

Lead Poisoning in Children and Pregnant Individuals

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Why Are We Still Talking About Lead Poisoning?



We have learned that:

- Many of the effects of lead exposure can occur at low levels of exposure
- We have not found a “safe” level of lead
- Effects of exposure early in life can be severe and permanent
- There is no effective treatment to overcome the adverse effects of lead poisoning. Chelation, performed for BLLs \geq 45 $\mu\text{g}/\text{dL}$, does not reverse the adverse effects of previous exposure.

Uses of Lead

Lead is a naturally occurring element which has been used in hundreds of ways, including:

- | | |
|----------------------|---------------------------|
| Pipes/plumbing | Cosmetics |
| Ammunition | Traditional medicines |
| Pewter and bronze | Paints and glazes |
| Leaded glass/crystal | Gasoline anti-knock agent |
| Building material | Radiation shields |
| Inks and dyes | Car batteries |
| Sweetener | Plastics |



Elemental Lead (Pb)

Lead has no use in the human body. All forms of lead are TOXIC to people and animals.



Lead Oxide
(PbO)



Lead Carbonate
(PbCO₃)



Tetraethyl Lead
(C₈H₂₀Pb)

Lead is Still All Around Us

Soil contamination from:

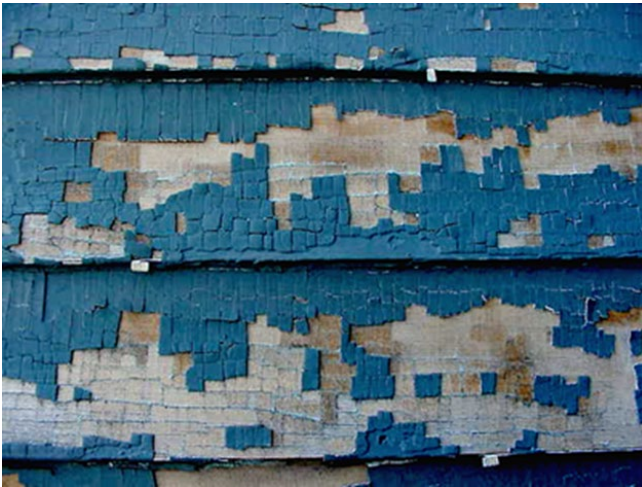
- Gasoline – historic auto emissions and current aviation fuel
- Industrial emissions
- Paint chips/dust from exterior renovation and scraping



Lead is Still All Around Us

Housing

- Homes that have cracked and peeling old lead paint on their walls.
- Lead from old lead paint may contaminate household dust and nearby soil.
- Home renovations that disturb old lead paint can spread invisible lead dust.



Lead is Still All Around Us

Plumbing

- pipes
- solder
- fixtures



Lead is Still All Around Us

Hobby or Occupational Exposures

- Repair, renovation, abatement or painting of residential and commercial buildings
- Use of firearms or working at a firing range (e.g., law enforcement, military, private industry, and training)
- Trades like plumbing, automotive, and construction (bridge painting)
- Recycling (e.g., stripping electronics)
- Artists – stained glass, painters, ceramics
- Casting or soldering (e.g., bullets, fishing weights)



Lead is Still All Around Us

Imported products:

- canned goods
- spices
- candy
- medicines
- cosmetics
- jewelry
- toys
- ceramic dishes
- crystal



Lead is Still All Around Us

Pregnant people

- Home renovation projects in preparation for a growing family
- Lead stored in bones from previous exposures being released because of pregnancy changes
- Pica – urge to eat non-food items which may contain lead – primarily soil, ceramics, or brick, but sometimes paint, plaster, or other material

<https://pubmed.ncbi.nlm.nih.gov/22302239/>



Lead is Still All Around Us

Children are uniquely vulnerable

- brains and bodily systems are rapidly developing
- spend a lot of time on the floor where the dust falls
- naturally put everything in their mouths
- lead paint has a sweet taste which is attractive to children



Lead is Still All Around Us

Low income renters in older housing

New York State has the largest percentage of older housing in the U.S

75% built before 1978
45% rental units

US Census 2018 American Community Survey 5 year estimates
(<https://data.census.gov/>)



Lead is Still All Around Us

In New York State and across the US, average blood lead levels tend to be higher in the summer months compared to winter. Reasons include...



