

Statements that support no threshold level for health effects of lead

ATSDR statement

"ATSDR has not derived MRLs (minimum risk level) for lead. The EPA has not developed a reference concentration (Rfc) for lead. EPA has also decided that it would be inappropriate to develop a reference dose (RfD) for inorganic lead (and lead compounds) because some of the health effects associated with exposure to lead occur at blood levels as low as to be essential without a threshold (IRIS 1999)." (ATSDR Toxicology Profile for Lead - <http://www.atsdr.cdc.gov/toxprofiles/tp13.html>)

CDC MMWR Statement

"Because no threshold for adverse health effects in young children has been demonstrated (Schwartz 1994), public health interventions should focus on eliminating all lead exposures in children (Rogan and Ware 2003). Lead concentrations in drinking water should be below the EPA action level of 15 ppb." (MMWR 2004).). (<http://www.cdc.gov/mmwr/preview/mmwrhtml/mm53d330a1.htm>)

CDC statement on not lower BLL action level

"Recent studies suggest that adverse health effects exist in children at blood lead levels less than 10 µg/dL. In the past the Centers for Disease Control and Prevention (CDC) has lowered the level considered elevated in response to similar reports. However, at this time the reasons not to lower the level of concern are as follows: (see above for rationale) <http://www.cdc.gov/nceh/lead/spotlights/changeBLL.htm>

CDC statement on harm to children

"Lead poisoning is entirely preventable. However, nearly half a million children living in the United States have lead levels in their blood that are high enough to cause irreversible damage to their health." <http://www.cdc.gov/nceh/lead/factsheets/leadfacts.htm>

CDC statement low-level lead effects

"Even low levels of lead are harmful and are associated with decreased intelligence, impaired neurobehavioral development, decreased stature and growth, and impaired hearing acuity." <http://www.cdc.gov/nceh/lead/factsheets/leadfacts.htm>

CDC statement on no effect level for lead exposure

"Because there is no apparent threshold below which adverse effects of lead do not occur, "EBLL" must be defined arbitrarily." http://www.cdc.gov/nceh/lead/CaseManagement/caseManage_chap1.htm

Statement by CDC working group on low level lead exposure

"The WG identified and considered several issues that bear on drawing causal inference from the observed associations among children with blood lead levels <10 mcg/dL. After considering these issues, the work group concluded that, while available evidence does not permit a definitive causal interpretation of the observed associations between higher BLLs in the range < 10 mcg/dL and adverse health indicators, the weight of available evidence favors, and does not refute, the interpretation that these associations are, at least in part causal. However, the WG also concluded that the possibility of residual confounding and other factors leaves considerable uncertainty as to the absolute size of the effect and shape of the dose response relationship at blood lead levels < 10 mcg/dL." CDC (2004). Evidence of health effects of blood lead level < 10 µg in children - Draft February 2004. . Advisory Committee on Childhood Lead Poisoning Prevention. <http://www.cdc.gov/nceh/lead/ACCLPP/meetingMinutes/lessThan10MtgMAR04.pdf>

EPA statement on health effects of lead

Maximum Contaminant Level Goal (MCLG): zero ppb

Lead can cause a variety of adverse health effects in humans. At relatively low levels of exposure, these effects may include interference with red blood cell chemistry, delays in normal physical and mental development in babies and young children, slight deficits in the attention span, hearing, and learning

abilities of children, and slight increases in the blood pressure of some adults. It appears that some of these effects, particularly changes in the levels of certain blood enzymes and in aspects of children's neurobehavioral development, may **occur at blood lead levels so low as to be essentially without a threshold**. <http://www.epa.gov/safewater/dwh/t-ioc/lead.html>

