

## Tox / Risk Notes

*An occasional series of updates on topics of interest in the fields of toxicology and risk assessment.*

### What's going on with Lead (Pb)?

More children identified for management of blood lead levels.

Recent stories in the popular press (such as The Week and National Public Radio) have included headlines and leads stating that childhood lead poisoning in the US affects twice as many children as CDC “previously thought”. This could imply that CDC had somehow failed to properly estimate or determine the distribution of blood lead levels among children. What really happened was that CDC re-evaluated NHANES data (1999-2002 to 2007-2010) for children 1 to 5 years old in light of a new “reference value” of 5 ug lead/dL in blood (identified by CDC based on ACCLPP’s determination in 2012 that there is no safe level of lead in a child’s blood) as opposed to the prior CDC “level of concern” of 10 ug/dL. This information, combined with US Census data, yields an estimate that the number of children ages 1 to 5 years with blood lead levels exceeding the “reference level” is about twice the number of children that had blood lead levels exceeding the now-outdated “level of concern”. The change in prevalence of childhood lead poisoning came because the “reference level” is lower than the “level of concern”, not because population blood lead levels have increased and not because population blood lead levels had been misestimated. What is true is that many more children/families will be identified for follow-up (by physicians and public health agencies) to monitor and reduce their exposure to lead. Public health efforts toward primary prevention (ensuring that all homes are lead-safe) will increase, with special emphasis on children in the most vulnerable groups.

Themes and topics in recent lead literature.

I found over 160 articles on lead and health, published between January 2012 and March 2013. As I scanned that body of lead literature, some patterns emerged.

- There is an ongoing theme suggesting that, on a population level in the US, soil has become an increasingly important source of lead to children. The implication may be that, while lead-based paint is a key source affecting blood lead levels in some individual children, greater focus on soil may be necessary to support continued population-wide decline in blood lead levels. This is consistent with experience with lead exposure over decades: as one leading source of lead is regulated or otherwise addressed (such as leaded gasoline, lead water pipes, lead solder in food cans), another source takes on greater importance for exposure to lead at the population level.

- Among publications focused on potential adverse health effects of lead, neuropsychological/ neurodevelopment accounted for the most articles; a wide range of other adverse effects were represented, including child fatality, autism, vestibular function, violence/crime, hearing, and blood pressure. Gene expression was presented as an effect of lead exposure (lead changing gene expression) and as a mediating factor in lead toxicity (pre-existing gene expression affecting lead's toxicity).
- Among potential sources of lead, those that were addressed most often were drinking water, soil, mining (and especially artisanal mining for gold in Nigeria), diet and air. Others included home remodeling, opium, dust, e-waste, traditional medicines and cosmetics, and pottery.
- Many papers reported observations related to specific populations, such as indigenous peoples, geriatric folks, refugees from a variety of areas now living in a variety of locations, and more. In addition, several countries were specifically addressed, including Nigeria, Czech Republic, Iran, Iraq, Kuwait, and Democratic Republic of Congo.
- Other common topics were bioaccessibility of lead, exposure to lead and predictions of blood lead levels, lead toxicity, and the effectiveness of various types of interventions intended to decrease exposure. Less common topics included biological media, analytical methods, and phytoremediation. Uncommon topics included new blood lead screening recommendations and their implications, elimination of lead from blood, and biomonitoring.

Lead was recognized as toxic by ancient Romans, yet our knowledge about lead toxicity and related topics continues to evolve and grow today, centuries later. This expanding understanding of lead influences approaches to identifying at-risk populations and intervening to reduce exposure.

### **Acronym list**

ACCLPP – Advisory Committee on Childhood Lead Poisoning Prevention

CDC – US Centers for Disease Control and Prevention

NHANES – (US) National Health and Nutrition Examination Survey

ug/dL – micrograms lead per deciliter of blood

*Helping clients understand the potential health impacts of chemical exposures.*

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Over 25 years of consulting experience in the fields of Toxicology, Risk Assessment, Epidemiology Reviews and (Public) Health Impact Assessment. Available to serve as an expert witness in cases related to toxicology, risk assessment, and health. Dr. Heath has testified in both bench and jury trials.

<b>INDUSTRIES / SETTINGS</b>	<b>REGULATIONS / PROGRAMS</b>	<b>CHEMICALS</b>	<b>EXPOSURE MEDIA</b>
Refineries	Superfund	Solvents	Soil
Gas plants	RCRA	Lead	Groundwater
Pipelines	Brownfields	Metals	Indoor Air
Chemical Manufacturing	Underground Storage Tanks	Hydrogen Sulfide	Ambient Air
Smelters	Property Redevelopment	Explosives	Forage
Mines	NEPA (EIS, EA)	Tear Gas	Surface Water
Genetically Modified Crops	Infant Lead Poisoning	PCBs	Sediment
Lead Paint	Risk Communication	Asbestos	Food
Steel	Fact Sheets	Total Petroleum Hydrocarbons	Tailing
Shooting Ranges	Voluntary Cleanup	PAHs	Mine Waste
Active and Former Military Facilities	Wyoming Voluntary Remediation Program (VRP)	Pesticides	Drinking Water
Hydraulic Fracture	Genetically Modified Crops; Organic Foods	Particulates	Paint

## EDUCATION

Ph.D. Environmental Toxicology, Cornell University  
 M.A. Public Policy Studies, Duke University  
 M.S. Toxicology and Nutrition, North Carolina State University  
 B.S. Public Health, University of Massachusetts at Amherst  
 A.S. Nursing, Ellis Hospital School of Nursing  
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