- Lead in pipes leaches into water more easily in warmer weather
- Dry summer winds stir up lead from the soil into the air and it can also get in the home
- Home renovations are more likely to occur in warm weather
- Lead on old painted windows is scraped off or becomes a powder due to friction as the windows are opened and shut
- Children are playing outside more on porches or in soil that contains lead



Seasonality and trend in blood lead levels of New York State children
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC449716/>

Exposure Sources for Children

- For young children with the highest blood lead levels most of the lead in their blood comes from soil and dust.
- For the "average" child, with lower blood lead levels, water and food can also be primary sources.
- For infants make sure to flush pipes before using tap water for mixing formula and use cold water

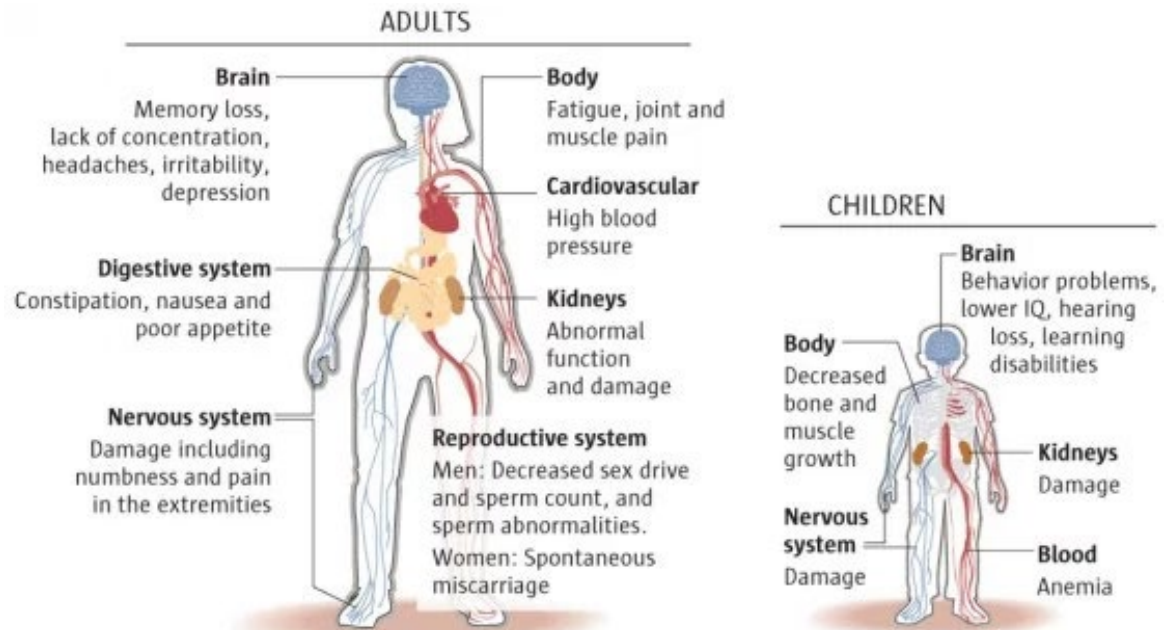


Health Effects of Lead

At very high levels, lead can cause encephalopathy, seizures, coma or death.

Lead affects many body systems:

- Neurological
- Renal
- Cardiovascular
- Hematological
- Immunological
- Reproductive
- Developmental



