

# Mercury poisoning

# Mercury poisoning

- **There are 3 different forms of mercury**
  - **elemental**
  - **inorganic**
  - **organic**
- **Each has a different toxicological profile**

# Sources of mercury

- **Elemental mercury:**
  - Sphygmomanometers, thermometers, barometers
  - Liquid at room temp – volatilises easily
- **Inorganic mercury:**
  - Traditional remedies (ayurvedic, chinese)
  - Used in gold extraction, caustic soda manufacturing
  - Rodenticides
- **Organic mercury:**
  - Fungicides, seed dressings
  - Methylmercury in fish ...

# Mercury - Absorption

- **Inhalation : 60-80%**
- **Dermal : 3-15%**
- **GI Tract :  
Metallic <0.2%  
Inorganic 15%  
Organic 90+%**

# **Organic mercury poisoning: Rare ... but severe**

- **Exposure: ingestion, topical or inhalation**
- **CNS Toxicity:**
  - **poor concentration, fatigue, ataxia, tremor, constricted visual fields,**
  - **coma & convulsions**
- **BM suppression**
- **Renal toxicity - dealkylation to inorganic form**
- **Poorer response to treatment**

# Inorganic mercury poisoning

- Gastrointestinal phase:  $\text{Hg}^{2+}$  is a potent GI irritant
  - gingivitis, stomatitis
  - oesophageal, gastric, small and large bowel erosions
  - haematemesis, bloody diarrhoea, CVS collapse
- Systemic toxicity:  $\text{Hg}^{2+}$  inhibits sulphhydryl enzymes
  - hypotension, lactic acidosis
- Nephrotoxicity:  $\text{Hg}^{2+}$  deposits in the tubules → ATN
  - acute renal failure
  - potentially leads to CRF in survivors

# **Elemental Mercury**

**Case 1: A 4 yr old boy has bitten the top of a mercury thermometer and his mother thinks he may have swallowed it.**

- **What would your advice be?**
- *Little or no risk of toxicity from oral elemental mercury:*
  - **Faecal excretion precedes slow oxidation**



**Case 2: A man rings A&E because he has dropped a mercury thermometer in his son's bedroom.**

- **What is the risk of toxicity?**
  - *elemental mercury is volatile*
  - *if on a heated surface it may volatilise & be inhaled*
  - *once inhaled ~ 80% absorption*

# Case 2: Mercury thermometer broken in a bedroom

- How would you advise him to clean up the mercury?

## 1. Spill on a non-porous surface:

- *lift the mercury with card or paper (remove gold rings and wear gloves)*
- *place in a sealed container & dispose in general waste*

## 2. Spill on a carpet:

- ***DON'T USE a Hoover !***
- *Use a sulphur based (calcium polysulfide) powder → mercuric sulphide & then can vacuum up ...*
- *Large spills: involve environmental health*

# Inhaled Elemental Mercury (1)

## ACUTE

- **Irritant respiratory effects:**
  - cough, dyspnoea
  - pulmonary oedema, ARDS
- **Metal fume fever:**
  - pyrexia, cough, malaise, flu-like symptoms
- **CNS features:**
  - confusion, emotional lability, psychoses
  - convulsions, CNS depression & coma
- **Renal effects:**
  - rarely ARF (oxidation to  $\text{Hg}^{2+}$ )

# **Inhaled Elemental Mercury (2)**

## **CHRONIC**

- **‘Erethism’**
  - **TREMOR, dysarthria**
  - **peripheral neuropathy, sweating**
  - **personality change**
- **Stomatitis, gingivitis**
- **Chronic renal impairment**

# Acrodynia

- **Mercury syndrome in children**
  - Usually related to elemental mercury exposure, 2 reports secondary to inorganic exposure
- **6 P's hands & feet: puffy, pink, painful, peeling, paraesthetic, perspiring**
- **Associated with weight loss, anorexia, irritability, behavioural changes**
- **Hypertension – can mimic phaeochromocytoma**
  - Mercury inhibits COMT (catecholamine-o-methyltransferase) ... NAdr / Adr accumulate

