lead

Metallic poison
sources

- Environmental
  - Water
  - Air
  - Soil
  - food
- House hold
  - Crayons and toys
  - Paint flakes
  - Furniture
  - Lead glazed dishes, cups
- Industrial
  - Storage battery workers
  - Miners
  - Spray painters
Mechanism of toxicity

• Binding to sulfhydryl groups of protein molecules

• Structural and functional changes in mitochondria

• Inhibition of heme formation
  • Interferes with heme synthesis by preventing conversion of delta-aminolevulinic acid to porphobilinogen and incorporation of iron into protoporphyrin IX
PHARMACOKINETICS

- Initially distributed to soft tissues
- Then redistributed and incorporates into bone, hair, and teeth as a tertiary lead phosphate.
- Diet low in phosphate favors release of lead into blood
- High phosphate intake promotes storage
- Vitamin D promotes storage
Acute poisoning

- Colic like pain
- Paralysis of limbs
- Decrease in urinary output
- Cardiovascular collapse
- Lead encephalopathy
Chronic poisoning

• Hematologic
• Neurologic
• Gastrointestinal
• Neuromuscular
• Renal
• Lead line
  – Burtonian lines
  – Blue or black in color
Diagnosis

- 200 punctate basophilia/cm³
- 0.25mg lead/liter of urine
- Alpha amino leviolenic acid
- Presence of porphyrin (reddish fluorescence)
- X-ray evidence of transverse band
- Opaque particles in the intestine
Management

• Treatment in adults

  – Decontamination

    • Whole bowel irrigation

    • Endoscopic removal

    • Follow with abdominal radiograph
Antidotes

• **Indication of chelation**
  – Severe symptomatic patient
  – Patient with end organ damage
  – Elevated blood lead level (>70µg/dl)

• **Chelators to be used**
  – B.A.L(dimercaprol)
  – Succimer
  – penicilliamine
Treatment in children

• Initial measure
  – Removal from the source

• Decontamination
  • If lead visualized on radiograph
    – Whole bowel irrigation
    – Endoscopic removal

• Treatment plan

  class one (BLL >9µg/dl)
  • Educate parents
  • Rescreen in 3 months
• **Class two (BLL 10-19µg/dl)**
  – Test and correct for iron deficiency
  – Rescreen in 3 months

• **Class three (BLL 20-44µg/dl)**
  – Retest within one month
  – Consider chelation therapy

• **Class four (BLL 45-69µg/dl)**
  • Retest within 48 hours
  • Chelation

• **Class five (BLL > 70µg/dl)**
  – Medical emergency
  – Hospitalize and treat with chelation
Chelators

• With level between 45-70
  • Oral chelation with Succimer

• With level exceeding 70µg/dl or encephalopathy
  – Start with B.A.L
    • Intramuscularly every 4 hours
  – When urinary out put is adequate
    • CaEDTA is added
    • Continue for 5 days
Postmortem findings

- Acute
- Chronic
- Samples
Medico legal importance

- Rarely used for homicidal
- Usually accidental
- Industrial poisoning
- Abortion