

## PARAQUAT

- mild poisoning (< 20 mg Paraquat/ kg body weight): asymptomatic or vomiting/diarrhea -> full recovery
- moderate to severe poisoning (20-40 mg Paraquat/ kg body weight):
  - . vomiting, diarrhea
  - . systemic toxicity -> generalized symptoms
  - . pulmonary fibrosis, renal failure, hepatic dysfunction
  - . death in the majority of cases (can be delayed for 2 or 3 weeks)
- acute fulminant poisoning (> 40 mg Paraquat/kg body weight)
  - . vomiting
  - . ulceration of the oropharynx
  - . MODS: cardiac (myocarditis), respiratory (pulmonary fibrosis), hepatic (liver necrosis), renal (tubular necrosis), adrenal (necrosis), pancreatic, neurologic
  - . mortality = 100 % (within 24 hours, never delayed for more than one week)

## PARATHION & CARBAMATES

The cholinergic effects of parathion poisoning depend on the balance between muscarinic and nicotinic receptors

1. Bronchial tree (muscarinic): bronchoconstriction, dyspnea, increased bronchial secretion, pulmonary edema
2. Gastrointestinal system (muscarinic): nausea, vomiting, cramps, diarrhea
3. Sweat, salivary and lacrimal glands (muscarinic): increased sweating, salivation, lacrimation
4. Cardiovascular system (muscarinic): bradycardia, fall in blood-pressure, rare atrial fibrillation or ventricle tachycardia
5. Pupils (muscarinic): miosis
6. Ciliary body (muscarinic): blurring of vision
7. Bladder (muscarinic): urinary incontinence
8. Striated muscle (nicotinic): fasciculations, weakness, cramps
9. Sympathetic ganglion (nicotinic): pallor, tachycardia, elevation of blood pressure, hyperglycemia

Carbamate pesticides cause a decrease in cholinesterase activity. They bind reversibly to the active site on the cholinesterase enzyme, in contrast to the organophosphate pesticides.

Carbamates cause the same excess in muscarinic and nicotinic stimulation, followed by weakness seen in organophosphate poisoning, but for a relatively shorter duration.

## **METHANOL**

Methanol is metabolized to formaldehyde by the enzyme alcohol dehydrogenase. Formaldehyde is metabolized to formic acid by aldehyde dehydrogenase.

Methanol itself is a mucosal irritant: it causes nausea, vomiting and abdominal pain. Pancreatitis is seen in 2/3 of the cases.

Its metabolite formic acid is much more dangerous:

- eyes: mydriasis, hyperemic conjunctivae, loss of sight
- CNS: depression, drowsiness, weakness, coma, death
- urinary: anuria after two or more days
- cardiovascular: tachycardia, bradycardia, hypertension, hypotension, central cyanosis, asystole
- hematologic: methemoglobinemia, intravascular hemolysis, DIC
- metabolic: metabolic acidosis, respiratory acidosis, acute tubular necrosis, ARDS, peritonitis, sepsis, shock and death

## **HYDROCARBON PRODUCTS** (white spirit - thinner)

Deaths attributed to hydrocarbon products almost always result from pulmonary damage.

The primary target organ in a serious hydrocarbon ingestion is the lung, where toxicity occurs by aspiration, leading to a hydrocarbon pneumonitis: aspirated hydrocarbons inhibit surfactant, leading to alveolar instability, early distal airway closure, ventilation-perfusion mismatches and subsequent hypoxemia. Bronchospasm may contribute to ventilation-perfusion defects.

CNS depression is almost always the result of aspiration-induced hypoxia. Poor gastrointestinal absorption limits the CNS toxicity of most hydrocarbons.

Clinical presentation

- pulmonary system: symptoms of respiratory distress from aspiration usually, but not always, appear within 30 minutes of exposure
  - . mild symptoms: coughing, choking, tachypnea, irritability
  - . moderate symptoms: grunting, lethargy, flaccidity, bronchospasm
  - . severe symptoms: tachypnea with grunting respiration, cyanosis, coma, seizures
- central nervous system: the most serious aspiration pneumonias present with depressed sensorium and lethargy is the most common sign
- gastrointestinal tract: local irritation of mouth and pharynx occurs, but diarrhea, hematemesis and melena are rare.
- cardiovascular system: myocardial involvement is rare
- organ dysfunction: liver, kidney and splenic changes are uncommon and usually reversible