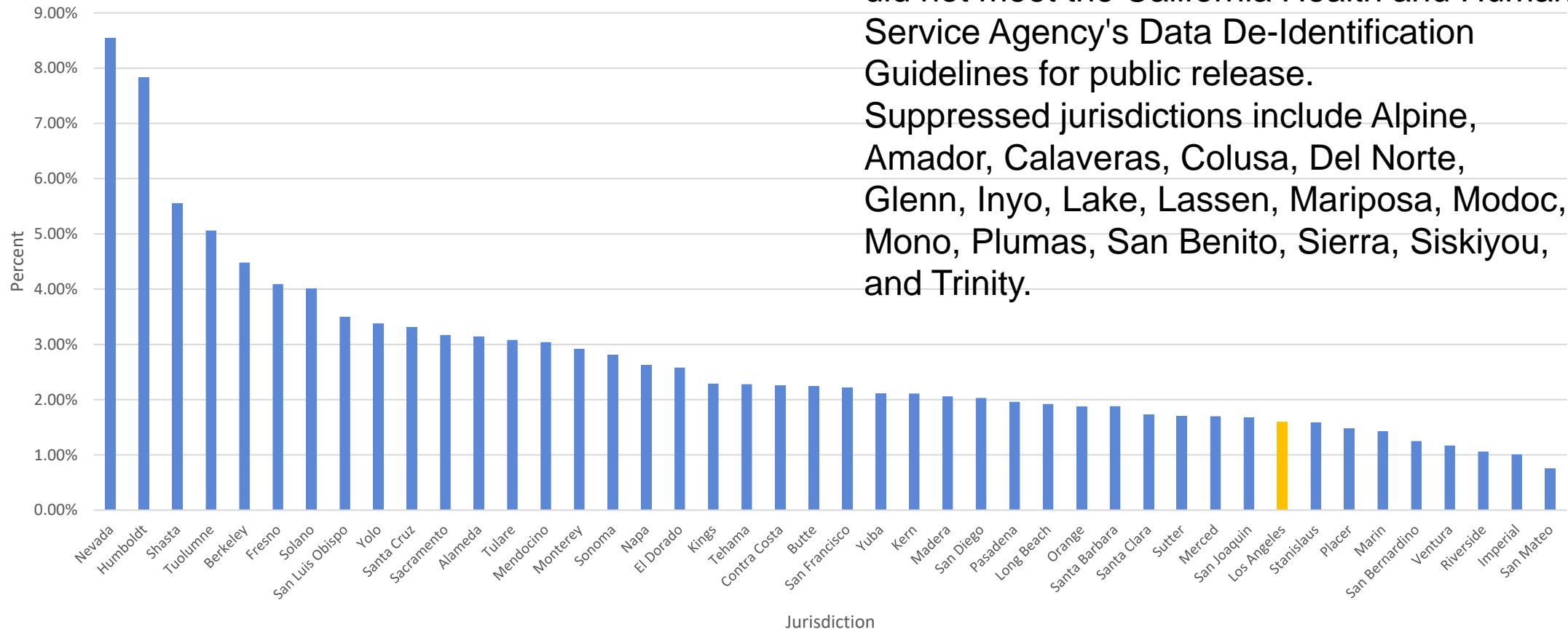


| | 2021 | | | 2022 | | |
|---------------|---------|---------------------|---------------------|---------|---------------------|---------------------|
| | Total N | N \geq 3.5 mcg/dL | % \geq 3.5 mcg/dL | Total N | N \geq 3.5 mcg/dL | % \geq 3.5 mcg/dL |
| Age <6 | 370,981 | 6,973 | 1.88 | 376,007 | 7,514 | 2.00 |
| Age 6-21 | 37,468 | 1,522 | 4.06 | 42,674 | 1,555 | 3.64 |
| Total Age <21 | 408,449 | 8,495 | 2.08 | 418,681 | 9,069 | 2.17 |

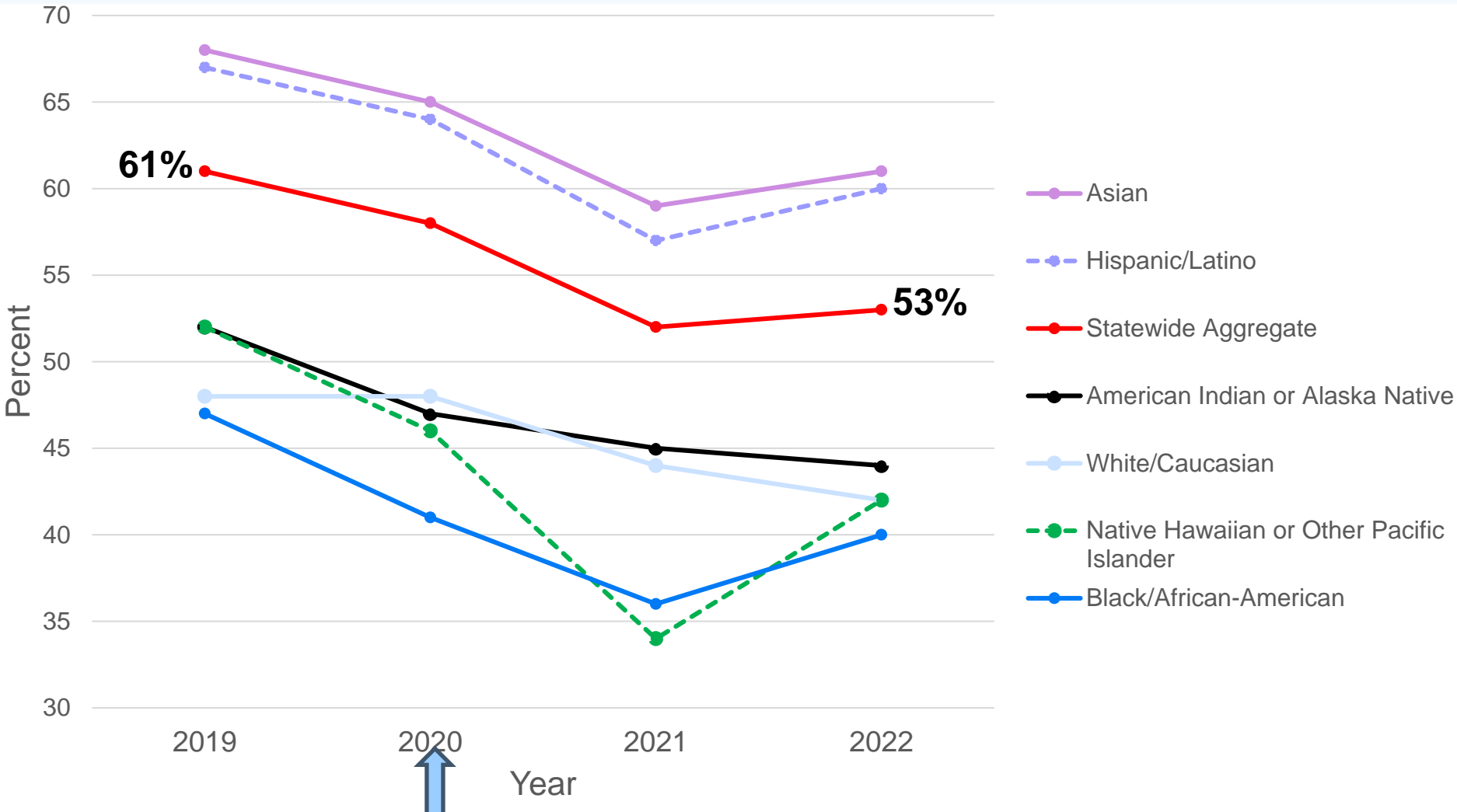
Percent of Children Age < 6 Years Screened for Lead with BLLs \geq 3.5 mcg/dL, Selected Jurisdictions*, 2022



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, Lake, Lassen, Mariposa, Modoc, Mono, Plumas, San Benito, Sierra, Siskiyou, and Trinity.

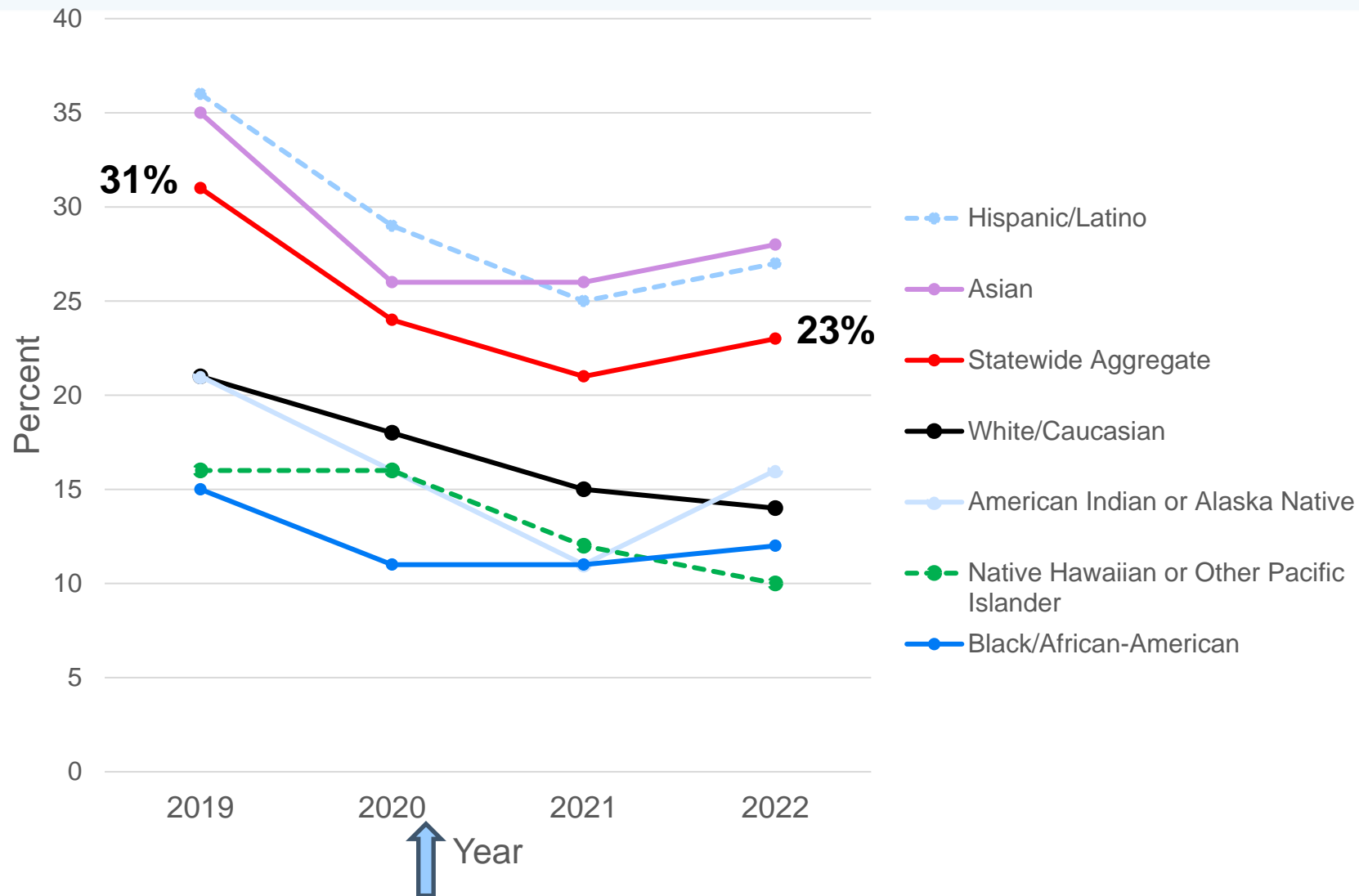


Percent of California Children Enrolled in Medi-Cal with at Least One Blood Lead Test by 24 Months - HEDIS



California COVID-19 Pandemic Incident Period: January 20, 2020 - May 11, 2023

Percent of California Children Enrolled in Medi-Cal with Blood Lead Tests at Both 12 and 24 Months



California COVID-19 Pandemic Incident Period: January 20, 2020 - May 11, 2023

Lead Exposure is Measured By Blood Lead Levels



- Since 2003, all blood lead levels are reported to the State of California.
- The blood lead level is a biomarker that reflects both short and long-term exposure:
 - Current exogenous sources.
 - Slow release associated with bone remodeling:
 - Accelerated during periods of rapid growth, post fractures, prolonged bedrest or immobilization.
 - May be higher during pregnancy and breastfeeding.

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/dL.²
- 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:

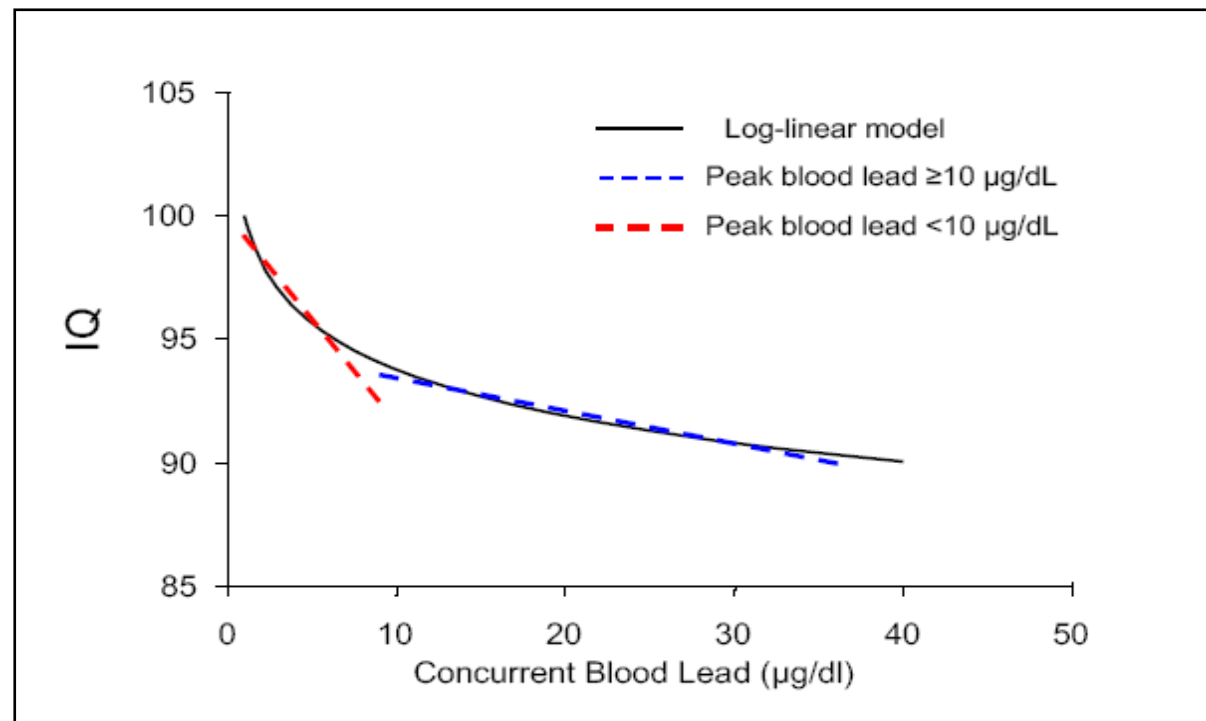
- Give anticipatory guidance about common sources of lead exposure and how to prevent exposure.
- Obtain a confirmatory venous sample for capillary results ≥ 3.5 mcg/dL.
- For children with venous BLLs ≥ 3.5 mcg/dL, provide:
 - Venous blood lead monitoring at recommended intervals
 - Follow-up based 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 scores.¹
- 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 2005;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.





