

Turned toxic....

How to deal with poisoning in small animals

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Challenges

- Toxicity is often uncertain

Poisoning

- Poisoning is usually accidental
 - Scavenging
- Can be owner-induced
 - Ingestion of human medication
- Malicious poisoning is rare

Clinical Signs

- Can be rapid, severe and potentially fatal
- Non-specific
- Mimic other disease & other toxicities
- Reflect toxin's target organ / system
 - E.g. Rodenticides → coagulation
 - bleeding

Diagnosis

- Index of suspicion
- Thorough history & physical examination
- Toxicological analysis is available for some toxins
 - Collect relevant samples
 - blood, serum, vomit, liver, kidney, brain, urine, food, water

Accurate records

Information Sources

- Veterinary Poisons Information Service
 - 24 hour advice service
 - available only to veterinary practices
 - Cost per case system
- Reference textbooks

Top ten enquiries to VPIS

- Anticoagulant rodenticides
- NSAID's
- Chocolate
- Paracetamol
- Permethrin
- Metaldehyde
- Lillies
- Grape/raisin/sultana
- Batteries
- Adder bites

Initial management

- Telephone advice
- Stabilise vital signs
- History and physical examination
- Prevent continued absorption
- Increase excretion
- Supportive care and monitoring
- Antidote

Telephone advice

- What are the clinical signs?
 - i) does pet need examining
 - ii) is poisoning a possibility
 - iii) can the owner do anything

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Initial Stabilisation

- Airway
- Breathing
- Circulation
- Vascular access/Fluid therapy
- Manage life threatening signs
 - seizures, arrhythmias
- Monitor vital signs

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Eliminating further absorption

- Toxin may be absorbed from skin, gut or both
- Buster collar or muzzle
- Skin & coat can be washed or clipped
- Decontamination of the gut

Prevent further GI absorption

- Induce Vomiting
- Gastric Lavage
- Adsorbent

Induce Vomiting

- Indicated
 - within 2-3 hrs from ingestion
- Contraindicated
 - respiratory depression
 - seizures, reduced consciousness
 - ingested caustic substance
- Drugs
 - Apomorphine
 - Alpha-2 agonist
 - medetomidine
 - xylazine
 - 3% Hydrogen peroxide
 - Syrup of Ipecac
 - Washing liquid
 - Soda crystals

Gastric Lavage

- Indicated
 - if vomiting is contraindicated or ineffective
- Risks
 - Aspiration
 - Incomplete evacuation
 - Anaesthetic
- Pre-measured stomach tube placed
- Lavage with warm saline or tap water
- Drain
- Continue until clear lavage fluid

Adsorbent

- Binds toxin and prevents further absorption from gut
- Activated charcoal commonly used
 - Oral or via stomach tube
 - Repeated administration
 - Every 4-6 hours interrupts enterohepatic recycling
 - Not effective for alcohol, corrosives, iron, lithium

WBI?

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Hasten Elimination

- Cathartic or laxative
- Increase renal elimination
 - Intravenous fluids \pm diuretic agents
- Dialysis

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Supportive Therapy

- Fluid therapy
- Maintain body temperature
- Eliminate toxin from environment
- Decontaminate skin/coat if not already done
- Support vital body functions
 - Cardiorespiratory
 - Neurological
 - Renal
 - Hepatic
- Consider nutrition

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Treating the effects of the toxin

- Haemorrhage
 - Apply pressure
 - Fluids+/- blood
- Seizures
 - Diazepam, barbiturates, propofol CRI
- Respiratory depression
 - Oxygen
 - ventilation
- Hyperaesthesia
 - sedatives
- Tachycardia
 - Beta blockers, antidysrhythmics
- Bradycardia
 - atropine
- Hypothermia
 - External warming, warm water enema or lavage
- Hyperthermia
 - Ice packs, muscle relaxants, NSAIDs

Specific toxins

Lily toxicity

- Liliaceae plant family can cause ARF
 - Consider any *Lilium* spp or *Heimerocallis* spp potentially nephrotoxic
- Neither Lily-of-the-Valley (*Convallaria majalis*), the peace lily (*Spathiphyllum* spp) nor *Calla* lily are true lilies
 - Not nephrotoxic
 - Peace and Calla contain oxalates
 - Develop stomatitis which limits ingestion and stops renal failure
 - Lily of the Valley contains cardiac glycosides

Clinical Signs

- Signs develop within 12 hours and progress to renal failure within 2-3 days
- Vomiting
- Inappetance /anorexia
- Depression /lethargy
- Oliguria/Anuria
- CNS signs
 - Ataxia, head pressing, disorientation, tremors, seizures

Clinicopathological findings

- Biochemistry
 - Acute renal failure
 - Azotaemia, hyperkalaemia, hyperphosphataemia
- Urinalysis
 - Epithelial casts
 - Submaximally concentrated urine SG
 - Proteinuria
 - Glucosuria