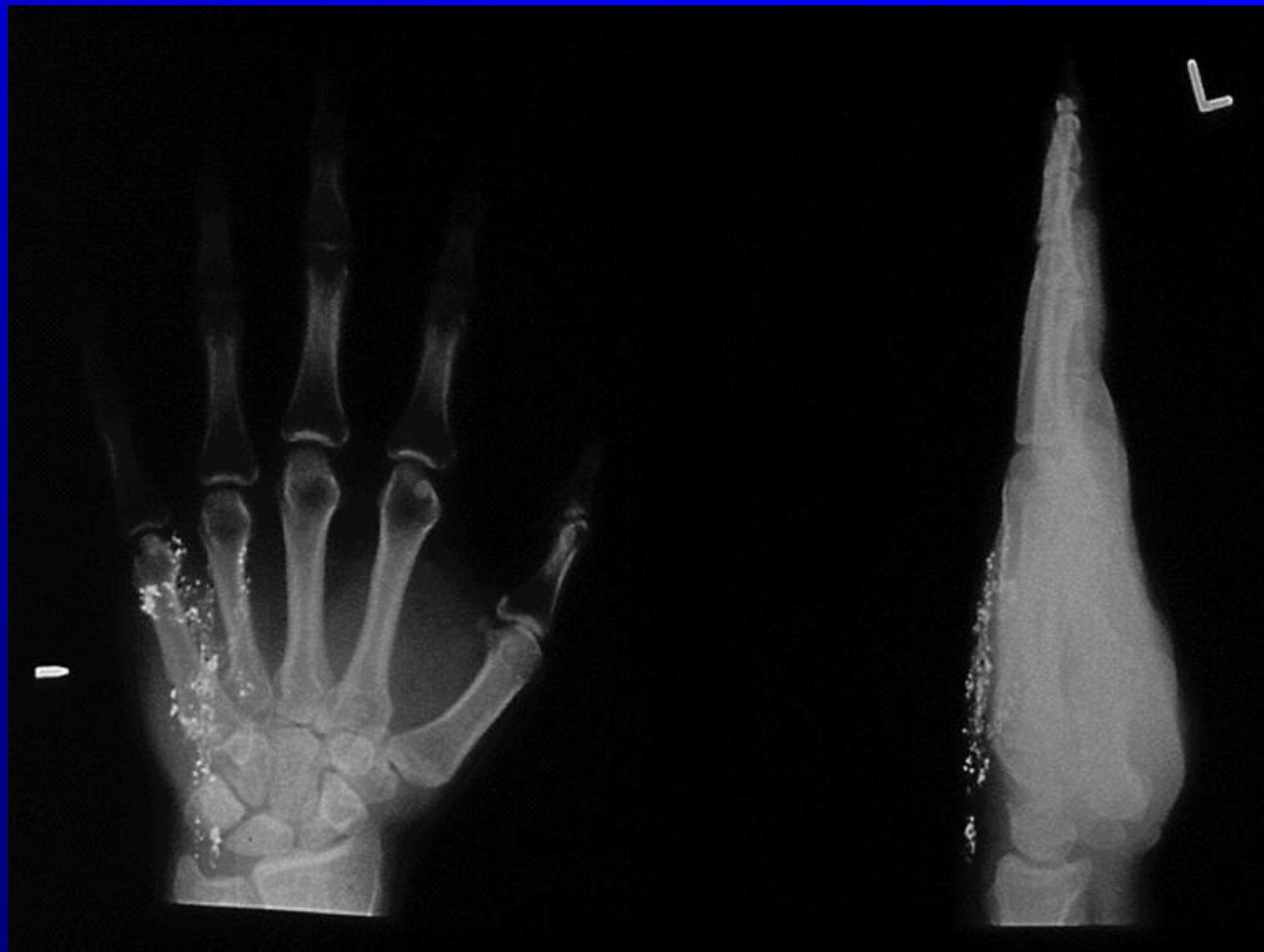
# IV/IM Elemental Mercury

- **Results in:**
  - **local complications**
  - **embolic complications**
  - **mercurialism**

# IV/IM Elemental Mercury

## Local Complications

- **Thrombophlebitis**
- **Infection**
- **Granuloma formation**
  - **Excise large s/c deposits**
    - **? prevents local & systemic effects**