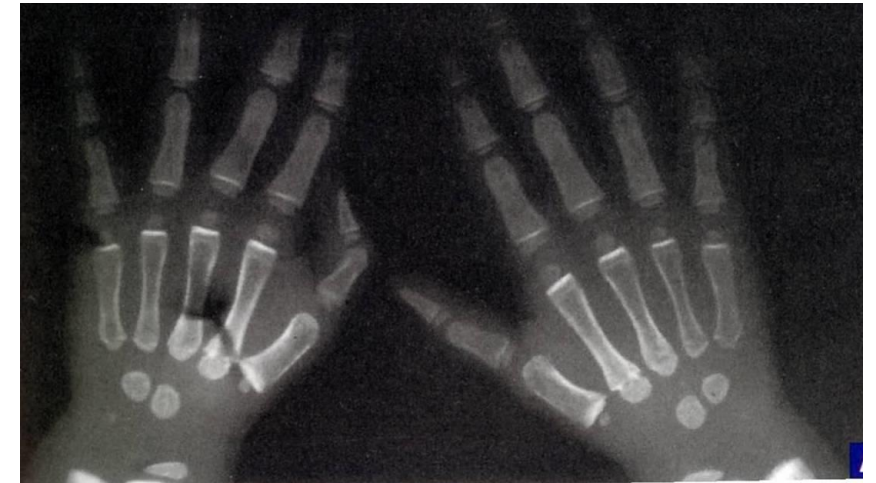
Health Effects of Lead

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 children.¹
 - 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



- Anemia.¹
- Neurologic System: Neurotoxic.¹
 - 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 Issues:¹
 - 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 rate.¹²
 - Potential link to criminal behavior.¹³
- Neurodegenerative Issues:
 - Affects structural brain integrity in midlife with potentially greater risk of neurodegenerative diseases in later life.¹⁴

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 Maturation.²⁰
 - Problems with Fertility.
- Cardiovascular Disorders:
 - Link to childhood^{21,22} and adult hypertension,^{23,24,25,26}
 - Atherosclerosis.²⁴
 - Cardiovascular mortality.^{27,28}
 - Cerebrovascular morbidity and mortality.²⁸

Other Disorders Associated with Lead Exposure (Cont'd)

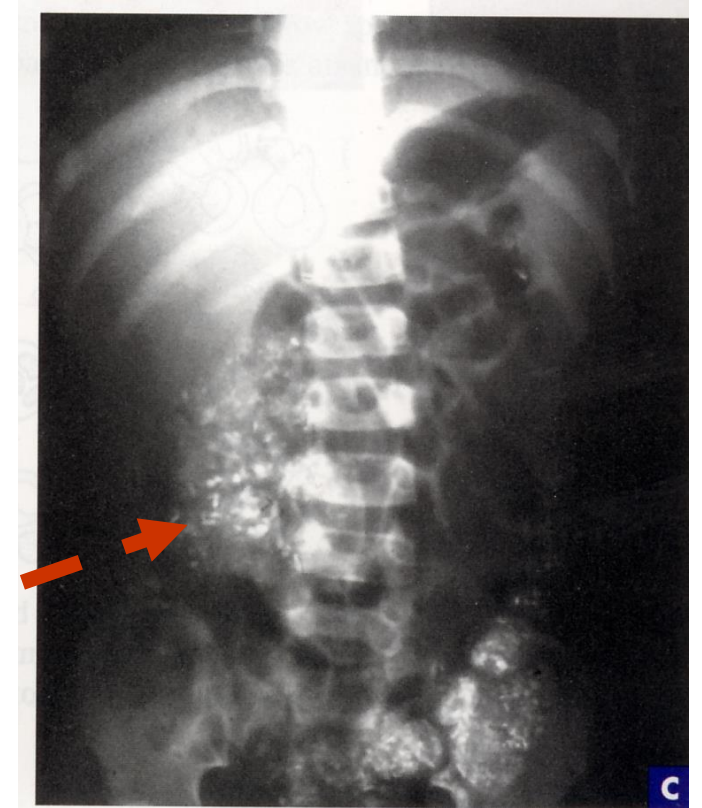


- Immunologic Effects.²⁹
- Renal Disorders:
 - Lead nephropathy.^{24,29}
- Respiratory Disorders:²⁹
 - Possible link to obstructive lung changes and asthma (inconsistent findings, more studies needed).
- Adverse dental effects:²⁹
 - Dental caries (children).
 - Tooth loss (adults).
- Probable Human Carcinogen.^{29,30}

Most Children Today Don't Have Overt Clinical Symptoms

- Earliest clinical signs and symptoms:
 - Anemia.
 - Anorexia, loss of appetite.
 - Abdominal discomfort.¹
 - Constipation.²
 - 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

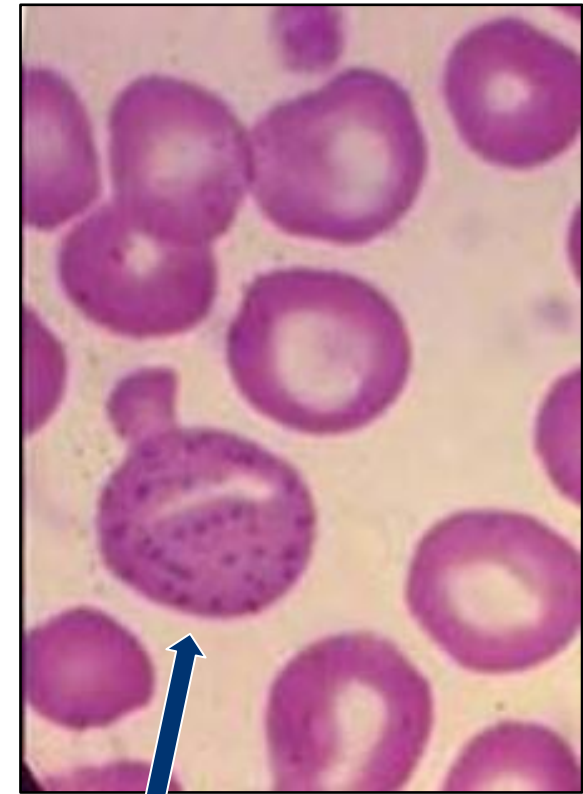
³ Pediatric Environmental Study Group (PEHSU) AAP. Recommendations on Medical Management of Childhood Lead Exposure and Poisoning, June 2013 Update

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



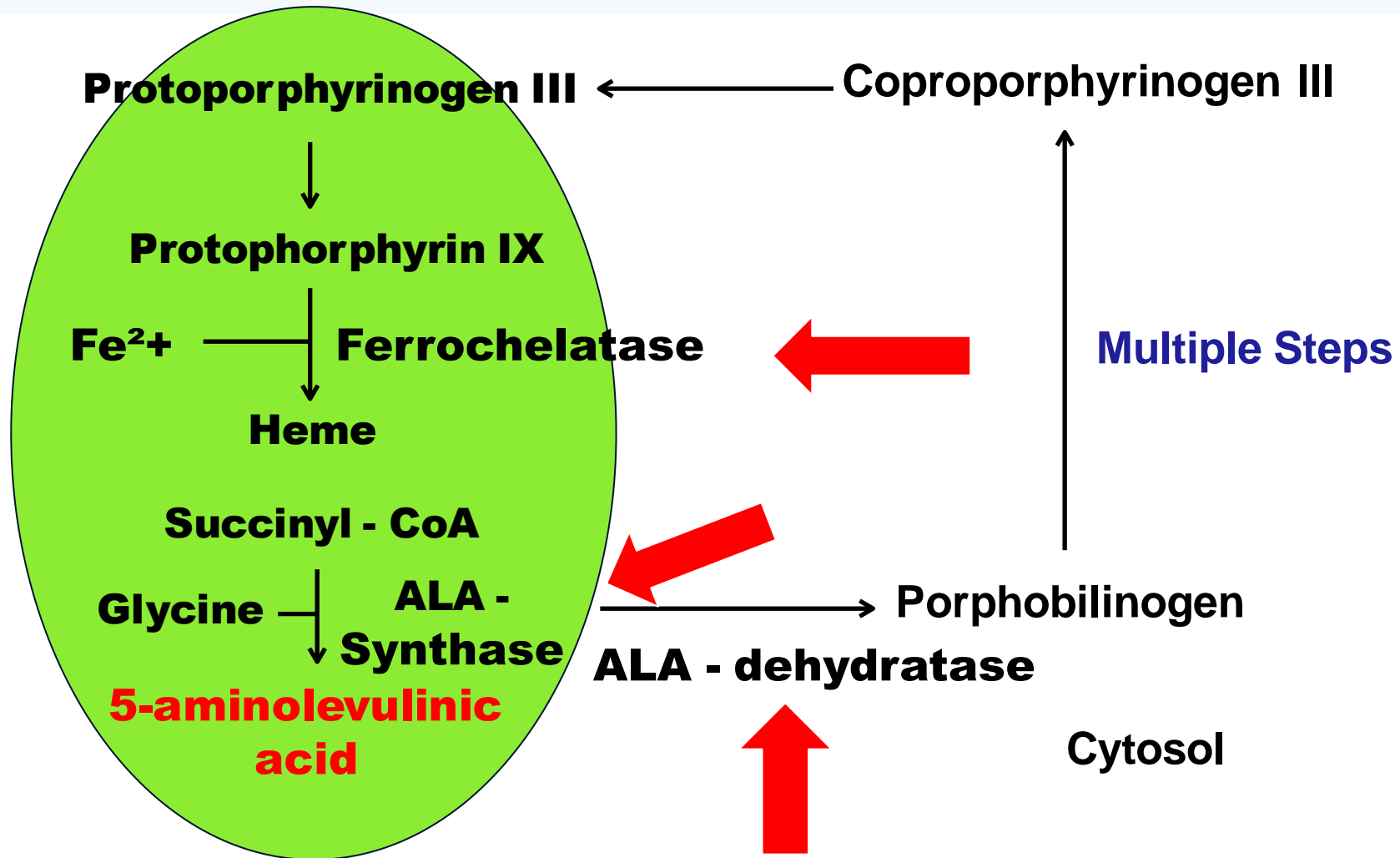
- Microcytic and normocytic anemia:
 - Interferes with hemoglobin synthesis and erythrocyte lifespan.
 - Increased free erythrocyte protoporphyrin (FEP).
 - Basophilic stippling.
- Iron insufficiency leads to more lead absorption.
- Iron deficiency anemia often associated with elevated blood lead level.¹



Basophilic Stippling

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

Lead Interferes with Heme Biosynthesis^{1,2}



¹ Alcindor T, et al, Brit J of Haematology, 2002, 116, 733–743

² Piomelli S, in “Low Level Lead Exposure: The Clinical Implications of Current Research”, HL Needleman, Ed, Raven Press, 1980, pp 67-74

Effects of Lead on the Neurologic System

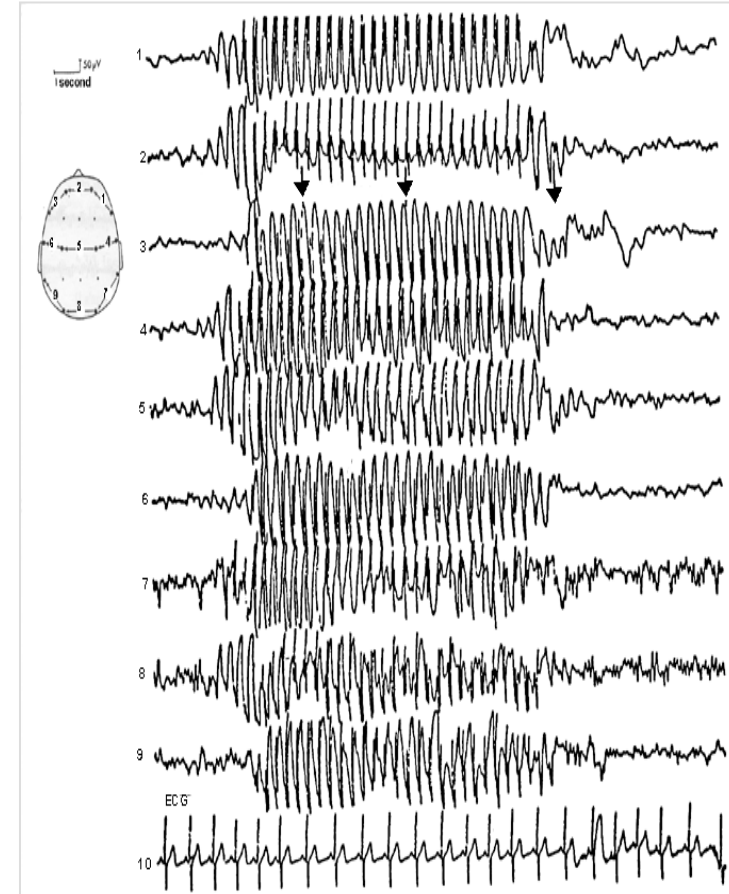


- Substitutes for calcium in the brain and impairs neurotransmitter and receptor development and function.
- Neurologic toxicant:
 - Affects mobility and differentiation of neurons during development.
 - Creates oxidative stress, alters gene expression.
 - Affects early development of blood-brain barrier.¹
 - 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.
- Reduces pruning associated with brain maturation.

Toxicity - Rare Clinical Signs and Symptoms



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



Case Report of Death from Lead Poisoning: MMWR 3/23/2006¹



- Feb 2006: 4-year-old dies in Minnesota of undiagnosed lead poisoning (BLL 180 mcg/dL).²
- Child swallowed a charm that came with sneakers.
- No history of pica.
- Charm was made of lead.
- Reebok recall.



