

Types

Include: Dipyridyl compounds (paraquat, diquat), glyphosate, chlorphenoxy compounds (e.g. 2,4-D, 2,4,5-T [part of Agent Orange], MCPA, mecoprop [MCP]) and propanil.

Paraquat

See separate topic.

Glyphosate

Toxicity: Organophosphate that doesn't inhibit AChE. Inactivated on soil contact. Inhibits amino acid synthesis in plants but not animals. However toxicity may be more from the organic surfactant (most commonly polyoxyethyleneamine, POEA) component of the herbicide product e.g. in Roundup®. Surfactant disrupts cell & mitochondrial membranes and → uncoupling of oxidative phosphorylation. Poorly absorbed, low V_d , renal excretion.

Clinical: Mostly asymptomatic or mild GIT upset. Mod toxicity results in GIT upset & ↓BP. Sev toxicity includes metabolic acidosis, organ damage, pulm dysfn/ARDS, RF, coma by 12-24hrs. Overall 3% mort with ↑risk if 190ml (>2-3ml/kg) ingested.

Investigations: Std screening (paracetamol, ECG). ABG, lactate, UEC, LFT, BSL, ±CXR.

Management: Early decontamination (AC<1h) esp if >2ml/kg ingested, maintain urine output & BP with fluids ±pressors, correct acidosis, supportive care. Case reports of benefits with Intralipid in severe toxicity.

Chlorphenoxy compounds e.g. MCPA (4-Chloro-2-Methylphenoxyacetic Acid)

Toxicity: Mitochondrial poison → uncoupling of oxidative phosphorylation. Severity doesn't correlate well with levels. Saturable albumin binding (→↑ V_d) and long $T_{\frac{1}{2}}$ at high doses. Weak acid, $pK_a=3.05$ (comparable to aspirin) with mainly renal elimination & some hepatic conjugation.

Clinical: Commonly no/mild GIT symptoms. May have corrosive injury to oropharynx. Salivation very responsive to atropine (unlike OP OD) may occur. Initial resp alkalosis followed by met acidosis & rhabdomyolysis (ARF) in mod toxicity. Sev toxicity can include ↑HR & refractory ↓BP, ARDS, coma & seizures. Overall 5% mort by 24-48h. Severity doesn't correlate well with dose.

Investigations: Std screening (paracetamol, ECG). ABG, lactate, UEC, CK, LFT, BSL, ±CXR.

Management: Decontamination (AC if <6h), maintain urine output & BP with fluids ±pressors, correct acidosis, urine alkalinisation, consider dialysis in large OD, supportive care.

For both glyphosate and chlorphenoxy compounds the following clinical grading may be used:

Toxicity	Clinical Features
Asymptomatic	No clinical/inv abnormalities
Mild (<50ml)	Predominantly GI symptoms with stable vital signs and no other organ involvement
Moderate (50-100ml)	GI symptoms > 24h, Fluid responsive ↓BP, Pulmonary dysfn not requiring intubation, Acid-base disturbance, Evidence of renal impairment, Myalgia, Sedation
Severe (>100ml)	Pulmonary dysfn requiring intubation, RF requiring dialysis, ↓BP requiring pressor, Acid-base disturbance, Cardiac arrest, Coma, Seizures, Death

Propanil (3,4-dichloropropioanilide)

Toxicity: Hydrolysed & oxidised by CYP450 to primary toxin 3,4-dichlorophenylhydroxylamine in liver which then can oxidise Fe^{2+} to Fe^{3+} → methaemoglobinaemia. Mortality ~10-12%.

Clinical: Mild GI upset, SOB, fatigue. In sev, met acidosis, ↑HR/↓BP/arrhythmias, ↓GCS, fits.

Investigations: see Methaemoglobinaemia topic.

Management: Decontamination (AC<1h), see Methaemoglobinaemia topic.