Treatment

- Induce emesis if < 2 hours from ingestion
 - Adsorbent
- IVFT < 6 hours of ingestion
 - Can prevent the development of renal failure
 - Continue for at least 48 hrs
- > 6 hours post ingestion
 - consider dialysis
- IVFT starts > 18 hours after ingestion or anuria
 - Poor prognosis

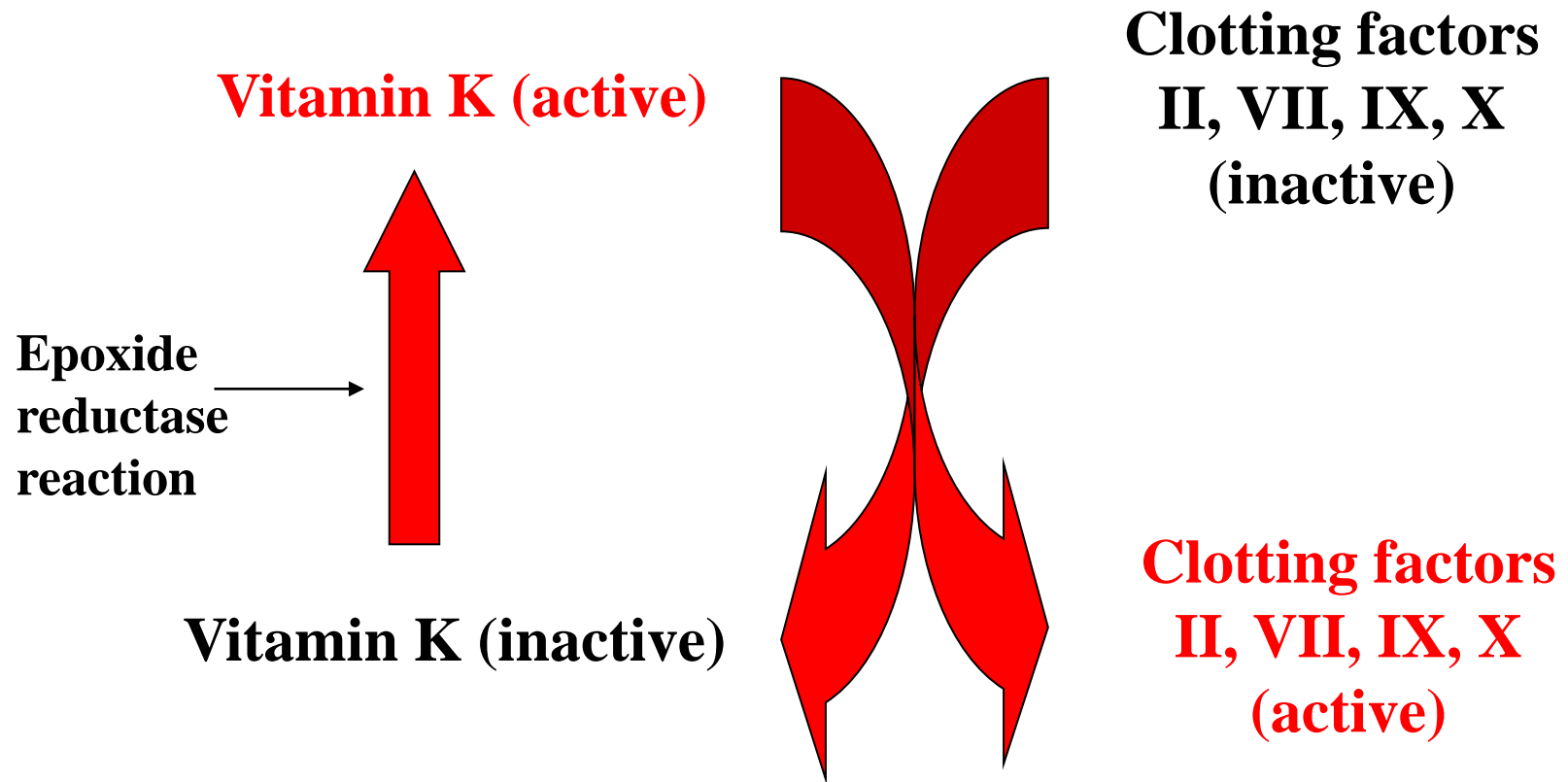
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- 12 week old FE DSH
- 48hr history lethargy, anorexia, vomiting and abdominal pain
- No improvement with symptomatic therapy
 - Including NSAID's
- Depressed, generalised tremor, ataxia
- Abdominal palpation – renal pain and irregularity
- Hypothermia (36.7C)
- Dehydration