¹ Berg et al, MMWR, [Death of a Child After Ingestion of a Metallic Charm-Minnesota](#), 2006

² Berkowitz S, Pediatrics, Dec 2006; 118(6): 2548-51

Lead Metabolism in Children is Different Than in Adults

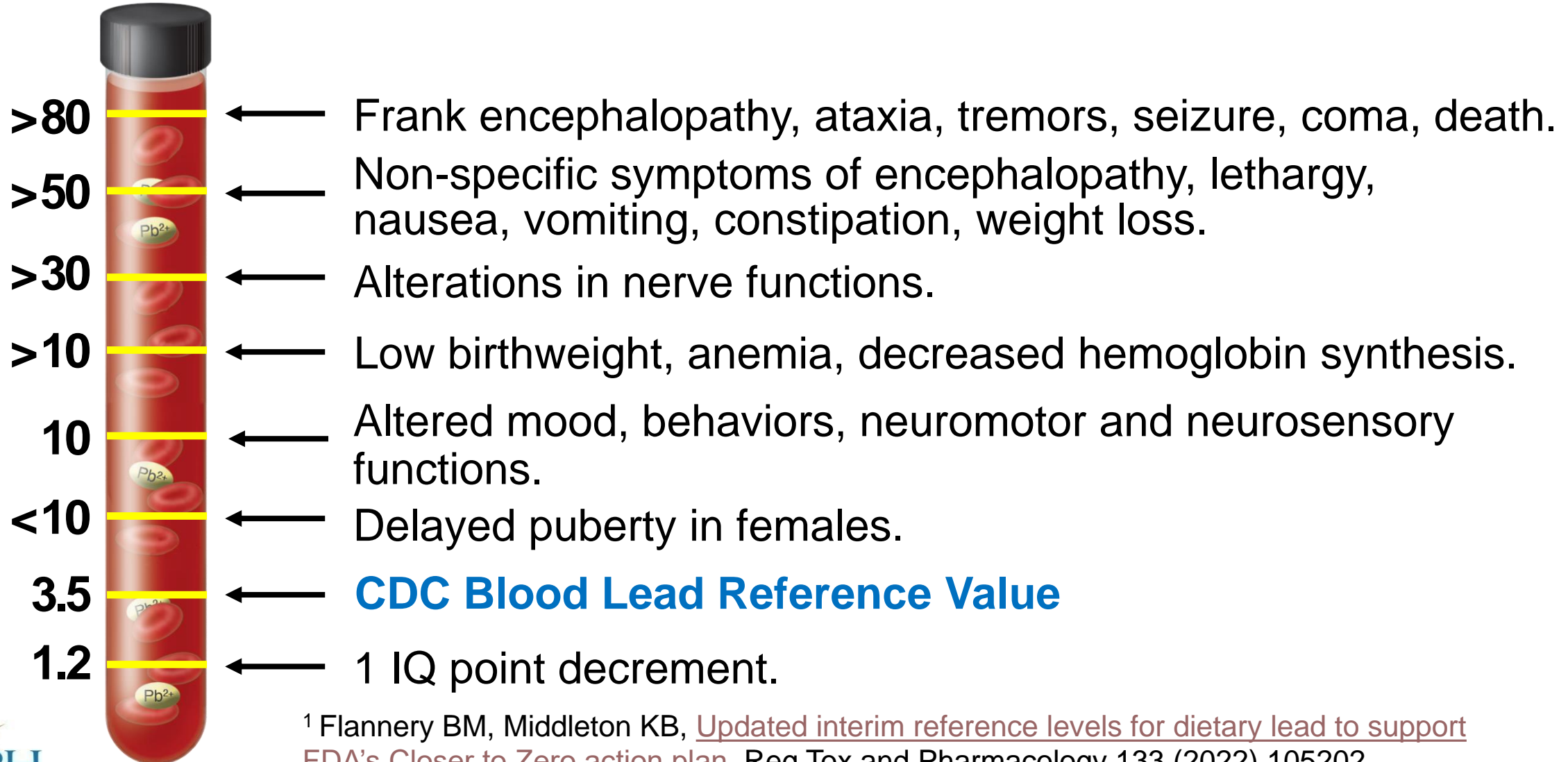


| | Children and Adolescents | Adults Age 21 and up |
|------------------------------|---|--|
| GI Absorption ^{1,2} | 50% | 10% |
| Blood-Brain Barrier | Still developing in infancy and early childhood | Fully formed by adulthood |
| Bone Storage ³ | ~73% | ~94% |
| Bone Resorption | <p>Periods of rapid growth⁴</p> <p>Adolescent pregnancies⁵</p> <p>Periods of bone remodeling such as fractures, prolonged bedrest⁶</p> | <p>Pregnancy⁷</p> <p>Breastfeeding</p> <p>Osteoporosis, Menopause⁸</p> <p>Periods of bone remodeling</p> <p>Accelerated bone turnover (e.g., bone disease, thyrotoxicosis)</p> |

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



Blood Lead Levels(mcg/dL)

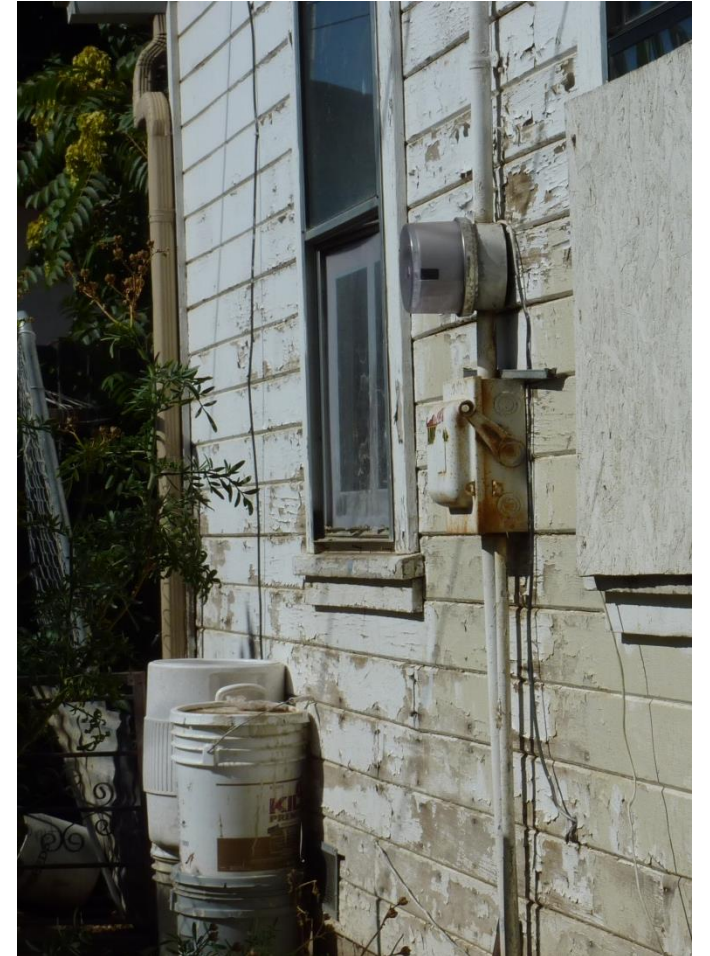


¹ Flannery BM, Middleton KB, [Updated interim reference levels for dietary lead to support FDA's Closer to Zero action plan](#), Reg Tox and Pharmacology 133 (2022) 105202

Paint, Dust and Soil Are Still the Most Common Sources of Lead for Children in California



- Young child with capillary blood lead level < 5 mcg/dL on routine screening evaluation.
 - Venous BLL (VBLL) 86 mcg/dL more than 12 months later when returned for Well Child Check.
 - Sent to local Children's Hospital Emergency Department (ED) and admitted for chelation.
 - Source: Eating the “walls” – old peeling paint.



Infant with Apnea



- 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.



Toddler with Diaper Rash



- Toddler, recent immigrant, with severe diaper rash.
- Routine blood screening at time of entry.
- Family used a homemade cream made with sindoor for diaper rash.
- VBLL 37 mcg/dL on initial screening exam.
- Similar creams have been identified in other cases in Northern California.



Sindoor

570,000 ppm lead

Obtunded and Seizing Toddler

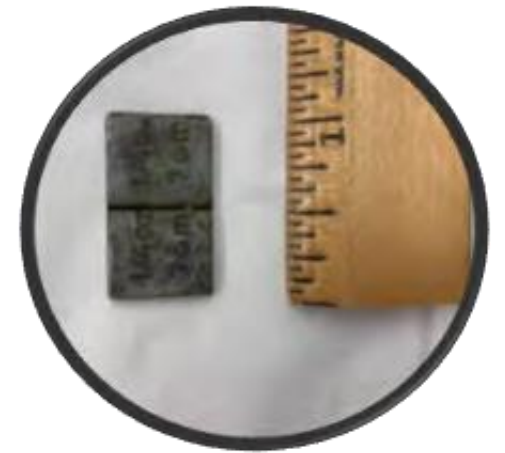


- Toddler with no known history of seizures.
- Lethargic, obtunded, recurring seizures.
- In Pediatric Intensive Care Unit (PICU), developed encephalopathy and increased intracranial pressure.
- Scans suggested cerebellar mass.
- Emergency craniotomy performed.
- Abdominal x-ray (KUB) after placing nasogastric tube a few days after admission.
- Radiopaque mass seen in stomach.

Obtunded and Seizing Toddler (Cont'd)



- Rectangular piece of metal found on endoscopy.
- VBLL 80 mcg/dL – drawn after finding metal in gastrointestinal tract.
- Wheel weight containing 97% lead.
- Required IV chelation several times.
- Rehabilitation, developmental services.
- Source: parent is a mechanic, items stored in garage.



**Wheel weight
97% lead**

Consider Lead as Possible Cause for Children with Behavioral and Neurologic Problems



- 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

Teen with Vomiting and Abdominal Pain



- 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.



Abdominal Pain in a Child with Sickle Cell Disease



- School-aged child with known sickle cell disease:
 - Onset of abdominal pain, seen at local ED, no VBLL drawn.
 - History of prior elevated VBLL, chelated 5 years prior.
 - History of pica - observed eating dirt and other non-food items.
 - VBLL ordered by hematologist and drawn 2 weeks later.
 - Confirmed VBLL 159 mcg/dL.
 - KUB negative for opaque foreign body, positive for constipation.
 - Admitted for IV chelation.

Sickle Cell Disease, Pica, and Lead Poisoning



- Prevalence of pica in sickle cell pediatric patients is 34% to 66%.¹
 - Pica can be associated with elevated blood lead levels.
 - Peak blood lead levels in sickle cell patients occur at age 6-8.
 - Pica behavior in sickle cell patients may continue to mid-teens.^{1,2}
- Consider testing for lead in school-aged children with hemolytic blood disorders.

¹ Rodrigues N, et al, [Pica in Pediatric Sickle Cell Disease](#), J Clin Psych in Med Settings, 2019

² Jung JM, Peddinti R, [Lead Toxicity in the Pediatric Patient with Sickle Cell Disease: Unique Risks and Management](#), Ped Ann 47(1)2018:e36-e402

Some Effects of Lead Exposure Potentially Not Identified Until School Age^{1,2,3}



- Speech and language delay.
- Hearing loss.
- Cognitive problems:
 - Short-term memory.
 - Long-term memory.
- Executive function.
- Perceptual problems.
- Behavioral problems:
 - Lack of attention.
 - Hyperactivity.
 - Impulsiveness.

¹ Braun JM et al, Exposures to Environmental Toxicants and Attention Deficit Hyperactivity Disorder in U.S. Children, *Env Health Persp* 2006;114:1904-1909

² Lanphear BP et al, Cognitive deficits associated with blood lead concentrations <10 mcg/dL in US children and adolescents, *Public Health Rep* 115;(2000):521-529

³ Lidsky TI, Schneider JS, Lead neurotoxicity in children: basic mechanisms and clinical correlates, *Brain* (2003); 126:5-19

Some Studies on Educational Impact of Lead Exposure in Children¹



| Blood Lead Levels | Educational Impact | Size of Study | Location of Study |
|---------------------------|--|---------------------------|--------------------------------------|
| ≤ 3 mcg/dL | Decreased end of grade test scores | More than 57,000 children | North Carolina (Miranda et al. 2009) |
| 4mcg/dL at 3 years of age | Increased likelihood learning disabled classification in elementary school | More than 57,000 children | North Carolina (Miranda et al. 2009) |
| | Poorer performance on tests | 35,000 children | Connecticut (Miranda et al. 2011) |

¹ CDC, [Educational Interventions Affected by Lead](#)



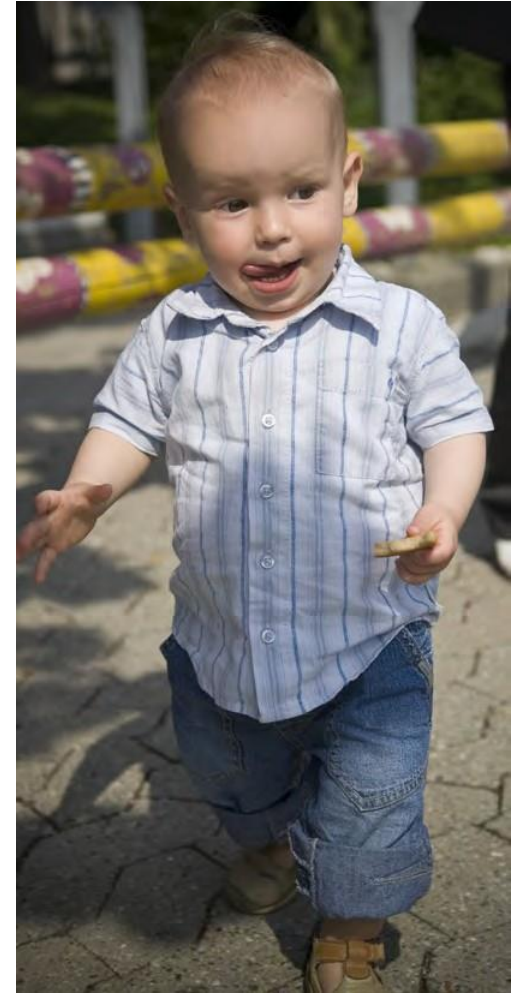
Who is at Risk for Lead Exposure?



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.
 - 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.



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.

Sources of Lead Exposure



Routes of Exposure

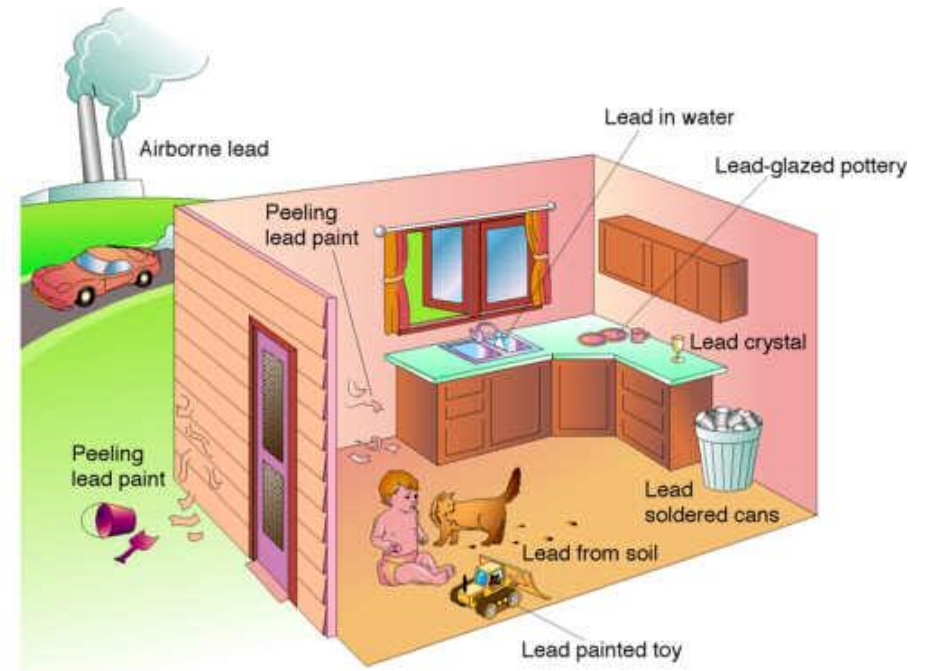


- Oral and Hand-to-Mouth
- Respiratory
- Transplacental & Breast Milk
- Dermal
- Retained Bullets

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.



