Childhood Lead Poisoning

Office of Environmental Health Services
Radiation, Toxics and Indoor Air Division
350 Capitol Street, Room 313
Charleston, West Virginia 25301

Paul Ice
Environmental Resource Specialist 3
(304) 356-4271
Paul.D.Ice@wv.gov
What is Lead?

- Lead is a naturally occurring element found in the earth’s crust. While it has some beneficial uses, it can be toxic to humans.
- It is soft, malleable, has a relatively low melting point and is highly durable.
- It is often found with silver.
Uses of Lead

- Construction - plumbing, soldering, radiation shielding, paint
- Cosmetics - Lipstick, face powder, eyeliner
- Jewelry - Necklaces, earrings, charms
- Hobbies - bullets, sinkers, crafts
- Other - Home remedies, drink sweeteners, gasoline additive
Effects on the Human Body

Can be Acute (short term) or Chronic (long term)

- Can lead to severe damage to brain and kidneys.
- Loss of appetite
- Stomach Pain
- Fatigue
- Weakness
- Weight loss
- Insomnia
- Headache
• Irritability
• Tremors
• Dizziness
• Anxiety
• Hyperactivity
• Poor memory
• Reduced IQ
Effects on Adults

In Women

• Abnormal reproductive cycles
• Sterility
• Miscarriages
• Stillbirths or premature births

In Men

• Decreased Sex Drive
• Impotence
• Inability to produce healthy sperm
Effects on Children

Born to Parents with High Lead Levels

• Low birth weight
• Slower growth weight
• Nervous system problems
• Higher first year death rates

Get High Lead Levels After Birth

• Delayed mental development
• Lower IQ
• Impaired hearing and sense of balance
• Behavioral problems
Effects at different BLL

Lead concentration in blood (μg Pb/dL)

**CHILDREN**

- 150
- Death

**ADULTS**

- 100
- Encephalopathy
- Anemia

- 50
- Decreased life span

- 40
- Infertility

- 30
- Hearing loss

- 20
- Stunted IQ, hearing, and growth

- 10
- Hypertension

Source: CDC
Symptoms

Lead poisoning

Lead buildup in the body causes serious health problems

**Symptoms**
- Headaches
- Irritability
- Reduced sensations
- Aggressive behavior
- Difficulty sleeping

- Abdominal pain
- Poor appetite
- Constipation
- Anemia

**Additional complications for children:**
Lead is more harmful to children as it can affect developing nerves and brains

- Loss of developmental skills
- Behavior, attention problems
- Hearing loss
- Kidney damage
- Reduced IQ
- Slowed body growth

Source: MedlinePlus/ Mayo Clinic
How **lead** effects children’s health

**Brain**
Any exposure is linked to lowered IQ, ADHD, hearing loss, and damaged nerves. Acute exposures can cause convulsions, loss of body movement, coma, stupor, hyperirritability, & death.

**Heart**
Studies suggest that adults who endured lead poisoning as children had significantly higher risks of high blood pressure 50 years later.

**Hormones**
Lead disrupts levels of vitamin D, which can impair cell growth, maturation, and tooth and bone development.

**Blood**
Lead inhibits the body’s ability to make hemoglobin, which can lead to anemia. This reduces oxygen flow to organs, causing fatigue, lightheadedness, rapid heartbeat, dizziness, & shortness of breath.

**Stomach**
Severe lead exposure can create intense abdominal pain and cramping.

**Kidneys**
Chronic exposures can cause chronic inflammation, which can lead to kidney failure, bloody urine, fever, nausea, vomiting, drowsiness, coma, weight gain, confusion, rash, and urinary changes.

**Reproductive System**
A moderate exposure can not only lower sperm count, but also damage them. Chronic exposures can diminish the concentration, total count, and motility of sperm, though it's unclear how long these effects last after the exposure ends.

**Bones**
Lead may impair development and the health of bones, which can slow growth in children.

**Sources:** Centers for Disease Control, World Health Organization
Sources of Lead Poisoning

• Lead Paint
• Dust
• Soil
• Water
• Hobbies
• Traditional Ethnic Remedies
Lead-Based Paint

Lead was used in most interior and exterior paint before the 1950’s. It contained as much as 50% lead by weight.