California EPA - Summary for Lead

A **Public Health Goal (PHG) of 2 ppb** is developed for lead in drinking water based on the neurobehavioral effects of lead in children and the hypertensive effects of lead in adults. Lead has been known as a toxic metal since ancient times, and has been studied for its toxic effects since the middle ages. It is a widespread contaminant in the human environment and occurs in drinking water as a consequence of leaching from plumbing containing lead. Lead may also enter drinking water from other sources, for example, directly from soil contaminated with lead or deposited from air emissions. Lead has multiple toxic effects on the human body. Among its most serious noncarcinogenic effects are decreased intelligence in children and increased blood pressure in adults. Lead is a carcinogen in laboratory animals and a probable human carcinogen. The U.S. Environmental Protection Agency (U.S. EPA) has adopted a Maximum Contaminant Level Goal (MCLG) of zero for lead in drinking water based on "occurrence of low level effects" and because U.S. EPA classifies lead as a Class B2 carcinogen. Based on the toxicological data for noncarcinogenic endpoints, and potential human exposures, a PHG of 0.002 mg/L (2 ppb) is calculated for lead in drinking water. http://www.oehha.ca.gov/water/phg/referenced_docs/lead_c.html
Also see Public Health Goal for LEAD in Drinking Water (Cal EPA, 1997) - http://www.oehha.ca.gov/water/phg/pdf/lead_c.pdf

WHO statement of lead

"Even blood lead levels as low as 5 micrograms per deciliter can irreversibly impair the development of children's brains, reducing their IQ."

<http://www.who.int/ceh/publications/en/14lead.pdf>

WHO – Lead burden of disease

"The burden of disease caused by relatively low and widespread exposures to lead is often underestimated by policy makers. For example, loss of IQ points is not considered a disease per se, yet it reflects subtle neurological impairment that will be most marked on the social and psychological development of children who already have a low IQ score. Subtle effects on IQ loss are expected from blood lead levels as low as 5 g/dl and the effects gradually increase with increasing levels of lead in the blood. The effects of losing IQ points will be greater in children with an IQ score just above 69 (with mild mental retardation defined as an IQ score between 50–69), than in children with a higher IQ. At higher levels, lead exposure also leads to gastrointestinal symptoms and anaemia (about 20% of children are affected when blood lead levels exceed 60–70 g/dl). In adults, relatively low levels of lead exposure (5 g/dl) may increase blood pressure, which can then lead to cardiovascular diseases."

http://www.who.int/quantifying_ehimpacts/publications/9241546107/en/

Elevated Blood lead levels

In 1991, CDC considers children to have an elevated level of lead if the amount in the blood is 10 mcg/dL. According to the CDC in 1999 and 2000, 2.2% of children in the 1-5 year age group had lead levels that were above 10 mcg/dL. There are approximately 20 million children under age 5, which means that about 440,000 children in the US have blood lead levels above 10 mcg/dL. (The CDC states that – "Approximately 434,000 U.S. children aged 1-5 years have blood lead levels greater than the CDC recommended level of 10 micrograms of lead per deciliter of blood." (from - <http://www.cdc.gov/nceh/lead/faq/about.htm>). There is not adequate national data on children with blood lead levels below 10 mcg/dL.

Statement of Dana Best, M.D., M.P.H. – testimony before U.S. Senate Committee on Environment & Public Works, April 7, 2004

"A 4-5 point decrease in IQ can mean the difference between normal and sub-normal intelligence and the ability to function independently; over the long term, it can mean a significant decline in the average intelligence of the affected population. Many other studies have demonstrated similar effects of blood lead levels under 10 mcg/dl; some have shown effects under 5 mcg/dl."

"While these figures seem reassuring at first look, with "only" 3.8% of District children having a lead level 10 mcg/dl or higher, the reader should remember that even at values of 5 mcg/dl or lower neurocognitive and behavioral effects have been documented."

Full statement at - http://epw.senate.gov/hearing_statements.cfm?id=220242

Statement from Canfield paper

"Blood lead concentrations, even those below 10 microgram per deciliter, are inversely associated with children's IQ scores at three and five years of age, and associated declines are greater at these concentrations than at higher concentrations. These findings suggest that more U.S. children may be adversely affected by environmental lead than previously estimated.

Canfield, R.L. et al. (2003) Intellectual impairment in children with blood lead levels concentrations below 10 microgram per deciliter. *New England Journal of Medicine*. 348: 1517-26.

http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Citation&list_uids=12700371

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March 5, 2004

Lead Contamination In The District Of Columbia Water Supply Oversight Hearing By The Committee On Government Reform -- <http://www.dccwatch.com/wasa/040305g.htm>

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Rogan, W. J., and Ware, J. H. (2003). Exposure to lead in children--how low is low enough? *N Engl J Med* **348**, 1515-6.

Schwartz, J. (1994). Low-level lead exposure and children's IQ: a meta-analysis and search for a threshold. *Environ Res* **65**, 42-55.