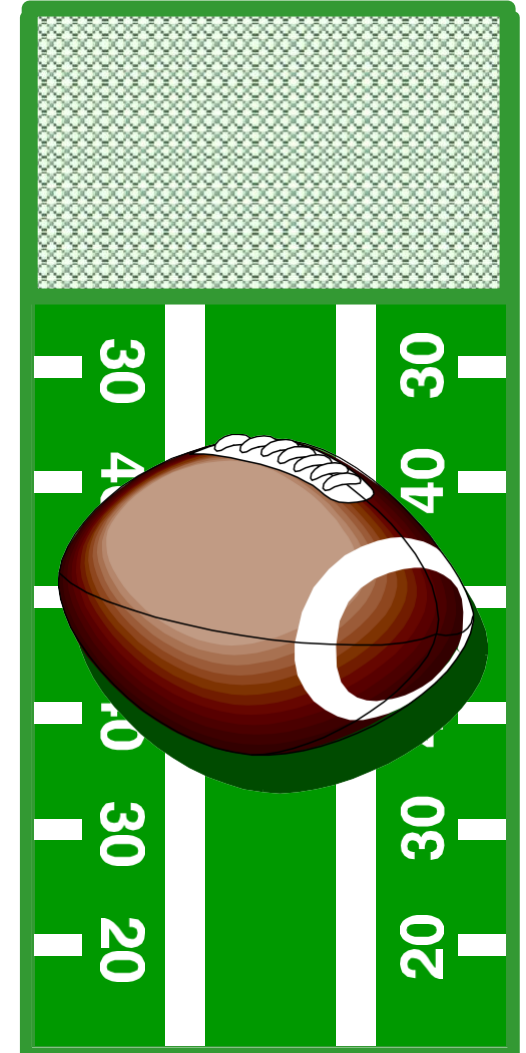
How Much Lead is of Regulatory Concern?



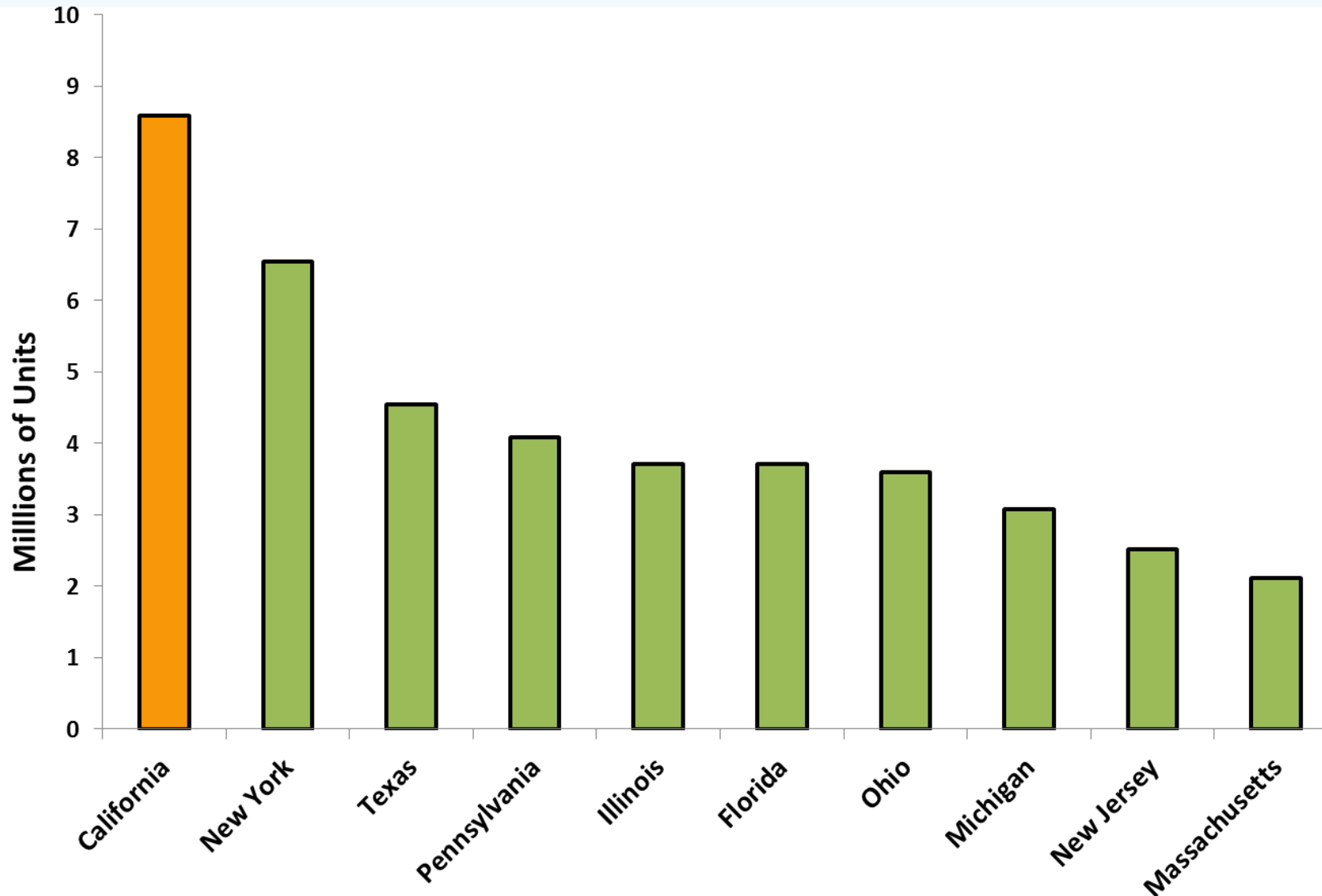
- 1 gram packet of lead dust spread over 10,000 square feet (ft²) = 100 mcg/ft².
- Current EPA action level: 10 mcg/ft² of indoor floor dust.
- FDA maximum daily dietary intake for lead (Interim Reference Level):^{1,2}
 - 2.2 mcg per day for children.
 - 8.8 mcg per day for females of childbearing age.

¹ FDA, [Closer to Zero: Action Plan for Baby Foods](#)

² Flannery BM, Middleton KB, [Updated interim reference levels for dietary lead to support FDA's Closer to Zero action plan](#), Reg Toxicology and Pharmacology 133(2022)105202



Older Housing More Likely to Have Lead-Based Paint: Top Ten States in U.S. with Pre-1980 Housing¹



¹ Based on 2010 Census Data

Leaded Gasoline



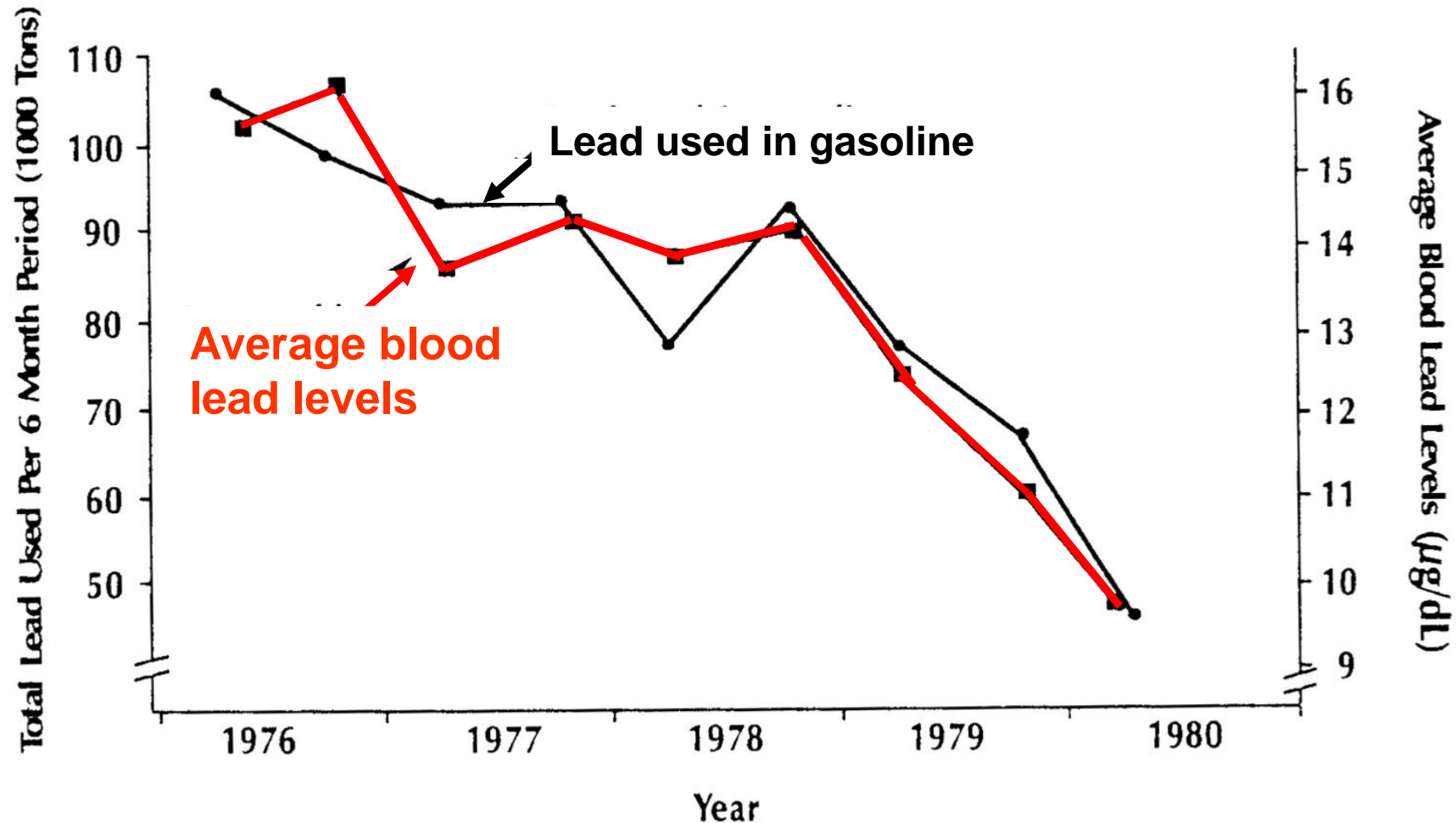
- Lead removed from gasoline for on-road vehicles in the 1990s in the U.S.
- Leaded gasoline still used for small aircraft (avgas).^{1,2}
- USEPA declares endangerment finding for lead emissions in aircraft engines operating with leaded fuel.³

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

Change in Blood Lead Levels in Relation to Decline in Use of Leaded Gasoline in On-Road Vehicles 1976-1980



Annest JL, et al, NEJM 1983;308(23):1373-1377
Fergusson JE, Sci of the Tot Env 1986;50(1968):1-54

Lead in Soil Remains



Lead in Drinking Water



- Pre-1986 housing more likely to have lead in pipes, fittings, solder, fixtures and faucets.¹
- Lead and Copper Rule (1991) prohibited lead pipe for residential use and set a federal action level of 15 ppb for drinking water.²
- EPA is considering long term revisions to the Lead and Copper Rule.³



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](#)

California Lead Service Line Replacement



- Service lines that contain lead are called lead service lines.
- Over the next ten years, California public water utilities are replacing lead service lines that they own.
- Further information can be found at: [CLPPB, Lead Service Line Replacement](#)



Potential Lead Service Line

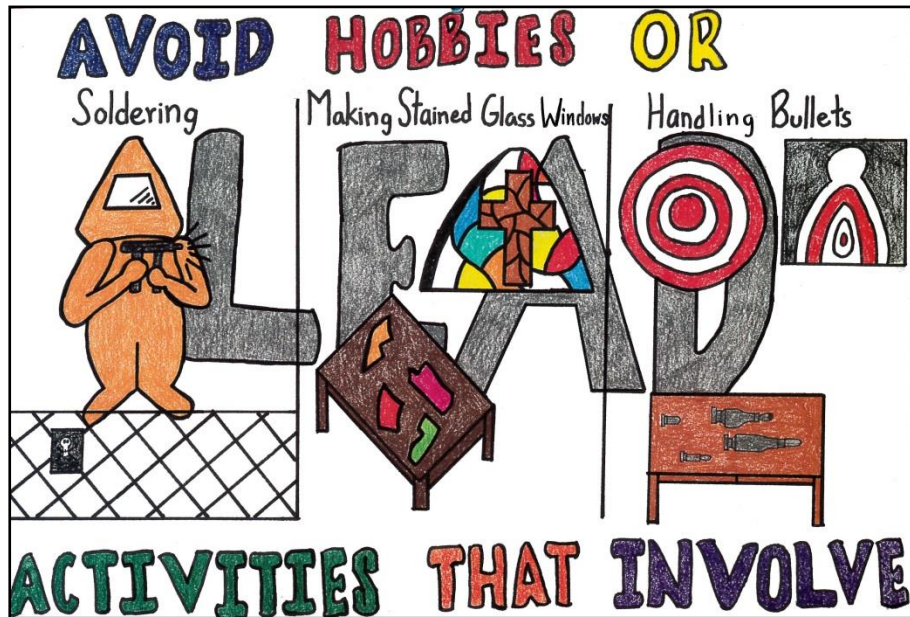
Steps to Help Reduce Any Potential Exposure to Lead in Tap Water



- Always use water from the cold tap for drinking or cooking.
- If water needs to be heated, draw water from the cold water tap and heat the water on the stove, teapot or in the microwave.
- Let the water run for at least 30 seconds prior to using it for drinking or cooking.
- If the household water has not been used for 6 hours or more, let the water run for a longer period of time (1 to 5 minutes until the water feels cold).
- Set this water aside for non-potable uses (e.g., cleaning, houseplants).
- Consider using a water filter certified to remove lead.
 - EPA, [A Consumer Tool for Identifying Point of Use \(POU\) Drinking Water Filters Certified to Reduce Lead](#)
- Well water should be tested before use.
 - US EPA, [Private Drinking Water Wells](#)



Other Sources of Lead are Important Lead Exposure is Cumulative



Examples of Sources of Lead



- Occupational Sources
- Pica
- Hobbies
- Ceramics
- Leaded Crystal
- Ceramic Water Crocks
- Artist's Paint
- Consumer Products
- Traditional Remedies
- Traditional Creams and Cosmetics
- Candy
- Spices
- Baby Food
- Metal Objects
- Aluminum Pots

