Lead

**Toxic Mechanism**
Interferes with intracellular functions in CNS, kidneys, reproductive, haematopoietic systems.
Absorbed via oral, topical and inhaled routes.
Absorbed and bound by red cells, widely distributed through body, stored in bones.

**Sources**
Smelting, metal recycling
Atmospheric due to leaded petrol
Occupational - soldering, lead paint, stained glass, plumbing
Lead pain prior to 1960s, antique toys, Make up, Retained bullets

**Clinical Features**
Acute or subacute lead toxicity due to ingestion or inhalational occupational exposure.
- AP, N/V, haemolytic anaemia, hepatitis
- metallic taste
- cerebral oedema, encephalopathy, seizures, coma
- clinical effects correlate with levels
Chronic lead toxicity
- vague constitutional symptoms: poor concentration, anorexia, vague AP, weight loss, arthralgia
- teratogenic

**Investigations**
ECG, BSL, paracetamol level
Whole blood lead level
FBC: normochromic, normocytic anaemia with basophilic strippling of erythrocytes; U+Es, LFTs
AXR for ingested FB
Nerve conduction tests for chronic exposure

**Management**
**Resuscitation, Supportive Care and Monitoring**
Acute resus rarely required
Mannitol 1g/kg + dexamethasone 10mg for cerebral oedema

**Decontamination**
Endoscopy if above GO junction, whole bowel irrigation if below and symptomatic, high fibre diet+laxatives + repeat
AXR if asymptomatic

**Antidotes**
Chelation if symptomatic
Sodium calcium EDTA iv for acute encephalopathy
Succimer (DMSA) po if no encephalopathy or asymptomatic but high levels

Consider others exposed - notifiable
Identify source to prevent further exposure
**Arsenic**

Elemental, inorganic and organic forms

**Toxic Mechanism**

Binds numerous cellular enzymes - interferes with cellular respiration

Absorbed by dermal, resp or GI routes

**Acute ingestion**

Usually DSH

- >1mg/kg potentially lethal
- <0.05mg/kg mild self-limiting GI symptoms

Severe gastroenteritis with MOF

Rapid onset severe watery (rice water) diarrhoea, vomiting, abdo pain, GI haemorrhage

Encephalopathy, seizures, cardiovascular collapse

Hypersalivation

Garlic odour

Acute cardiomyopathy, prolonged QT, arrhythmias

ARDS, renal failure, hepatic injury, bone marrow suppression (max 2-3/52)

Delayed: alopecia, peripheral neuropathy (may mimic GBS - may progress to resp failure)

**Subacute ingestion**

Industrial accidents, food contamination, herbal medicines

GI symptoms, leucopenia, hepatic injury, haematuria

Peripheral neuropathy

**Chronic ingestion**

Contaminated artesian water

Multi-system disorder: constitutional sx, cutaneous lesions, nail changes, peripheral neuropathy, skin/bladder malignancies

**Investigations**

ECG, BSL, paracetamol level

Spot urinary arsenic level or 24 hour urinary arsenic excretion

Blood levels limited utility: FBC, U+Es, LFTS, ABG

CXR/AXR - inorganic compounds radio-opaque

**Management**

**Resuscitation, Supportive Care and Monitoring**

ABC. Immediate life threats: hypovolaemia and shock due to GI losses

**Decontamination**

Cooperative patients, + XR - whole bowel irrigation - polyethylene glycol (monitor with serial AXR)

**Antidotes**

Chelation when acute, severe poisoning - Succimer po

Dimercaprol im if unable to give orally due to GI symptoms

**Disposition**

Chronic intoxication managed as outpatient

Acute - discharge if clinically well, no GI sx at 12 hrs
Mercury
Inhibits enzymes/disrupts cellular membranes

Sources
Elemental mercury - thermometers, dental amalgam, manufacture paints/pigments, gold mining
Inorganic mercury - disinfectants, fireworks, manufacture fur/leather, batteries
Organic mercury - embalming fluid, fungicide, pesticide, wood preservative, seafood

Risk Assessment
Benign:
- accidental ingestion elemental mercury (broken thermometer) in normal intact GI tract

Acute
- inhaled elemental mercury aerosol or vapour: pneumonitis, NCPO, neurological injury; H/N/V, metal taste, salivation, visual disturbance
- ingestion inorganic mercury salts: haemorrhagic gastroenteritis, ARF, shock
- organic mercury ingestion/inhalation/skin contact: GI sx, dermatitis, ARF, delayed neurolog injury

Chronic
Multi-system disorder, prominent neuropsychiatric symptoms:
- tremor, fatigue, headaches, depression, insomnia, delirium, neuropathy, ataxia, anosmia
- metallic taste, burning in mouth, looth teet, gingivitis, nausea, hypersalivation
- renal dysfunction
- acrodynia: red/swollen/hyperkeratotic rash palms, soles and face - can desquamate and ulcerate

Investigations
ECG, BSL, paracetamol level
Whole blood or urinary mercury level - confirms recent exposure but not total body burden
XR - radio-opaque; Endoscopy

Management
Accidental oral or skin exposure - no assessment or treatment
ABC
Inhalational - close monitoring, supportive
Ingestion - aggressive fluid resus, supportive care for MOF.

Decontamination
Environmental - remove contaminated clothes, don’t vaccum (aerosols), throw away carpets
Whole bowel irrigation for massive elemental mercury
Charcoal for organic mercury

Antidotes
Chelation if unwell - dimercaprol (not for elemental), penicillamine or succimer

Dimercaprol
Rarely used, toxic, im chelator for severe poisoning from lead, inorganic arsenic, mercury.
Contraindications: peanut allergy (peanut oil), G6PD def.
Binds to metal ions, forms stable compound, excreted in urine
Only use in ICU due to severity of underlying condition and adverse effects.
Adverse effects (50%) - pain, sterile abscess, fever, chest pain, HTN, tachycardia, headache, N/V, peripheral paraesthesia, lacrimation, salivation, nephrotoxicity
If possible use succimer - orally-active analogue of dimercaprol