

Industrialization

Industrialization: Metals

- Annual worldwide production of metals has increased dramatically as a result of the industrial revolution
- “More metal and mineral products have been used in the past 50 years than were used in the entire previous history of the world.”

NPL Sites

- From epa.gov: “Years ago, people were less aware of how dumping chemical wastes might affect public health and the environment. On thousands of properties where such practices were intensive or continuous, the result was uncontrolled or abandoned hazardous waste sites, such as abandoned warehouses and landfills.”
- The superfund was created by taxing industry to pay for the clean up of abandoned sites

Occupational hazards of industrialization

- Mining
 - Accidents
 - Government safety inspections
 - Black Lung
- Disease risk due to high exposure
 - As a result, much was learned about metal toxicity syndromes
- Which leads to the question: What are the effects of exposure at non-occupational (generally lower) levels?

Lead-history

- Toxic effects have been known for centuries
- Paint known to be a poison in household paint as far back as late 1800's
 - Seven countries ban lead paint in 1922
- 1920s: added to gasoline (tetraethyl lead)
- Industry fought public health efforts to cease the ubiquitous use of lead

Lead in the body

- Measuring
 - Methods: blood levels, x-ray refraction (bone)
 - Appropriate biological sampling:
 - bone, blood: long term
 - Urine: short term only
- High dose ($>80\mu\text{g}/\text{dl}$):
 - Affects blood-brain barrier, leading to increased intracranial pressure (lead encephalopathy)
 - Seizure, mental retardation, death
- Low dose: impaired cognitive function
 - Current limit in US is $10\mu\text{g}/\text{dl}$

Treatment

- Chelation therapy
 - Prevent death in children with encephalopathy from large exposure levels
 - Do not restore lost cognitive function in those exposed to lower levels
- No treatment for the effects of low level exposures
- Defining safe levels
 - Is there a threshold?

Studies on health effects of lead exposure

- Needleman
 - Dentine lead and classroom behavior
- Yugoslavia
 - Mother-child interaction
 - Cord blood lead/maternal blood lead
 - Blood lead:bone lead levels, a good correlation

Public health triumph or failure?

- Major sources of exposure were finally eliminated
- But why?
- And who is exposed to the paint that remains in older housing stock?
- No longer used in gasoline only because of catalytic converters
- Why did recognition of the problem take so long?