

## A NEW LOOK AT LEAD POISONING

*By Jean Woo, M.D., M.P.H., M.B.A.; Margaret Mossman, P.H.N.; Carrie Jones, M.D., M.P.H.; and Valerie Charlton, M.D., M.P.H.*

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

Since 1991, the Centers for Disease Control and Prevention (CDC) have used a blood lead level (BLL) of 10 mcg/dL as a “level of concern” for managing childhood lead poisoning. In May 2012, CDC announced a change in its recommendations after studies showed harmful effects below 10 mcg/dL.<sup>1,2</sup> CDC has now issued guidelines setting a “reference value” of 5 mcg/dL for management of lead exposure in children between six months and six years, a value derived from the 97.5th percentile of the BLL distribution in U.S. children aged 1 through 5 years.<sup>3</sup> However, even a blood lead level less than 5 mcg/dL can have adverse effects, so health care providers need to continue to be concerned about lead poisoning. **There is no known safe level of lead in the body.**<sup>4</sup>

### SOURCES OF LEAD EXPOSURE

For children, the most common lead hazards are lead-based paint and lead in dust and soil resulting from leaded gasoline, air emissions, and paint deterioration. Young children interact with their environment through hand-to-mouth activity, which exposes them to contaminated dust and soil. Lead poisoning has been reported due to water or pipes in some areas.<sup>5</sup>

Occupations involving lead are a risk for children as well as adults. Take-home exposure – lead contamination on the skin, hair, clothes, shoes, or vehicle – may result in childhood lead poisoning. Some occupations and hobbies with a risk for lead exposure include work with radiators, batteries, plastics, soldering, construction, renovation, painting, demolition, recycling, fishing sinkers, ammunition, and on firing ranges.<sup>6</sup>

Other sources can add to the cumulative body burden. Some consumer products contain lead, such as metal and vinyl objects, some imported eyeliners (kohl, surma, and tiro), foods (spices, dried plums, candy, fried grasshoppers or “chapulines”), and alternative remedies (greta, azarcon, ayurvedic medications). Eating dirt or clay during pregnancy, or chewing on clay pots, is a common practice in some cultures. Immigrants or foreign adoptees may have been exposed in their country of origin.<sup>7</sup>

### CLINICAL EFFECTS

Lead interferes with heme synthesis and is a potent neurotoxin. Lead is associated with anemia, learning disability, hypertension, cardiovascular and renal disease, delayed puberty, and reduced fertility.

Perinatal lead poisoning can have lasting adverse effects on the mother, fetus, neonate, and breast-feeding child. Lead readily crosses the placenta and prenatal exposure is

associated with intra-uterine growth restriction, maternal hypertension, and an increased frequency of spontaneous abortion.<sup>8</sup>

In children, the most significant impact of lead poisoning is neurodevelopmental. It has been associated with Attention Deficit Hyperactive Disorder,<sup>9</sup> developmental delay, speech and language deficiencies, and cognitive deficiencies. Childhood lead poisoning may present as learning and behavioral issues. In teens and young adults, it may be associated with increased school drop-out rates and aggressive behavior.<sup>10</sup>

## **MEDICAL MANAGEMENT**

California has mandated a standard of care for the medical management of lead-exposed children which requires anticipatory guidance and BLLs at specified times.<sup>11</sup> The Childhood Lead Poisoning Prevention Branch (CLPPB) and the Child Health and Disability Prevention Program (CHDP) have adopted management guidelines for MDs, nurse practitioners, and physician assistants.<sup>12</sup> Local and state childhood lead poisoning programs are available to help identify lead hazards and provide ongoing case management.

Providers should be aware that a highly elevated BLL in a person of any age is an urgent situation requiring immediate action. While lead poisoning is typically asymptomatic, acute lead exposure must be considered when a patient presents with seizures, encephalopathy, or a history of pica or small-object ingestion. A venous BLL is necessary to confirm the diagnosis of lead poisoning; and, if a swallowed non-food object is suspected, an abdominal x-ray should be obtained.

## **LEAD AND CULTURE**

Health care providers need to be alert to possible sources of exposure, but also sensitive to culture. Not all cultural practices or imported products are harmful, and not all items produced in the U.S. are lead-free.

For further information, refer to the website of the Childhood Lead Poisoning Prevention Branch, California Department of Public Health, [www.cdph.ca.gov/programs/CLPPB/Pages/default.aspx](http://www.cdph.ca.gov/programs/CLPPB/Pages/default.aspx) or contact (510) 620-5600.

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

<sup>2</sup> Koller et al. EHP, Jun 2004.

<sup>3</sup> CDC, [www.cdc.gov/nceh/lead/ACCLPP/CDC\\_Response\\_Lead\\_Exposure\\_Recs.pdf](http://www.cdc.gov/nceh/lead/ACCLPP/CDC_Response_Lead_Exposure_Recs.pdf).

<sup>4</sup> Bellinger, Current Opinions in Pediatrics, 2008, 20:172-177.

<sup>5</sup> MMWR, August 10, 2012 / 61(04);1-9, *Lead in Drinking Water and Human Blood Lead Levels in the United States*, [www.cdc.gov/mmwr/preview/mmwrhtml/su6104a1.htm?s\\_cid=su6104a1\\_w](http://www.cdc.gov/mmwr/preview/mmwrhtml/su6104a1.htm?s_cid=su6104a1_w).

<sup>6</sup> Kosnett M, *Recommendations for Medical Management of Adult Lead Exposure*, Env Health Persp, March 2007; 115(3):463-71.

(References continued on next page)

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<sup>7</sup> CDC, *Screening During the Domestic Medical Examination for Newly Arrived Refugees*, April 2012, [www.cdc.gov/immigrantrefugeehealth/guidelines/lead-guidelines.html](http://www.cdc.gov/immigrantrefugeehealth/guidelines/lead-guidelines.html).

<sup>8</sup> CDC, *Guidelines for the Identification and Management of Lead Exposure in Pregnant and Lactating Women*, [www.cdc.gov/nceh/lead/publications/LeadandPregnancy2010.pdf](http://www.cdc.gov/nceh/lead/publications/LeadandPregnancy2010.pdf).

<sup>9</sup> Bellinger DC (2008) Neurological and behavioral consequences of childhood lead exposure. *PLoS Med* 5(5): e115. doi:10.1371/journal.pmed.0050115

<sup>10</sup> Wright JP, Dietrich KN, Ris MD, Hornung RW, Wessel SD, et al. (2008) Association of prenatal and childhood blood lead concentrations with criminal arrests in early adulthood. *PLoS Med* 5(5): e101. doi:10.1371/journal.pmed.0050101

<sup>11</sup> California Code of Regulations, Sec. 3700-37100, *Screening for Childhood Lead Poisoning*, [www.cdph.ca.gov/programs/CLPPB/Pages/ScreenReqs-CLPPB.aspx](http://www.cdph.ca.gov/programs/CLPPB/Pages/ScreenReqs-CLPPB.aspx).

<sup>12</sup> CLPPB, [www.cdph.ca.gov/programs/CLPPB/Documents/HAGS\\_201107.pdf](http://www.cdph.ca.gov/programs/CLPPB/Documents/HAGS_201107.pdf).