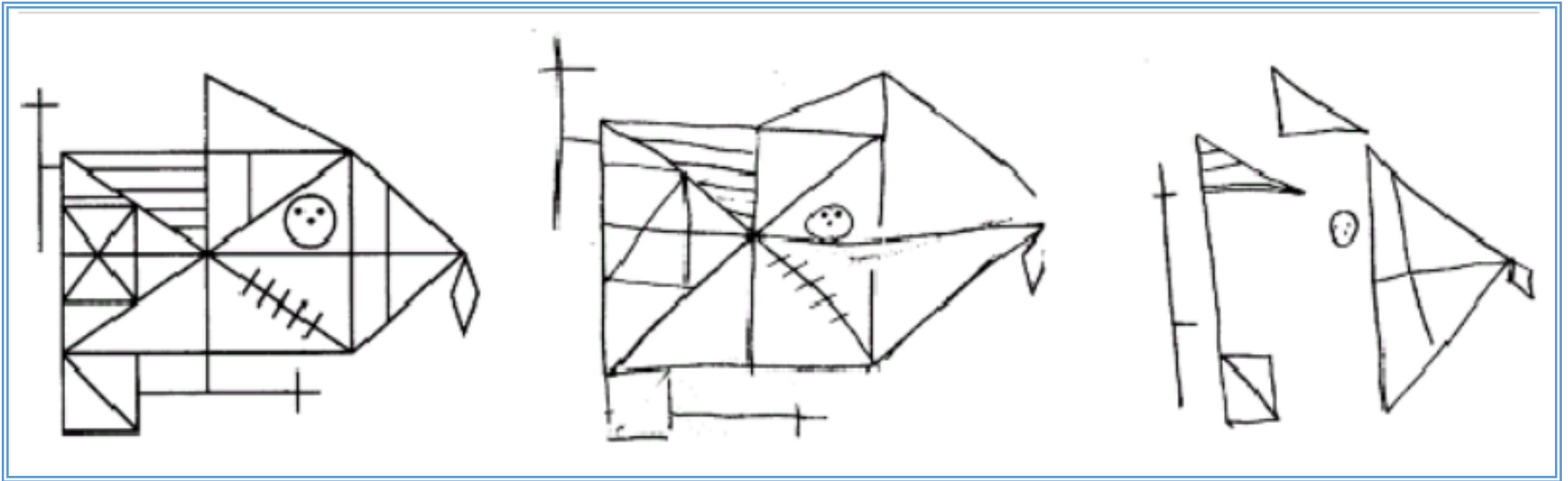
Health Effects of Lead

Neurological effects at lower levels of exposure in childhood include:

- Irreversible loss of IQ
- Auditory processing difficulty
- Attention problems & distractibility (ADHD)
- Emotional dysregulation
- Increased likelihood of
 - Dropping out
 - Delinquency
 - Incarceration



Health Effects of Lead: Visual Memory



Complex Figure

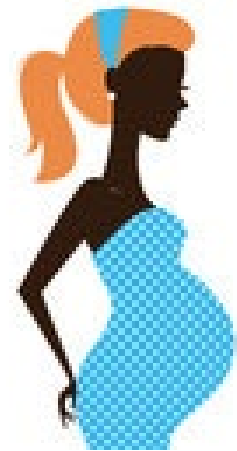
Non-Lead Exposed
Child

Lead Poisoned Child

Effects of Lead During Pregnancy

Lead exposure (even at low levels):

- Negatively affects fetal growth & neurodevelopment
- May increase risk of gestational hypertension/pre-eclampsia
- May increase risk of premature delivery and/or low birth weight
- Associated with a heightened risk of spontaneous abortion



Pregnant Individuals and Fetus/Newborn

- Lead passes through the placenta to the fetus primarily in the 2nd half of the pregnancy
- Lead can pass to the infant in breastmilk (but only 3% of maternal blood lead passes)
- Lead may be stored in adult bones and released during pregnancy or while breastfeeding via the pathways used to mobilize calcium to the infant. This is more likely if the woman's diet is low in calcium.



What is Considered an Elevated Lead Level?



NYS requires blood lead testing at ages 1 & 2 and whenever a risk is identified

Current CDC reference level is 3.5 ug/dL

New York State public health action level is 5 ug/dL

Role of the Local Health Department

As of October 1, 2019 Local Health Departments are required to provide care coordination and environmental management to children with venous lead levels of 5 $\mu\text{g}/\text{dL}$ and above.

Environmental inspections include the child's home and other locations where they spend significant time.



Reduce Risk

How to Protect Your Child From Lead Poisoning

- Wash kids' hands (especially after playing and before eating) and toys often.
- Take off and leave all shoes at the door so lead doesn't get tracked into your home.
- Keep kids away from lead hazards such as home renovations, bare soil close to older buildings, and chipping or peeling paint.
- Clean your home with soap and water frequently to remove lead dust.
- Eat foods high in [iron](#) and [calcium](#), because children's intestines will digest more lead if they do not eat enough foods with calcium and iron. (It is harder for the body to absorb iron that is found in fruits, vegetables, and grains, so combine those foods with food high in vitamin c.)
- If you are concerned that your home might have lead pipes, run your tap on cold for 1-2 minutes to flush your system before cooking or drinking.

Rochester's Coalition to Prevent Lead Poisoning

- Established in 2000 with a mission to "end childhood lead poisoning in Monroe County."
- Supports local prevention efforts, educates partners and the public and brings Rochester's perspective to state and national efforts.



Thank You!

Visit these websites for more information:

Coalition to Prevent Lead Poisoning

www.theleadcoalition.org

WNY Lead Poisoning Resource Center's Rochester Office

www.golisano.urmc.edu/lead-poisoning

NYS Department of Health

www.health.ny.gov/environmental/lead

Centers for Disease Control and Prevention

www.cdc.gov/lead-prevention/