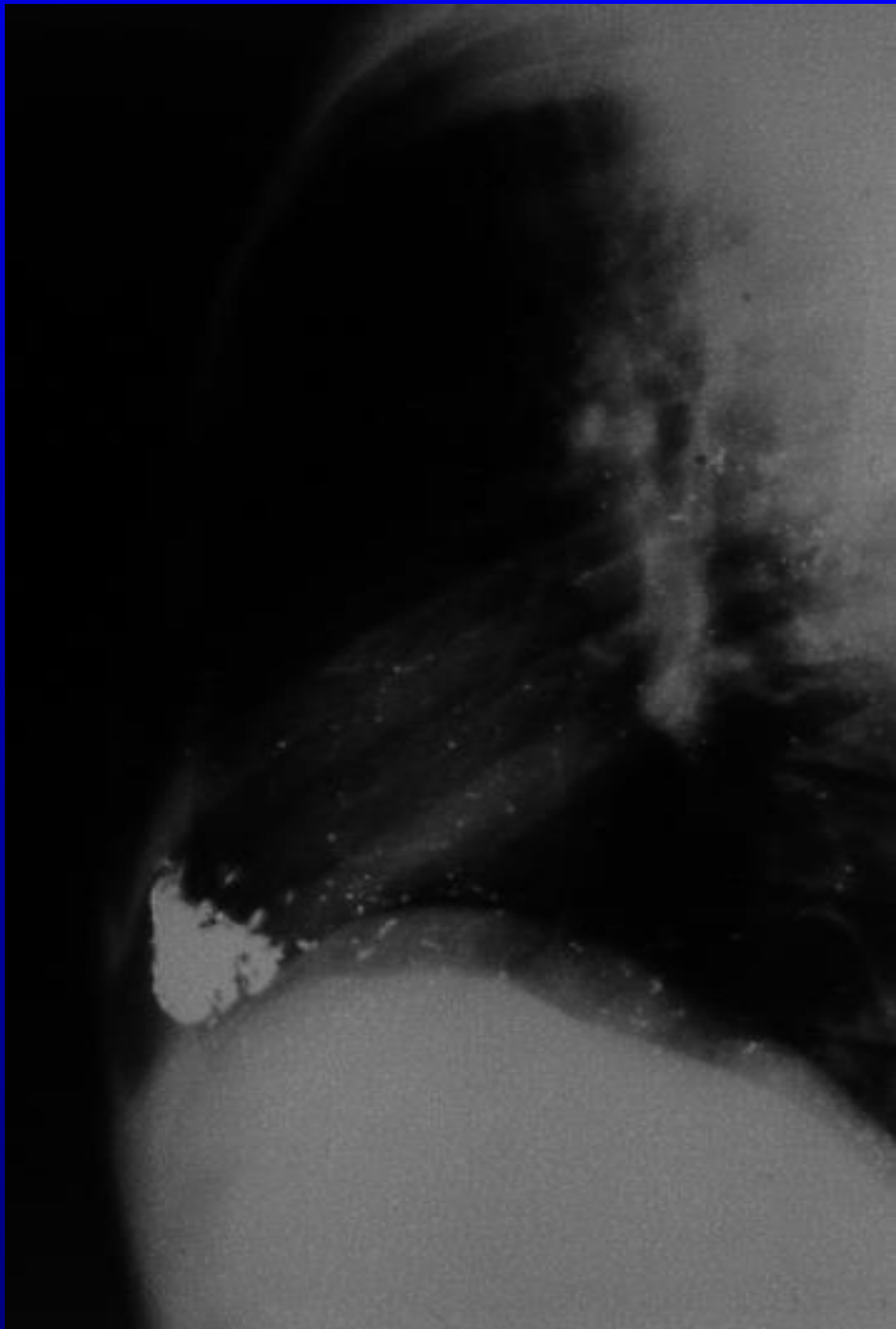




# IV/IM Elemental Mercury

## Embolic Complications

- **Pulmonary**
  - usually asymptomatic
  - may cause chest pain, SOB
  - normal spirometry, decreased transfer factor
- **Systemic**
  - ? mercury through pulmonary capillary bed
  - widespread eg. abdomen, intracerebral
  - asymptomatic





# IV/IM Elemental Mercury

## Mercurialism

- Slow oxidation of metallic Hg
  - └ mercuric ions ( $\text{Hg}^{2+}$ )
    - Chronic renal impairment
    - ?? CNS toxicity
- Consider chelation therapy:
  - guided by blood mercury
  - *may* require long-term chelation

# Diagnosis of Mercury poisoning

- **Blood mercury:**
  - only really useful acutely
  - normal  $<10\mu\text{g/l}$
  - symptoms with blood mercury  $>150\text{-}200\mu\text{g/l}$
- **Urine mercury**
  - probably the most reliable indicator
  - normal  $<10\mu\text{g/l}$
  - symptoms with urine mercury  $>100\text{-}150\mu\text{g/l}$
- **U&E**
- **Radiology:** for elemental ingestion/aspiration/injection

# Treatment of Mercury poisoning

- **Remove from source**
- **Supportive care**
  - particularly important with inhalation
- **DMPS Chelation (2,3-Dimercapto-1-propanesulphonate)**
  - Chelation therapy of choice for mercury
  - For both acute and chronic mercury poisoning
  - For all forms of Hg (inorganic > metallic >> organic)
  - **Indications:**
    - symptomatic patients
    - blood/urine mercury persistently > 100 - 150mg/l