


**Kentucky Childhood  
Lead Poisoning Prevention  
Program**



**Kentucky Public Health**  
Division of Public Health

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**WHAT IS LEAD?**

- Lead is a heavy metal. It is a naturally occurring chemical element in the carbon group with symbol Pb and atomic number 82. Lead is a soft, malleable and the heaviest non-radioactive element. Lead has been utilized since before 3500 B.C.

**WHY IS LEAD A PROBLEM?**

- Lead is a potent neurotoxin and affects almost every system of the body, especially the developing brain and nervous system of a fetus and children < 6 years of age. Because of size and charge similarities, lead can substitute for calcium in bone stores. Young children are especially susceptible to lead because developing skeletal systems require high amounts of calcium and will mistakenly pull lead in instead.

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**HEALTH EFFECTS OF LEAD**

"Lead interferes with the normal functioning of just about every cell in the body because it chemically displaces elements that are essential to daily life, such as calcium, zinc and iron. So lead can botch up the elegant way red blood cells carry and deliver oxygen, how one moves his muscles or her limbs, and, perhaps most importantly, the transmission of electrical messages by the brain. Because the brains and bodies of young children are still developing and growing on a daily basis, lead is especially harmful to youngsters". Dr. Herbert Needleman

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**WHO IS AT-RISK?**

- Small children are close to the ground and windowsills where lead based paint chips, flakes and dust are easily accessible.
- Small children have normal hand to mouth exploration behavior.
- The developing fetus of a pregnant woman who has a history of lead hazard exposure or elevated blood lead level.
- Adults and older children may be at risk for lead hazard exposure through a lead based hobbies or work.

*\*See Lead Poisoning Verbal Risk Assessment*

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**ROUTES OF LEAD EXPOSURE**

Primary Routes of Exposure

- > **Ingestion** – Primary route for young children
  - Hand to mouth, teething, hygiene, etc.
- > **Inhalation** – Primary route for adults (fastest route leading to elevated blood leads)
  - Occupational exposure, hobbies, smoking, etc.
- > **Dermal Absorption** – Rare but possible
  - Conjunctival absorption of Kajal, eye makeup used on children, common in Afghanistan
  - Chemical compounds containing lead can enter blood through open cuts and scratches

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**DETECTING LEAD IN THE BODY**

- Lead is detected in the body through a blood lead test. A venous sample over a capillary is preferred as it is considered uncontaminated.
- Capillary samples are at risk of being contaminated through improper collection techniques.
- Lead is measured in the blood in micrograms per deciliter ( $\mu\text{g/dL}$ ).

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### Neurological & Cognitive Effects of Childhood Lead Poisoning

- > Learning Disabilities
- > Decreased IQ
- > Decreased Attention Span
- > Hyperactivity
- > Impaired Hearing
- > Decreased Growth




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### WHAT IS CONSIDERED AN EBLL

Historically, CDC and the U.S. Public Health Services has made updates on what they consider an EBLL.

Year and Reference	BLL (µg/dL)
• 1971 (Surgeon General)	40
• 1975 (CDC)	30
• 1978 (CDC)	30
• 1985 (CDC)	25
• 1991 (CDC)	10
• 2012 (CDC)	5

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### CDC's Advisory Committee on Childhood Lead Poisoning Prevention (ACCLPP)

In May 2012, the Centers for Disease Control and Prevention's (CDCs) ACCLPP recommended that CDC eliminate the use of the term "blood lead level of concern" based on the compelling evidence that low BLLs are associated with IQ deficits, attention-related behaviors, and poor academic achievement. ACCLPP recommended that the terminology "level of concern" should be eliminated from all future agency policies, guidance documents, and other CDC publications, and (b) current recommendations based on the "level of concern" be updated according to the recommendations contained in this report.

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**CDC 2012 UPDATE on BLL GUIDELINES**

In May 2012, CDC amended its recommendations to use a childhood BLL reference value based on the 97.5th percentile of the population BLL in children aged 1–5 years (currently 5 µg/dL) to identify children living or staying for long periods in environments that expose them to lead hazards. This changed the BLL that initiates interventions in helping to decrease childhood lead hazard exposure and reduce BLLs, for children <72 months of age and pregnant women, from ≥ 10 µg/dL to ≥5 µg/dL.

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**EFFECTS OF LEAD POISONING (cont.)**

- >5µg/dL- Low BLLs are associated with IQ deficits, attention-related behaviors, and poor academic achievement.
- >10µg/dL – Child will have learning disabilities; impaired growth; IQ decline and some hearing loss.
- >20µg/dL – Interference with ability to make red blood cells.
- >30µg/dL – Less ability to use vitamin D; higher blood pressure & hearing loss.

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**EFFECTS OF LEAD POISONING (cont.)**

- >40µg/dL – Less ability to make red blood cells. Nerve problems develop (decreased sensation, less ability to move quickly, infertility in men, kidney damage).
- >60 µg/dL – Stomach aches/cramps.
- >70 µg/dL – Intellectual disabilities.
- >90 µg/dL – Seizures, coma, kidney damage & anemia.
- >130 µg/dL & up – Seizures, coma & death.

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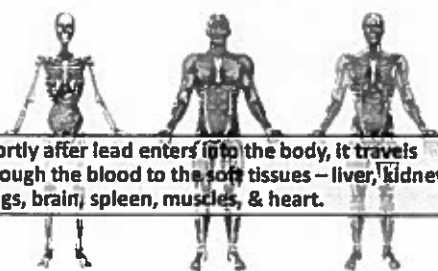
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### LEAD IN THE BODY



Shortly after lead enters into the body, it travels through the blood to the soft tissues – liver, kidneys, lungs, brain, spleen, muscles, & heart.

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### LEAD IN THE BODY

- If lead is not quickly eliminated, it will seek out storage sites that normally bind calcium. If the body does not have a sufficient amount of calcium, lead will more readily absorb and bind into those empty binding sites.



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### ELIMINATION OF LEAD

- Lead that is not stored is eliminated in the urine and feces.
  - 60% loss in urine
  - 30% loss in feces
  - 10% loss in hair, nail growth, & sweat
- About 99% of lead taken into the body of an adult will leave in the waste within a few weeks, but only about 32% will be eliminated from a child.

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**PRENATAL**



In prenatal patients, lead which has been previously stored in mom's bone may become mobilized as the body's need for calcium increases. Once free in mom's system, an elevated blood lead level may cause fetal neurodevelopmental problems as well as lead to other health concerns such as nephrotoxicity, neurotoxicity, and hypertension. If the pregnant woman has current lead hazard exposure, she is also at risk of an EBLL.

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**Blood Lead Levels (BLLs)**

The damage caused by lead in the human body depends on the amount of lead in the source and how long it stays in the body.



*Children with EBLs do not always look sick!!*

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**Children Run Better Unleaded**



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**Contact Information**



Susan Lawson, RN  
Nurse Consultant Inspector  
502-564-2154 ext. 4412  
[Susand.lawson@ky.gov](mailto:Susand.lawson@ky.gov)  
Cabinet for Health and Family Services  
Department for Public Health  
Childhood Lead Poisoning Prevention Program  
275 East Main Street HS2GWA Frankfort KY 40621



**Kentucky Public Health**  
Protecting. Promoting. Preventing.

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