Lead in Ceramics & Crystal^{1,2}



Cazuela

24-hour leach results:
13 mcg/mL =
3,250 mcg in 250 mL



Molcajete



Leaded Crystal



Dishware

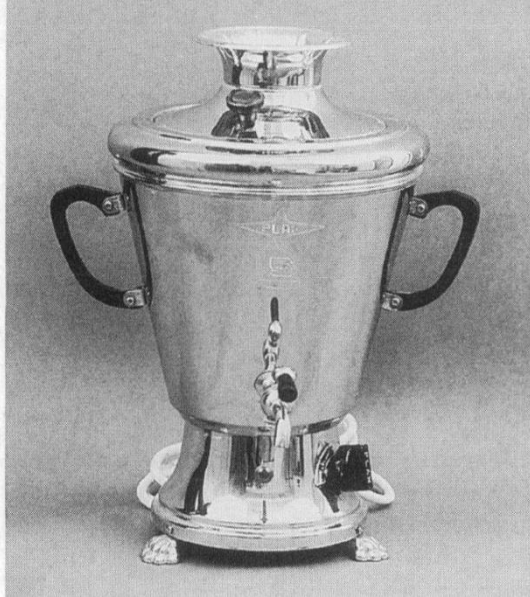
¹Lynch, R, J Environ Health, May 2008

²Villalobos, M, et al, Sci Tot Env, Apr 2009

Some Cookware May Contain Lead Including Cookware Brought to U.S. by Refugees



Samovar¹ Purchased Overseas



- Unboiled water after:
 - 15 minutes in Samovar
 - 1,000 mcg/250 ml

From Afghanistan* 2,3



- Leachate after:
 - 15 min boiling
 - 89.8 mcg/250 ml
 - 24 hrs in pot after boiling
 - 315 mcg/250 ml

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

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

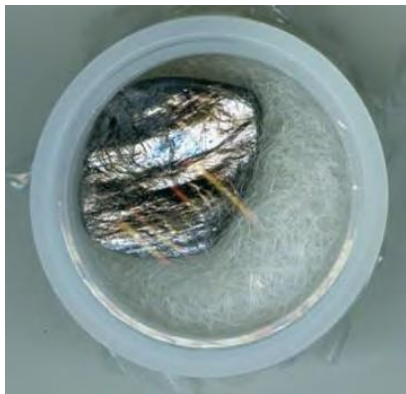
*Photos Courtesy: Stephen G. Whittaker, Katie M. Fellows, Hazardous Waste Management Program, King County, WA

Lead in Traditional Creams and Cosmetics



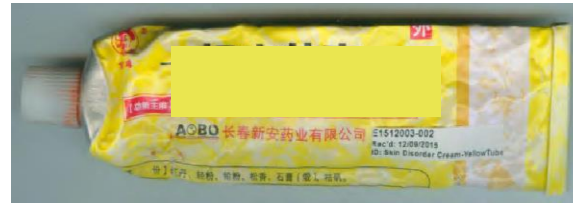
Kohl, Surma, Kajal

- 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](#)

Lead in Consumer Products



U.P. Fashion Rings –
CPSC recall 10-13-
2022



Stanley Garden
Toolbox- CPSC
Recall 9-12-2024



Butterfly Hair Band
Band: 548,871 ppm
Butterfly: 99,799 ppm
Associated with a
case in 2021



CUPKIN Double-walled
stainless steel children's 8 oz.
and 12 oz. cups-CPSC recall
on 7-20-2023



Men's Beaded Bracelet
Clasp High in Lead:
CPSC recall 9-21-2023



Red Tulle Bowtie Clip:
42,800 ppm lead – Oakland
Confiscated by DTSC in 2017

- [Consumer Products Safety Commission \(CPSC\)](#)
- [CPSC, perform a query search of recall clearinghouse data](#)
- www.recalls.gov
- [Department of Toxic Substance Control \(DTSC\), Lead in Jewelry](#)

Imported Spices and Other Foods May Contain Lead⁵

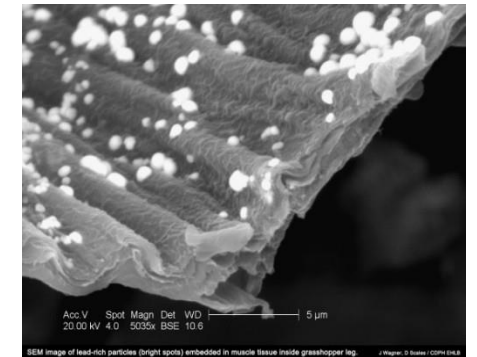
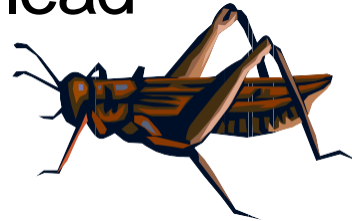
- Turmeric
 - up to 11,000 ppm lead
- Khmeli Suneli¹ – Georgian Spice
 - over 20,000 ppm lead
- Chapulines^{2,3}
 - up to 6,400 ppm lead



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

Heavy Metals in Baby Food^{1,2,3,4}



- Heavy metals, including arsenic, lead, cadmium, and mercury were found in baby food and juices.
- Most reported lead results were for ingredients.
- AB899 requires testing and reporting of lead levels in final products beginning January 1, 2024.⁵
- Lead levels up to 641 ppb (0.641 mcg/g) were reported for some final baby food products.
- This could result in ingestion of more than 2.2 mcg of lead per day (the FDA Interim Reference Level (IRL) for children), depending on the quantity consumed.
- The U.S. Food and Drug Administration's (FDA) plan, Closer to Zero, identifies actions the agency will take to reduce exposure to arsenic, lead, cadmium, and mercury from foods eaten by babies and young children—to as low as possible.



Public Health Advisory issued for WanaBana Cinnamon Apple Fruit Puree¹



- FDA warned WanaBana fruit pouches contain high lead levels, endangering children (10-28-2023). Schnucks and Weis brand applesauce with cinnamon were recalled on 11-05-2023.
- FDA found that Wanabana applesauce and cinnamon fruit pouches also contain high levels of chromium.
- On 1-05-2024 CDC issued a Clinician Outreach and Communication Activity (COCA) and an MMWR on 7-18-2024.^{2,3}
- Parents and caregivers are advised not to buy or feed these brands to toddlers or young children.
- Associated cases have been found in California.



¹ FDA, [Investigation of Elevated Lead Levels: Applesauce Pouches \(November 2023\)](#)
² CDC, COCA, <https://emergency.cdc.gov/newsletters/coca/2024/010524.html>
³ CDC, MMWR 7-18-2024, <https://www.cdc.gov/mmwr/volumes/73/wr/mm7328a2.htm>

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.





Anticipatory Guidance

Informing Requirements for California Health Care Providers



- Provide **anticipatory guidance** about lead at each periodic assessment from 6 months to 6 years.
- Health care providers who perform periodic health assessments for children are required to **inform** parents and guardians about:
 - The risks and effects of childhood lead exposure.
 - The requirement that children in Medi-Cal should be blood lead tested.
 - The requirement that children not in Medi-Cal who are at high risk of lead exposure should also be blood lead tested.

Anticipatory Guidance Requirements



- Provide oral or written anticipatory guidance to a parent or guardian of the child, including, at a minimum:
 - That children can be harmed by exposure to lead especially deteriorating or disturbed lead-based paint and the dust from it.
 - Are particularly at risk of lead poisoning from the time the child begins to crawl until 72 months of age.

Additional Anticipatory Guidance Recommendations

- Discuss hand to mouth activity, pica, hand washing, and sources of lead such as:
 - Lead-contaminated paint, dust, and soil (particularly near busy roads)
 - Plumbing, bullets, fishing sinkers, batteries
 - Lead-contaminated remedies, cosmetics, food, spices
 - Tableware, cookware
 - Jewelry, toys and other consumer products
 - Household member's lead-related work or hobbies
 - Recent time spent in another country.

Additional Anticipatory Guidance Recommendations (Continued)



- Encourage good nutrition, especially iron, vitamin C, and calcium.
- Encourage participation in early enrichment programs and activities.
- Consider referral to Supplemental Nutrition Program for Women, Infants, and Children (WIC).

CLPPB Anticipatory Guidance and Testing Materials to Share with Patients



- A brochure - [Getting Your Child Tested for Lead](#) – in English and Spanish
- [Anticipatory Guidance Materials](#) for health care providers to use with their patients to:
 - Help remind them to get tested
 - Track their test results
 - Be aware of potential exposure sources ([Family List of Sources](#))



GETTING YOUR CHILD TESTED FOR LEAD

WHEN YOUR CHILD SHOULD BE TESTED FOR LEAD
A blood lead test is required at one and two years old if your child:

- Is in a program such as **Medi-Cal, WIC¹, or Head Start.**
- Lives in or spends a lot of time in a place built before 1978 that has peeling or chipped paint or that has been recently remodeled.

If these do not apply, ask your child's doctor about their risk of lead exposure. A blood lead test for lead is free for children enrolled in the programs listed above, and health insurance companies will also pay for the test.

CHILDREN ARE AT A HIGHER RISK FOR LEAD EXPOSURE IF THEY:

- **Live** in a house or building built before 1978 or near a source of lead air emissions such as highways, industrial sites, general aviation airports, recycling sites.
- **Consume or come in contact with** certain foods, spices, traditional remedies, dishware or other products.
- **Spend time** outside the U.S.
- **Have a sibling with** an elevated blood lead level.
- **Have a family member who works with lead** such as construction or painting or has hobbies that involve lead such as stained glass, fishing, pottery, firearms, antiques.

For a list of lead sources, ask your doctor or visit: www.cdph.ca.gov/programs/clppb

LEAD IS HARMFUL
Lead poisoning can make it hard for your child to learn, pay attention, or behave and may cause long-term health problems. Children may not look or act sick. Having your child tested for lead is the only way to know if there is lead in your child's body.

WHAT TO EXPECT: BLOOD LEAD TESTING FOR YOUR CHILD

- 1 The test may be done at your child's doctor's office or at a laboratory.
- 2 There are two methods of collecting blood for lead testing: capillary or venous. Capillary tests typically use blood taken from your child's finger. Venous tests use blood from a vein in your child's arm.
- 3 Depending on the result, your child's doctor may order additional tests. Follow-up blood lead tests must be venous.

For more information visit:
www.cdph.ca.gov/programs/clppb
or contact your local Childhood Lead Poisoning Prevention Program:

WIC is the Special Supplemental Nutrition Program for Women, Infants, and Children

CLPPB3/2024

Lead Exposure Sources with Guidance for Families



What are some sources of lead?

Talk to your health care provider if you or your child comes in contact with any of these possible sources of lead.



| Possible Sources of Lead | What You Can Do... |
|--|--|
| <ul style="list-style-type: none"> Old paint inside or outside the home (most lead paint is in homes built before 1978) | <ul style="list-style-type: none"> Move cribs, high chairs, and playpens away from cracked or peeling paint. Do not allow children to chew on windowills or other painted surfaces. Call local lead poisoning prevention program (tinyurl.com/CLPPP-LIST) about testing paint for lead. |
| <ul style="list-style-type: none"> Dust on windowills, floors, and toys | <ul style="list-style-type: none"> Wet mop floors and wet wipe windowills and other surfaces. Wash toys often. Wash children's hands before eating and sleeping. |
| <ul style="list-style-type: none"> Dirt outside the home | <ul style="list-style-type: none"> Cover bare dirt with stones, grass, plants or gravel. Wipe shoes or take them off BEFORE going in the house. |
| <ul style="list-style-type: none"> Drinking Water (tinyurl.com/EPA-LEAD-H2O) | <ul style="list-style-type: none"> 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. |
| <ul style="list-style-type: none"> Take-home exposure from shoes/clothing/hair if family member works around lead on the job or at home, such as auto repair, metalworking, and battery or scrap metal recycling. | <ul style="list-style-type: none"> Shower and change clothes BEFORE coming home from work, if possible, and BEFORE holding your child. Remove work clothes and shoes and store them in a plastic bag. Wash work clothes separately from other clothes. |
| <ul style="list-style-type: none"> Some dishes or pots that are worn or antique, from a discount or flea market, made of crystal, handmade, or made outside the USA | <ul style="list-style-type: none"> Call local lead poisoning prevention program (tinyurl.com/CLPPP-LIST) for more information about testing dishes and pots for lead. |
| <p>Traditional remedies, such as:</p> <ul style="list-style-type: none"> Azaron and Greta – orange or yellow powder Paylooh – red powder Some Ayurvedic or traditional Chinese remedies | <ul style="list-style-type: none"> Do not let anyone give "natural" or traditional remedies to your child without talking to your health care provider first. |
| <p>Some traditional cosmetics and other substances applied to the skin, such as:</p> <ul style="list-style-type: none"> Surma + Kohl + Sindoor | <ul style="list-style-type: none"> Do not use these products on your child. Call local lead poisoning prevention program (tinyurl.com/CLPPP-LIST) about testing traditional cosmetics, ritual powders, and other substances applied to the skin. |
| <p>Altars for religious ritual containing:</p> <ul style="list-style-type: none"> Ritual powders Brass and some other metal, ceramic, or painted items | <ul style="list-style-type: none"> Place altars with these types of items where your child can't get to them. Don't let your child handle or mouth these items. Use separate cleaning supplies to clean these items. |
| <p>Some costume jewelry, amulets, and keys</p> | <ul style="list-style-type: none"> Do not allow your child to play with, mouth or touch these items. |
| <p>Some foods and spices, such as:</p> <ul style="list-style-type: none"> Some candies (especially imported) Chapulines (grasshopper snacks) Some imported spices, such as turmeric, chili powder, Khmeli Suneli Game meat containing lead shot | <ul style="list-style-type: none"> Be aware of foods and spices that might contain lead. Offer your child 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. |
| <p>Other items, such as:</p> <ul style="list-style-type: none"> Fishing sinkers, bullets, pellets, and solder Some art supplies and sewing chalk | <ul style="list-style-type: none"> Keep these items away from your child. Wash hands well after touching these items. Do not heat, melt, cast or file any metal items at home. |
| <p>Spends time at firing ranges</p> | <ul style="list-style-type: none"> Children and adolescents who spend time at firing ranges should be tested for lead. Use lead free ammunition. Do not eat or drink at a firing range. After shooting, immediately wash your hands and face with soap and water. Change clothes and shoes before going home / Wash those clothes separately. |
| <p>Retained bullets and shrapnel</p> | <ul style="list-style-type: none"> Consult with your health care provider about ongoing testing and monitoring. |
| <p>Lives or spends time near:</p> <ul style="list-style-type: none"> Major roadways or freeways A former or current lead or steel smelter, or a foundry or industrial facility that historically emitted or currently emits lead A general aviation airport used by small aircraft | <ul style="list-style-type: none"> Tell your health care provider if your child lives or spends time near these types of roadways or facilities. Do not let your child play or spend time near these types of roadways or facilities. |

Childhood Lead Poisoning Prevention Branch ♦ <http://www.cdph.ca.gov/programs/clppp> ♦ July 2023

¿Cuáles son algunas fuentes de plomo?

