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 out put
- Cardiovascular collapse
- Lead encephalopathy

Chronic poisoning

- Hematologic
- Neurologic
- Gastrointestinal
- Neuromuscular
- Renal

- Lead line
  - Burtonian lines
  - Blue or black in color

Diagnosis

- 200 punctate basophilia/cmm
- 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