• 87% of homes built before 1940 contain some lead paint.
• 69% of homes built between 1940 and 1959 contain some lead paint.
• 24% of homes built between 1960 and 1978 contain some lead paint.
• Department of Housing and Urban Development (HUD) estimates that 38 million (40%) of pre-1978 homes contain some lead-based paint.
• Lead was used as an additive to make paints more durable and weather resistant.
• As early as 1897, lead-based paint was identified as a cause of childhood lead poisoning.
• As early as 1922 countries had started prohibiting use of lead in residential paint.
• Two major forms of Lead pigment
  • White Lead, lead carbonate, used mainly in residential paint.
  • Red Lead, lead oxide, used mainly in metal primer.
• In 1946 a 6 gallon batch of interior enamel paint required 100 pounds of white lead. Exterior enamels often contained as much if not more.

• White lead also used as a drying agent in varnishes.

• Over time lead paint can crack or “alligator” because of wear and temperature changes.
“Alligating”
Peeling
Chalking
Dust

• Leaded Dust is created from Lead-Based Paint.
  • Is created from paint deteriorating over time
  • Damaged by moisture
  • From friction or impact surfaces
  • During renovation, repair and painting maintenance
  • From Abatement projects

• Lead Dust enters the body from ingestion or hand-to-mouth transmission
Deteriorating lead paint dust can be the surface paint or may be several layers underneath newer layers of paint.

Painting over lead-based paint with ordinary house paint will not stop lead dust from accumulating. This is only a temporary control not a permanent one.

Only way to control lead dust is through abatement or the permanent removal, encapsulation or enclosure of lead painted areas.
Dust

Abatement methods include

• Removal of lead-based painted building materials such as walls, floors or doors or the stripping of lead paint from an area.

• Enclosing of lead-based painted areas with new non lead materials such as drywall or siding.

• Encapsulation of lead-based painted areas with a special liquid coating that bonds to the paint and provides an effective barrier.
Dust
Dust
Dust

Insl-X Lead Block®
Lead Encapsulating Coating

Forms a barrier that blocks, coats, and seals lead based paints.
Contains Bitrex® • High Build, Water Cleanup

EC-3210 White (Tintable) 126 Fluid Ounces (3.726 Liters)
Lead in soil can be found in yards, parks and playgrounds. Most contaminated soil comes from exterior paint being washed into the ground around the home or peeling/flaking paint dropping into the soil.

Other sources
- Leaded gasoline in the past, phase out started in 1973 but complete ban not until 1996.
- Industrial sources like smelter, battery plants and recycling centers.
Gasoline
Lead contamination in water usually does not come from the water itself but from plumbing material.

Homes built before 1986 are more likely to have pipes, fixtures and solder that are lead or contain high levels of lead.

Corrosion of the leaded material happens when the water source has high acidity or high alkalinity.
Hobbies

- Lead shot from shotguns, rifle bullets and pellet guns
- Fishing sinkers and jigs
- Automotive care such as body work and tire weights
- Jewelry and Jewelry making
- Dyes and glazes in pottery
Lead Dust being Created
Jewelry

Can Include

• Rings
• Necklaces
• Earrings
• Bracelets
• Hairpins
• Broaches
Jewelry

Fatal Case of Lead Poisoning from Ingestion of Jewelry

- A 4-year old male died of acute encephalopathy 3 days after being admitted for intractable vomiting, stomach pain, and listlessness.
- A metal charm, seen in his stomach on radiograph and was later found to contain 99.1% lead.
- Reebok later recalled 500,000 of these charms, which they had given away free with pairs of girl’s shoes.

- MMWR. March 23, 2006 / 55(Dispatch);1-2
Jewelry
Ethnic Remedies

Examples

• Greta- a traditional Mexican remedy used as a laxative. 97% lead.

• Azarcon- Mexican treatment for Diarrhea. 95% lead.

• Pay-loo-ah- Asian remedy for rash and fever.

• Surma- From India as teething powder

• Kohl- Cosmetics
Any Questions?
Paul Ice
Environmental Resource Specialist III
350 Capital Street, Room 313
Charleston, WV  25301
304-356-4271
Paul.D.Ice@WV.GOV