Hable con su proveedor de atención médica si usted o su hijo entran en contacto con cualquiera de estas posibles fuentes de plomo.



| Posibles Fuentes de Plomo | Qué Puedes Hacer... |
|---|--|
| <ul style="list-style-type: none"> Pintura vieja dentro o fuera de la casa (la mayoría de la pintura con plomo se encuentra en casas construidas antes de 1978) | <ul style="list-style-type: none"> Aleje las cunas, las sillas altas y los corralitos de la pintura agrietada o descascarada. No permita que los niños mastiquen los alféizares de las ventanas u otras superficies pintadas. Llame al programa local de prevención del envenenamiento por plomo (tinyurl.com/CLPPP-LIST) para analizar la pintura para detectar plomo. |
| <ul style="list-style-type: none"> Polvo en alféizares, pisos y juguetes | <ul style="list-style-type: none"> Moje los pisos de trapeador y limpie húmedamente los alféizares de las ventanas y otras superficies. Lave los juguetes con frecuencia. Lávese las manos de los niños antes de comer y dormir. |
| <ul style="list-style-type: none"> Suciedad fuera de la casa | <ul style="list-style-type: none"> Cubra la tierra desnuda con piedras, hierba, plantas o grava. Limpie los zapatos o quíteselos ANTES de entrar a la casa. |
| <ul style="list-style-type: none"> Agua potable (tinyurl.com/EPA-LEAD-H2O) | <ul style="list-style-type: none"> Para cocinar o beber, deje correr el agua hasta que se enfríe antes de usarla. No use una vasija de agua a menos que haya sido probada y se haya encontrado que no contiene plomo. |
| <ul style="list-style-type: none"> Exposición a casa de zapatos/ropa/cabello si un miembro de la familia trabaja alrededor del plomo en el trabajo o en casa, como reparación de automóviles, metalurgia y reciclaje de baterías o chatarra. | <ul style="list-style-type: none"> Dúchese/bañarse y cámbiese de ropa ANTES de llegar a casa del trabajo, si es posible, y ANTES de cargar a su hijo. Quítese la ropa y los zapatos de trabajo y guárdelos en una bolsa de plástico. Lave la ropa de trabajo por separado de otras prendas. |
| <ul style="list-style-type: none"> Algunos platos o ollas que están desgastados o antiguos, de un descuento o mercado de pulgas, hechos de cristal, hechos a mano o hechos fuera de los EE.UU. | <ul style="list-style-type: none"> Llame al programa local de prevención del envenenamiento por plomo (tinyurl.com/CLPPP-LIST) para obtener más información sobre cómo analizar platos y ollas para detectar plomo. |
| <p>Remedios tradicionales, tales como:</p> <ul style="list-style-type: none"> Azaron y Greta – polvo naranja o amarillo Paylooh – polvo rojo Algunos remedios Ayurvédicos o tradicionales Chinos | <ul style="list-style-type: none"> No permita que nadie le dé remedios "naturales" o tradicionales a su hijo sin hablar primero con su proveedor de atención médica. |
| <p>Algunos cosméticos tradicionales y otras sustancias aplicadas a la piel, tales como:</p> <ul style="list-style-type: none"> Surma + Kohl + Sindoor | <ul style="list-style-type: none"> No use estos productos en su hijo. Llame al programa local de prevención del envenenamiento por plomo (tinyurl.com/CLPPP-LIST) para probar cosméticos tradicionales, polvos rituales y otras sustancias aplicadas a la piel. |
| <p>Altars para rituales religiosos que contienen:</p> <ul style="list-style-type: none"> Polvos rituales Latón y algunos otros artículos de metal, cerámica o pintados | <ul style="list-style-type: none"> Coloque altares con este tipo de artículos donde su hijo no pueda alcanzarlos. No permita que su hijo manipule o hable con estos artículos. Use productos de limpieza separados para limpiar estos artículos. |
| <p>Algunas bisuterías, amuletos y llaves</p> | <ul style="list-style-type: none"> No permita que su hijo juegue, entre la boca o toque estos artículos. |
| <p>Algunos alimentos y especias, tales como:</p> <ul style="list-style-type: none"> Algunos dulces (especialmente importados) Chapulines (bocadillos de saltamontes) Algunas especias importadas, como la cúrcuma, chile en polvo, Khmeli Suneli Carne de caza que contiene perdigones de plomo | <ul style="list-style-type: none"> Tenga cuidado con los alimentos y especias que pueden contener plomo. Ofrezca a su hijo comidas y refrigerios que incluyan una variedad de verduras, frutas, legumbres, semillas, nueces, granos enteros, carnes sin procesar y productos lácteos o sustitutos lácteos sin azúcar añadido. |
| <p>Otros artículos, tales como:</p> <ul style="list-style-type: none"> Plomos de pesca, balas, perdigones y soldadura Algunos suministros de arte y tiza de costura | <ul style="list-style-type: none"> Mantenga estos artículos alejados de su hijo. Lávese bien las manos después de tocar estos artículos. No caliente, derrita, funda ni lima ningún artículo metálico en casa. |
| <p>Pasa tiempo en los campos de tiro</p> | <ul style="list-style-type: none"> Los niños y adolescentes que pasan tiempo en los campos de tiro deben someterse a pruebas de plomo. Use municiones sin plomo. No coma ni beba en un campo de tiro. Después de disparar, lávese inmediatamente las manos y la cara con agua y jabón. Cámbiese de ropa y zapatos antes de irse a casa / Lave esa ropa por separado. |
| <p>Balas retenidas y metralla</p> | <ul style="list-style-type: none"> Consulte con su proveedor de atención médica sobre las pruebas y el monitoreo continuos. |
| <p>Vive o pasa tiempo cerca:</p> <ul style="list-style-type: none"> Carreteras principales o autopistas Una fundición de plomo o acero anterior o actual, o una fundición o instalación industrial que históricamente emitió o actualmente emite plomo Un aeropuerto de aviación general utilizado por aviones pequeños | <ul style="list-style-type: none"> Coméntele a su proveedor de atención médica si su hijo vive o pasa tiempo cerca de este tipo de carreteras o instalaciones. No permita que su hijo juegue o pase tiempo cerca de este tipo de carreteras o instalaciones. |

Subdivisión de Prevención del Envenenamiento Infantil por Plomo ♦ <http://www.cdph.ca.gov/programs/clppp> ♦ July 2023



Family List of Sources



California's Childhood Lead Poisoning Prevention Provider Screening Mandates and Recommendations

Informing Requirements for California Health Care Providers



- Provide **anticipatory guidance** about lead at each periodic assessment from 6 months to 6 years.
- Health care providers who perform periodic health assessments for children are required to **inform** parents and guardians about:
 - The risks and effects of childhood lead exposure.
 - The requirement that children in Medi-Cal should be blood lead tested.
 - The requirement that children not in Medi-Cal who are at high risk of lead exposure should also be blood lead tested.

California Assessment and Testing Mandates

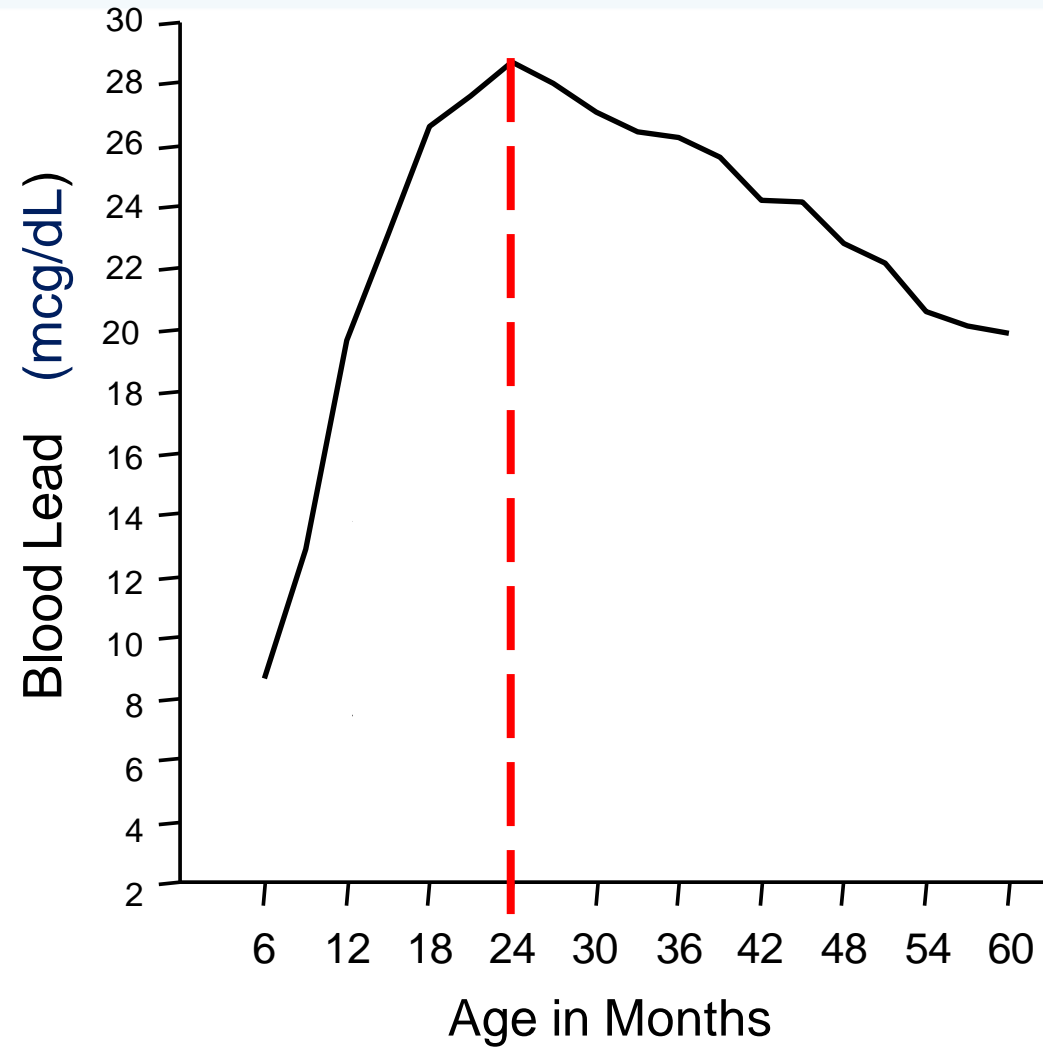
- **Blood lead test:** All children in publicly supported programs such as Medi-Cal and Women, Infants and Children (WIC) at both 12 months and 24 months of age.¹
- **Assess:** If child is not in a publicly supported program, at both 12 months and 24 months of age:
 - Ask: "Does your child live in, or 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."**
- Blood lead test if a change in circumstances has put child at risk of lead exposure.

Catch-Up Testing Mandates



- If **either** of these mandates is missed:
 - A. Blood lead testing of children in publicly funded programs for low-income children **or**
 - B. Assessment and testing of at-risk children not in these programs **then**
- Catch-up testing (A) **or** assessment and testing (B) is required:
 - When missed at 12 months of age, catch-up is mandated between 12 and 24 months of age.
 - When missed at age 24 months or later, catch-up is mandated for children ages 24 months to 72 months.

Mean Blood Level by Child's Age



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

Preventing Lead Contamination During Fingertick Testing ^{1,2}



- Explain procedure to parent/guardian and child.
- Wash child's hands thoroughly with soap and water, and air dry.
- Avoid child touching anything after hands are washed and before specimen is collected.
- Do not use paper towels to dry the child's hands.
- Massage finger with washed, clean gloved hands.
- Clean the finger with alcohol gauze pad.
- Hold finger in downward position.
- Lance finger lateral of center of fingertip - not close to nail bed.
- Infants: Heel stick if < 6 months of age, fingerstick if > 6 months of age ³

¹Centers for Disease Control and Prevention The CDC instruction poster, [Steps for Collecting Finger Stick Capillary Blood Using a Microtainer](#) and Mission Unleaded: [CDC Capillary Lead Testing Video](#)

²Adapted courtesy Butte County Childhood Lead Poisoning Prevention Program

³WHO Guidelines on Drawing Blood: Best Practices in Phlebotomy. Geneva: [World Health Organization](#); [7, Capillary sampling](#). 2010.

Preventing Lead Contamination During Fingertick Testing

Specimen Collection Specifics



- Apply slight pressure to start blood flow.
 - Blot first drop with a clean gauze pad without touching the finger,
 - Keep hand in downward position.
 - Hold the micro-collection tube at an angle of 10 degrees below the finger and touch the tapered end of the tube into the droplet of blood. Do not touch the skin with the tube.
 - Fill the micro-collection tube with the required amount of blood for the microtainer vial that you are using. Fill microtainer vial according to microtainer vial instructions.
 - Apply slight pressure to finger to stop bleeding and apply sterile bandage.
 - Seal the specimen container and invert it gently 7-10 times.

Specimen Labeling and Packaging



- Place label with name, DOB, and date collected on specimen tube.
- Label plastic zip-lock bag with patient's name, DOB and date collected.
- See laboratory reporting requirements at [Laboratory Blood Lead Reporting Requirements](#)
- Place sealed microtainer in zip-lock bag.
- Record patient information on tracking log.
- Discard used materials properly.
- Congratulate child and parents/guardian for a job well done!
- Provide encouragement, praise, stickers or other incentives as available.

Tracking and Recording Lead Test Results



- Track and record analysis results.
- Provide results to medical provider.
- Track results in EMR.
- A Blood Lead Testing Record ([*Getting Your Child Tested for Lead - Anticipatory guidance materials for health care providers to share with their patients*](#)) for parents and guardians is available for providers to use to assist in providing tracking and information for families.
 - Please use if helpful in your practice.
 - Advise parents/guardian to bring to subsequent visits.

Blood Lead Testing Fact Sheet



- An updated **Blood Lead Testing** fact sheet is now available on the CLPPB website which includes:
 - Information about tube type, draw type, avoiding lead contamination, and updated required specimen information.
 - Provider Mandates and Federal Refugee Lead Testing Guidelines.

Blood Lead Testing



Which sample type to use?

Blood lead tests fall into three main types:

| Test type | Draw / Sample Type |
|--------------|---------------------|
| Screening | Capillary or Venous |
| Confirmatory | Venous |
| Monitoring | Venous |

NOTE: Do not use Point-of-Care devices for venous confirmatory testing or monitoring.

Filter paper blood lead tests are NOT accepted by the State of California.

Avoid lead contamination

To minimize false positive results:

- Be careful when selecting gloves and towels. Some gloves and recycled paper towels have been found to contain lead and pose a risk of contamination.
- Wash child's hands thoroughly and allow to air dry. Do not dry with paper towels.
- All jewelry (including watches) should be removed and hands washed, before putting on gloves and drawing a sample. Jewelry (on the patient, the parent, or the person performing the blood draw) has been found to contain lead and could contaminate the specimen.

Other items can cause lead contamination:

- Dust from vents, open windows or doors
- Keys or key rings
- Cell phones, sunglasses
- Other items children play with or chew on

Sample Labeling: Be sure that draw/sample type is on the test tube label (C for capillary, V for venous).

Information to include on lab requisition or order:

- Patient Name
- Patient Address
- Patient Phone
- Patient Sex
- Patient Birth Date
- Patient Race and Ethnicity
- Point of Care Users—please assign unique accession numbers to each sample
- Patient's Employer Contact Info (if applicable)
- Provider Name/National Provider Identifier (NPI)
- Provider Address
- Provider Phone
- Date of Collection
- Draw/Sample Type (capillary, venous)
- Patient Pregnancy Status
- Medi-Cal client identification number (CIN) or other health plan name and identification number
- **Recommend:** Write "Use certified lead-free tube" (e.g., tan top or royal blue top) on lab requisition or order. **Any other tube must have been confirmed lead-free.**

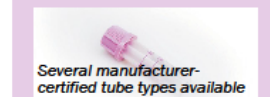
See US Centers for Disease Control and Prevention (CDC) [poster](https://www.cdc.gov/lead/faq.html) (tinyurl.com/CDC-BLS-FS) and [video](https://www.cdc.gov/lead/faq.html) (tinyurl.com/CDC-BLS-VID) about best practices for collecting blood lead specimens.

NOTE: For point-of-care test kits, refer to [Magellan LeadCare@recall page](https://www.cdc.gov/lead/faq.html) (tinyurl.com/CLPPB-MAG) for screening restrictions.

Use the Proper Collection Tube

Tubes must be proven lead-free

Capillary Samples



Several manufacturer-certified tube types available
 Capillary microcollection container
Top color: usually lavender
Use: may use if certified by manufacturer for lead analysis
Anticoagulant: EDTA

Venous Samples



Top color: Tan
Use: lead analysis
Anticoagulant: EDTA or Heparin¹



Top color: Royal Blue
Use: trace metals analysis
Anticoagulant: EDTA or Heparin¹



Top color: Lavender
Use: only use for lead analysis if tubes are pre-screened for lead by your lab.²
Anticoagulant: EDTA

¹ know in advance the acceptable anticoagulant for your analyzing lab
² per CLSI C40-A2 process, October 2013

AB 2276 – Requirements for Medi-Cal Managed Care Plans



Beginning January 1, 2021, when there is a contract between the Department of Health Care Services (DHCS) and a Medi-Cal managed care plan, the Medi-Cal managed care plan is required quarterly to:

- Identify every enrollee who is a child without a record of completing the required blood lead screening tests.
- Remind the contracting network provider of the requirement to perform the required blood lead screening tests.
- Remind the contracting network provider of the requirement to provide the oral or written anticipatory guidance to a parent or guardian relating to risk of childhood lead poisoning at each periodic assessment starting at 6 months of age continuing to 72 months of age.
- Ensure signed statement of voluntary refusal is documented in the child enrollee's medical record if required blood lead screening test is refused.

AB2326 Updates on Laboratory Reporting Requirements



- **Beginning July 1 , 2023 all laboratories in California, including POC laboratories must report:**
- 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.

California Management Guidelines on Childhood Lead Poisoning for Health Care Providers

- Provide summary testing and follow-up recommendations.
- Testing and follow-up recommended for all children with BLLs ≥ 3.5 mcg/dL (the [CDC BLRV](#)).
- Apply to all physicians, physician assistants, and nurse practitioners caring for California children.
 - [California Management Guidelines \(4-page version\)](#)
 - [California Management Guidelines \(One page, double sided version\)](#)
- More detailed information about the guidelines can be found at:

| California Management Guidelines on Childhood Lead Poisoning for Health Care Providers | | |
|---|--|---|
| <p>No level of lead in the blood is known to be safe. The US Centers for Disease Control and Prevention (CDC) established in 2021 a new reference value of 3.5 micrograms per deciliter (mcg/dL) for blood lead levels (BLLs), thereby lowering the level of which notification and intervention are recommended. Contact the California Department of Public Health, Childhood Lead Poisoning Prevention Branch (CLPPB), (510) 620-5630, www.cdph.ca.gov/Programs/OPA/Pages/NR230001.aspx, for additional information about childhood lead toxicity.</p> | | |
| BLL ¹ | EVALUATION AND TESTING | MANAGEMENT |
| <p>< 3.5 mcg/dL</p> <p>Screening BLLs may be either a capillary (CBLL) or a venous (VBLL).²</p> <p>Fluor capillary blood lead tests are not accepted by the State of California.</p> <p>Refer for identified risk must be venous.³</p> <p>If VBLL increases to higher range, retest and manage per that range.</p> | <p>General</p> <ul style="list-style-type: none"> • Perform routine history and assessment of physical and mental development. • Assess nutrition and risk for iron deficiency. • Consider lead exposure risks. <p>Blood Lead Levels</p> <p>California regulations require testing at 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, second time at a pre-1978 home with deteriorating paint or recently renovated, or has other lead exposure risks.⁴</p> <ul style="list-style-type: none"> • If screened early (before 12 months), retest in 3-6 months as risk increases with increased mobility. • Test anyone with BLLs at 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 guidelines for Head Start⁵ or refugees.⁶ | <p>Comply with California statutes and regulations mandating a standard of care under which the health care provider, at each periodic health care visit from age 6 months 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, and particularly at risk for lead poisoning from the time they crawl until 72 months old, and can be harmed by deteriorating or disturbed paint and lead-contaminated dust, and that children enrolled in Medi-Cal receive blood lead tests, and children not enrolled in Medi-Cal who are at high risk of lead exposure receive blood lead tests.⁷</p> <p>Discuss hand to mouth activity, pica, hand washing, and sources of lead such as lead-contaminated paint, dust, and soil (particularly near busy roads), plumbing, bullets, fishing sinkers, and also lead-contaminated non-food, cosmetics, food, tobacco, laboratory, cookware, batteries, jewelry, toys and other consumer products, a household member's lead-related work or hobbies, recent time spent in another country.</p> <ul style="list-style-type: none"> • Discuss BLLs with family. Counsel on any risk factors identified. • Encourage good nutrition, especially iron, vitamin C, and calcium. Consider referral to Supplemental Nutrition Program for Women, Infants, and Children (WIC). • Encourage participation in early enrichment programs and activities. <p>Chelation is not recommended in this BLL range.</p> |
| <p>3.5-9.4 mcg/dL</p> <p>Screening BLLs may be capillary or venous.</p> <p>Every retest must be venous.³</p> <p>If VBLL increases to higher range, retest and manage per that range.</p> | <p>General – Evaluate as above AND</p> <ul style="list-style-type: none"> • Take an environmental history to identify potential sources of exposure and provide preliminary advice on reducing/minimizing them. • Test for iron deficiency (CBC, Ferritin, and CRP).⁸ • 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. <p>Blood Lead Levels</p> <ul style="list-style-type: none"> • If initial BLL is capillary, obtain confirmatory venous test within 3 months. Retest based on range of confirmatory venous test. • For venous result in this range, obtain 2-4 follow-up VBLLs. • First venous retest within 1-3 months. • Then 1-3 subsequent venous retests every 3 months. • After VBLL declining, retest with VBLLs every 6-8 months and thereafter based on VBLL trend. | <p>Manage as above AND</p> <ul style="list-style-type: none"> • 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 American Academy of Pediatrics guidelines. Consider starting a multivitamin with iron. • Add referral 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 CLPPP for outreach, education, and other services. See CLPP Program Contacts for state and local contact information (http://www.cdph.ca.gov). <p>Chelation is not recommended in this BLL range.</p> |
| <p>9.5-14.4 mcg/dL</p> <p>Screening BLLs may be capillary or venous.</p> <p>Every retest must be venous.³</p> <p>If VBLL increases to higher range, retest and manage per that range.</p> | <p>General – Evaluate as above</p> <p>Blood Lead Levels</p> <ul style="list-style-type: none"> • If initial BLL is capillary, obtain confirmatory venous test within 1 month. Retest based on range of confirmatory venous test. • For venous result in this range, obtain 2-4 follow-up VBLLs. • First venous retest within 1-3 months. • Then 1-3 subsequent venous retests every 1-3 months. • After VBLL declining, retest with VBLLs every 3-6 months and thereafter based on VBLL trend. • To determine eligibility for full public health case management, a follow-up venous test in this range is needed (eligible if persistent in or above this range). | <p>Manage as above AND</p> <ul style="list-style-type: none"> • If BLL is persistent in or above this range with at least the second test being venous, contact the local CLPPP (or, if no local program, the state CLPPP) (http://www.cdph.ca.gov) for full case management services (nurse case management, environmental investigation, and recommendations for remediation of lead sources), provided at no cost to the family, for children aged birth to 21 years. • The state CLPPP is available for further consultation: (510) 620-5630. • See fact sheet for other lead knowledge page⁹. <p>Chelation is not recommended in this BLL range.</p> |

Reformatted summary table from: Department of Health Care Services, [Blood Lead Testing and Anticipatory Guidance](#). (<http://www.cdph.ca.gov>)

¹ Centers for Disease Control and Prevention, Blood Lead Reference Value. (<http://www.cdc.gov>)
² For levels other than 3.5 mcg/dL, CDC uses whole integers. California rounds BLL to the closest whole integer (10 includes 9.5 mcg/dL, 15 includes 14.5 mcg/dL, etc.).
³ Capillary lead specimens are only confirmed. They are acceptable for screening but all retests on BLLs ≥ 3.5 mcg/dL should be venous. Consider an analytical or clinical lead specimen as if venous. A heel stick may be used to obtain a capillary specimen in children under one year. LeadCheck analyzers should not be used for VBLLs. Information on Venous LeadCheck. 2021. (<http://www.cdph.ca.gov>)
⁴ California Code of Regulations, Title 17, Section 2139 (<http://www.cdph.ca.gov>) Health and Safety Code: 155030 (<http://www.cdph.ca.gov>)
⁵ Head Start Early Childhood Learning & Knowledge Center (ECLKC). (<http://www.eclkc.gov>)
⁶ State of California, Department of Health and Human Services, (<http://www.cdph.ca.gov>)
⁷ Statutes for Lead and Blood Lead Testing. (<http://www.cdph.ca.gov>)
⁸ Diagnosis and Prevention of Iron Deficiency and Iron Deficiency Anemia in Infants and Young Children (IDeA) (<http://www.cdc.gov>)
⁹ Pediatric Environmental Health Specialty Unit (PEHSU) and Centers for Disease Control and Prevention. (<http://www.cdc.gov>)



[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 | <ul style="list-style-type: none"> • 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 | <ul style="list-style-type: none"> • 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 | <ul style="list-style-type: none"> • Cover bare dirt with stones, grass, plants, or gravel. • Wipe shoes or take them off BEFORE going in the house. |
| Drinking Water | <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • Azarcon and Greta — orange or yellow powder • Payloohah — 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: <ul style="list-style-type: none"> • Surma • Kohl • Sindoor | <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • Ritual powders • Brass and some other metal, ceramic, or painted items | <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • Some candies (especially imported) • Chapulines (grasshopper snacks) • Some imported spices, such as turmeric, chili powder, Khmeli Suneli • Game meat containing lead shot | <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • Fishing sinkers, bullets, pellets, and solder • Some art supplies and sewing chalk | <ul style="list-style-type: none"> • 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 | <ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> • 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 | <ul style="list-style-type: none"> • 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. |

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 |
|---|---|--|
| <ul style="list-style-type: none">● Obtain confirmatory VBLL within 3 months.● Retest based on range of confirmatory VBLL. | <ul style="list-style-type: none">● Obtain 2-4 follow-up VBLLs.● First venous retest within 3 months.● Then 1-3 subsequent venous retests every 3 months. | <ul style="list-style-type: none">● 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 |
|--|---|--|
| <ul style="list-style-type: none">● Obtain confirmatory VBLL within 1 month.● Retest based on range of confirmatory VBLL. | <ul style="list-style-type: none">● Obtain 2-4 follow up VBLLs.● First venous retest within 1-3 months.● Then 1-3 subsequent venous retests every 1-3 months. | <ul style="list-style-type: none">● 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 |
|--|---|--|
| <ul style="list-style-type: none">● Obtain confirmatory VBLL within 1 month.● Retest based on range of confirmatory VBLL. | <ul style="list-style-type: none">● Obtain 2-4 follow up VBLLs.● First venous retest within 1-3 months.● Then 1-3 subsequent venous retests every 1-3 months. | <ul style="list-style-type: none">● 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 |
|--|---|--|
| <ul style="list-style-type: none">● Obtain confirmatory VBLL within 2 weeks.● Retest based on range of confirmatory VBLL. | <ul style="list-style-type: none">● 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. | <ul style="list-style-type: none">● 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 | <ul style="list-style-type: none">● 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 \geq 44.5 mcg/dL



- **Expedite confirmatory VBLL** to validate accuracy of initial BLL.
- If initial CBLL \geq 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 |
|---|--|
| <ul style="list-style-type: none">● Perform routine history and assessment of physical and mental development.● Assess nutrition.● Assess risk for iron deficiency.● Consider lead exposure risks. | <ul style="list-style-type: none">● 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 |
|---|---|
| <ul style="list-style-type: none">● 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. | <ul style="list-style-type: none">● 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 |
|---|--|
| <ul style="list-style-type: none">● Evaluate risk to other children and pregnant and lactating women in the home. | <ul style="list-style-type: none">● 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.● 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 |
|--|---|
| <ul style="list-style-type: none">● Evaluate as for 3.5-9.4 mcg/dL● To determine eligibility for full public health case management, retest with a VBLL.<ul style="list-style-type: none">● Eligible if persistent in or above this range. | <ul style="list-style-type: none">● Manage as for 3.5-9.4 mcg/dL AND● 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● The state CLPPB is available for further consultation (510-620-5600). See footnote for other knowledgeable agencies.² |

Evaluation and Management for VBLL 14.5-19.4 mcg/dL



| Evaluation | Management |
|--|---|
| <ul style="list-style-type: none">● 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. | <ul style="list-style-type: none">● 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. |

Evaluation and Management for VBLL 19.5-44.4 mcg/dL



| Evaluation | Management |
|---|---|
| <ul style="list-style-type: none">● 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. | <ul style="list-style-type: none">● 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 |
|---|---|
| <ul style="list-style-type: none">● Evaluate as for 19.5-44.4 mcg/dL AND● Obtain abdominal X-ray. | <ul style="list-style-type: none">● 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 |

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



| Evaluation | Management |
|---|---|
| <ul style="list-style-type: none">● Evaluate as for 44.5-69.4 mcg/dL AND● Obtain abdominal X-ray. <p>CAUTION: Depending on BLL, high index of suspicion, and/or clinical status, initiating management prior to receiving confirmatory VBLL result may be indicated.</p> | <ul style="list-style-type: none">● 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.
- Possible chelating agents (may need to work with a compounding pharmacy):
 - Succimer (Chemet) (oral)
 - CaNa₂EDTA per hospital protocol
 - CaNa₂EDTA with dimercaprol (BAL) may be considered at levels \geq 69.5 mcg/dL, if indicated

Chelation Therapy (Cont'd)



- **CAUTION**
 - Use only **CALCIUM Na₂EDTA**.⁷
 - If using CaNa₂EDTA with BAL, **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., CaNa₂EDTA), **test renal function before and during treatment**.⁸
 - Repeat treatment cycles may be needed due to blood lead rebound.⁸

CDC Initial BLL Testing Recommendations for Newly Arrived Refugees



- Initial lead exposure screening with blood test:
- All refugee infants and children \leq 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.

Further CDC Refugee Recommendations



- All newly arrived pregnant or breastfeeding women should be prescribed a prenatal or multivitamin with adequate iron and calcium.
- Referral to a healthcare provider with expertise in high-risk lead exposure treatment and management may be indicated for elevated BLLs..

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



California Refugee Blood Lead Testing 2018 – 2023

California Refugee Blood Lead Testing 2018-2023



- CLPPB matched refugee data from California Office of Refugee Health (ORH) from 2018 to 2023 with blood lead data from the Childhood Lead Poisoning Prevention Branch.
- CLPPB was able to match 13,862 children of the 15,927 children in the ORH file based on a combination for first name, last name, and birthdate.
- This is preliminary data and subject to change.

California Refugee Blood Lead Testing 2018 – 2023 by Country of Origin

| Country | Number of children | Percentage |
|----------------------|--------------------|------------|
| Afghanistan | 9740 | 70.3% |
| Ukraine | 1992 | 14.4% |
| Syrian Arab Republic | 288 | 2.1% |
| Haiti | 168 | 1.2% |
| Guatemala | 138 | 1.0% |
| Moldova, Republic Of | 121 | 0.9% |
| Armenia | 120 | 0.9% |
| El Salvador | 114 | 0.8% |
| Russian Federation | 109 | 0.8% |
| China | 76 | 0.5% |
| Other Countries | 996 | 7.2% |

California Refugee Blood Lead Testing 2018 – 2023 by Age Groups



| Age Categorizes | Number of children | Percentage |
|---------------------------|---------------------------|-------------------|
| Less than 6 months | 156 | 1.13% |
| 6 to <1 year | 339 | 2.45% |
| 1 to <3 years | 1,913 | 13.80% |
| 3 to <7 | 4,090 | 29.51% |
| 7 to 16 year olds | 7,364 | 53.12% |

California Refugee Blood Lead Testing 2018 – 2023 by Age Group and Country of Origin



| Country of Origin | 0-6 months (%) | 6 months – under 1 year (%) | 1 year to under 3 years (%) | 3 years to under 7 years (%) | 7 years to 16 years (%) |
|-----------------------------|------------------|-----------------------------|-----------------------------|------------------------------|-------------------------|
| Afghanistan | 105(1.1%) | 265 (2.7%) | 1,440 (14.8%) | 3,056 (31.4%) | 4,874 (50.0%) |
| Ukraine | 16 (0.8%) | 30 (1.5%) | 234 (11.7%) | 510 (25.6%) | 1,202 (60.3%) |
| Syrian Arab Republic | 0 (0%) | 1 (0.3%) | 6 (2.1%) | 33 (11.5%) | 248 (86.1%) |
| Other Countries | 35 (1.9%) | 43 (2.3%) | 233 (12.6%) | 491 (26.7%) | 1,040 (56.5%) |

California Refugee Blood Lead Testing BLL 2018 – 2023 by Age Group

| BLL level | Less than 6 mo (%) | 6 mo to <1 year (%) | 1 to <3 years (%) | 3 to <7 years (%) | 7 to 16 years (%) |
|----------------------|--------------------|---------------------|-------------------|-------------------|-------------------|
| Less than 3.5 mcg/dL | 120 (76.9%) | 223 (65.8%) | 1068(55.8%) | 2349(57.4%) | 5053 (68.6%) |
| 3.5 to 9.4 mcg/dL | 27 (17.3%) | 75 (22.1%) | 673(35.2%) | 1582(38.7%) | 2141 (29.1%) |
| 9.5 to 14.4mcg/dL | 3 (1.9%) | 24 (7.1%) | 122(6.4%) | 121(3.0%) | 126 (1.7%) |
| 14.5 to 19.4 mcg/dL | 3 (1.9%) | 10 (2.9%) | 27(1.4%) | 28(0.7%) | 27 (0.4%) |
| 19.5 to 44.4 mcg/dL | 3 (1.9%) | 7 (2.1%) | 23(1.2%) | 9(0.2%) | 16 (0.2%) |
| > 44.5 mcg/dL | 0 (0.0%) | 0 (0.0%) | 0(0.0%) | 1(0.0%) | 1 (0.0%) |



Nutrition and Lead Absorption

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 risk.¹
- 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 breastfeeding.²



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](#)

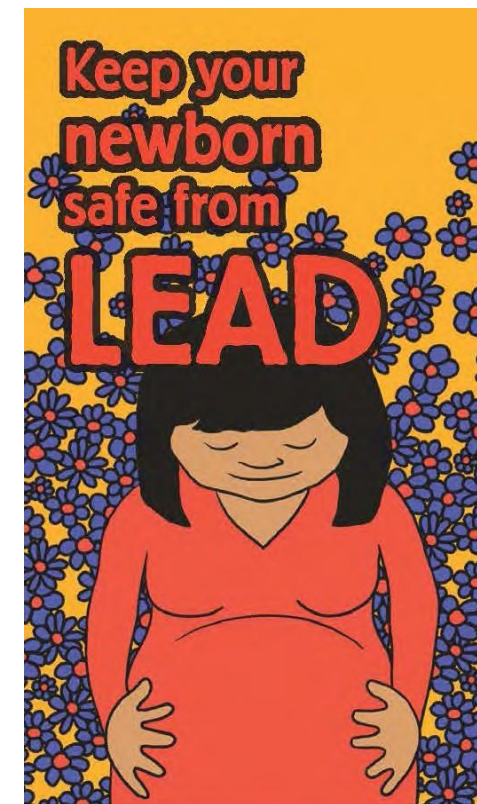


Lead in Pregnancy and Breastfeeding



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](#).



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.

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.

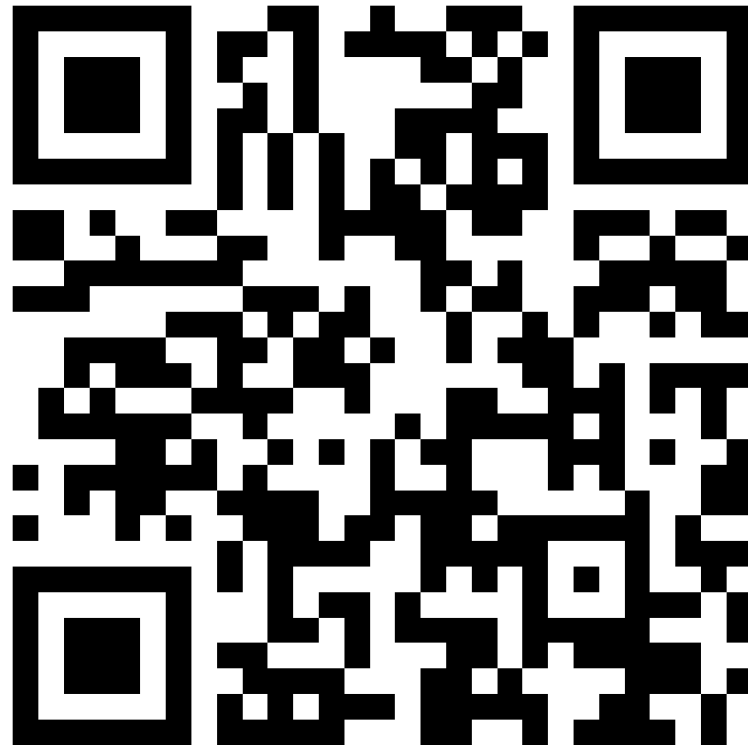
Take-Home Messages



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



LA Care Health Plan Post-Test



<https://forms.office.com/g/P5viakwMhF>

Contact Information:



1-800-LA-4-LEAD



Childhood Lead Poisoning Prevention Program
Los Angeles County Department of Public Health



Thank you!



**California Department of Public Health
Childhood Lead Poisoning Prevention Branch**

510-620-5600

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



Resources

California CLPP Programs



- An index of CLPP programs appears at the following link. The starred (*) counties do not have formal childhood lead poisoning prevention programs under contract with the state.

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

- If not in a contracted county, contact the state Childhood Lead Poisoning Prevention Branch: ask for the Care Management Section

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

Provider Guidelines



- [California Management Guidelines \(4-page version\)](#)
- [California Management Guidelines \(One page, double sided version\)](#)
- [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

Ways to Reduce Anxiety in Children Getting Blood Lead Tests



Ways for Caregivers to Reduce Anxiety in Children Getting Blood Lead Tests

Activities

To prevent lead contamination, make sure nothing touches the skin where blood is drawn after it has been cleaned. This helps to make sure the test results are accurate.



Bring a device with:

- Videos
- Cartoons
- Music
- Audio books



Bring items such as:

- Books
- Small puppets
- Cards with images



Distract the child by:

- Telling a story
- Playing peek-a-boo
- Singing a song
- Playing a guessing game
- Playing "I Spy"

Breathing Technique



Imagine the child's favorite food in front of them:

- Pretend the child's favorite food (like pizza or a birthday cake with candles) is in front of their face and have them blow on it to cool it down or make a wish

Work with the lab technician to divert child's focus from anxiety and fear. Afterward, praise the child that they did well.



Ways for Lab to Reduce Anxiety in Children Getting Blood Lead Tests

Activities

To prevent lead contamination, make sure nothing touches the skin where blood is drawn after it has been cleaned. This helps to make sure the test results are accurate.



Bring a device with:

- Videos
- Cartoons
- Music
- Audio books



Bring items such as:

- Books
- Small puppets
- Cards with images



Distract the child by:

- Telling a story
- Playing peek-a-boo
- Singing a song
- Playing a guessing game
- Playing "I Spy"

Breathing Technique



Imagine the child's favorite food in front of them:

- Pretend the child's favorite food (like pizza or a birthday cake with candles) is in front of their face and have them blow on it to cool it down or make a wish

Work with the caregiver to divert child's focus from anxiety and fear. Afterward, praise the child that they did well.

Strategies to Increase Blood Lead Screening and Testing



Strategies to Increase Blood Lead Screening and Testing

Provide Anticipatory Guidance

- ✓ Provide anticipatory guidance during well-child visits and encourage parents to get their child tested for lead.
- ✓ Remind families with Medi-Cal that lead testing is required along with their vaccinations.
- ✓ Remind parents to bring their child's records of prior blood lead tests to their well-child visits (see last CDPH publication: Blood Lead Testing Record).

Actions for In-Person Visits

- ✓ Talk with parents about the importance of testing for lead, listen to their feelings and concerns, and encourage them to have their child tested using simple, everyday language.
- ✓ Provide written information to the parents about lead exposure and testing in the family's preferred language.
- ✓ Reassure the parents that blood lead testing at age 1 and 2 (and up to age 6) is important for the health of their child.

Ensure Blood Draws Are Easily Accessible and Reinforce Follow-Ups

- ✓ Perform an in-office blood draw and send the sample to the lab.
- ✓ Refer parents to a lab within easy walking distance of the office.
- ✓ Make sure to review blood test results timely and talk about the result with the family.

Tips For Telehealth Visits

- ✓ Talk with parents about the importance of testing for lead, listen to their feelings and concerns, and encourage them to have their child tested using simple, everyday language.
- ✓ Encourage and provide support for families to get blood testing after the telehealth visit.
- ✓ Send reminders for blood lead testing by mail, text, or phone after the telehealth visit.

Resources

California Health Care Provider Mandates

Anticipatory Guidance

Required for all children at each periodic assessment from 6 months to 6 years.
Health care providers are required to provide anticipatory guidance, informing parents and guardians about:

- The risks and effects of childhood lead exposure.
- The requirement that children in Medi-Cal should be blood lead tested.
- The requirement that children not in Medi-Cal who are at high risk of lead exposure should also be blood lead tested.

Screen (Blood lead test)


All children in publicly funded programs for low-income children such as Medi-Cal and Special Nutrition Program for Women, Infants, and Children (WIC) **at both 12 months and 24 months of age, and order catch up testing if missed at either 12 or 24 months.**

Assess

If a child is **not** in a publicly funded program for low-income children, at both 12 and 24 months of age: **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?"
If answer is "yes" or "don't know", order a blood lead test.

Publications

To order free printed materials for providers and patients, including the materials below, please contact your local Childhood Lead Poisoning Prevention Program*. If your county does not have a local program, contact the Childhood Lead Poisoning Prevention Branch (CLPPB) directly at CLPPB_Provider_Materials@cdph.ca.gov.

Scan the QR** code for all publications for providers: 



Standard of Care and Potential Sources of Lead



Blood Lead Testing



Management Guidelines for Health Care Providers



Blood Lead Testing Record

*<https://www.cdph.ca.gov/Programs/CCDC/DEOD/CLPPB/Pages/CLPPPIndex.aspx>
**<https://www.cdph.ca.gov/Programs/CCDC/DEOD/CLPPB/Pages/Publications-for-Providers.aspx#pubprov>

AB 2326 Laboratory Reporting



- **These changes apply to all laboratories including POC laboratories, in California.**
- 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 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.

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- *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.*
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AB 2326 Laboratory Reporting¹ (Cont'd)



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- 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.

Filter Paper (Dried Blood Spots (DBS))^{1,2}



- Multiple issues of possible contamination during:
 - Paper production.
 - The collection and drying of the blood spot on the filter paper.
- Unequal blood distribution which can result in false positives or false negatives when the paper is punched for analysis.
- These issues become of greater significance with the lowering of the BLRV.

¹ CDC: [LeadCare® Expanded Recall \(October 2021\) Questions & Answers](#)

² [Parsons, PJ et al, A Critical Review of the Analysis of Dried Blood Spots for Characterizing Human Exposure to Inorganic Targets Using Methods Based on Analytical Atomic Spectrometry, J Anal At Spectrom 2020, 35:2092-2112](#)

Filter Paper Blood Lead Testing (Cont'd)

- If you are currently using filter paper testing, please discontinue its use. If you have used filter paper testing in the past to test children under age 6:
 - If the test result was less than 3.5 mcg/dL, repeat the test with
 - EITHER capillary blood and an FDA-approved Point of Care testing device.
 - OR capillary or venous blood sent to a lab.
 - If the filter paper result was equal to or greater than 3.5 mcg/dL:
 - Repeat with a venous test.
 - Send the blood sample for analysis to a reference lab that runs either:
 - Inductively coupled plasma mass spectrometry (ICP-MS) or
 - Graphite furnace atomic absorption spectrometry (GFAAS).

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/CLP/PB/Pages/CLPPPIndex.aspx>
- Lead Related Construction Program
<https://www.cdph.ca.gov/Programs/CCDPHP/DEODC/CLP/PB/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/medical/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>



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