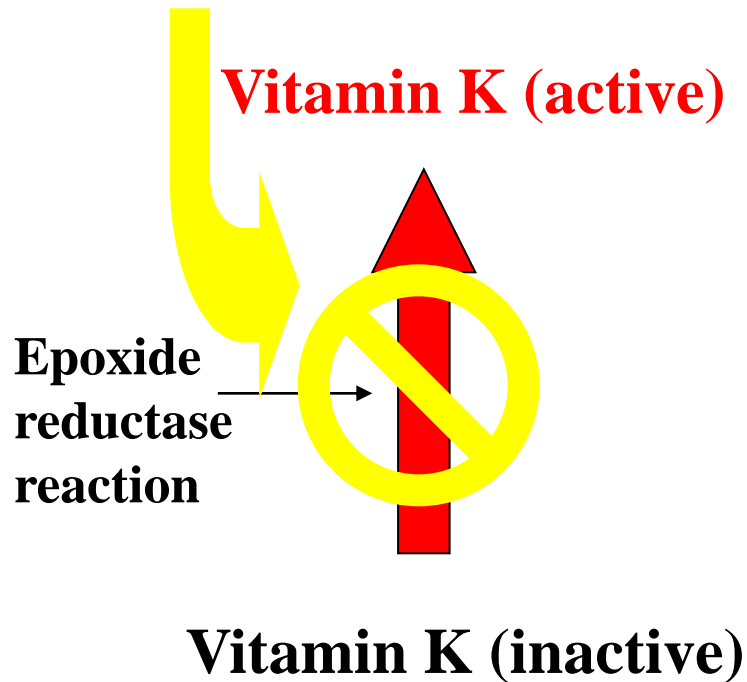
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- Urea 129 mmol/l (6.5-10.5)
- Creatinine 1800 μ mol/l (133-175)
- Sodium 137.3 mmol/l (149-157)
- Potassium 10.16 mmol/l (4-5)
- Calcium 2.21 mmol/l (2.3-2.5)
- Phosphate 4.36 mmol/l (0.95-1.55)
- pH 6.9 (7.3 +/- 0.08)
- Ultrasound
 - Bilateral hyperechoic kidneys
 - Small volume ascites and retroperitoneal fluid
- Treatment
 - Intravenous fluid therapy
 - Diuretics
 - Calcium gluconate and glucose to manage hyperkalaemia
 - Sodium bicarbonate to treat acidosis
 - Indwelling urinary catheter
- Despite 8hrs treatment remained anuric
 - Anuric for 36 hours prior to presentation
 - Further clinical deterioration
- Owner then reported observing kitten to have eaten Lily flowers

Anticoagulant rodenticides



Anticoagulant rodenticides



**Clotting factors
II, VII, IX, X
(inactive)**

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II, VII, IX, X
(active)**

Clinical effects may not show for 1-3 days

Diagnosis

- History
 - Possible exposure
- Clinical signs
 - Lethargy
 - Exercise intolerance
 - Respiratory distress
 - Hypovolaemic shock
 - Bleeding
 - Internal
 - External
- Clotting profile
 - Activated clotting time
 - PT and APTT

Clinical signs

- Haemorrhage into major body cavities

Clinical Signs

- Bleeding into lung parenchyma
- Bleeding into sub-mucosa of trachea
- Bleeding into GI tract
- Bleeding from nose
- Bleeding into joints
- Bleeding into subcutaneous space
- Repeated bleeding at venepuncture sites

Other abnormalities

- Anaemia
- Hypoproteinaemia

Management

- Gastric decontamination
 - <3h post ingestion
 - Emesis +/- gastric lavage
 - Adsorbents
- Not if already bleeding

Management (cont)

- Cage rest
- IVFT
- Drainage of cavity bleeds if necessary
- Blood/blood products
 - Fresh or stored blood contain adequate Vitamin K dependent clotting factors
 - Synthesis takes approx 6-12hours
- Oxygen

Management

- Vitamin K₁ (Konakion – 2 or 10mg/ml)
 - S/C (multiple sites) then orally
 - 5mg/kg s/c then 2.5-5mg/kg divided twice daily orally
 - Treat for 7-28 days depending on toxin
 - Check PT 2 days after finishing treatment and continue if necessary
- Avoid Vitamin K₃

Monitoring

- PT should normalise within 1 hour of plasma transfusion
- PT will normalise after 12-24 hours of Vitamin K alone
- Re-evaluate PT 2-4 days after stopping Vitamin K

Pyrethrins & Pyrethroids

- Misuse of concentrated products e.g. canine
 - Misadministration of canine product
 - Close contact recently treated dog
- Alter activity of sodium channels
 - Increase duration of depolarisation

Pyrethrins & Pyrethroids

- Clinical signs
 - Vomiting, hypersalivation, ataxia, mydriasis, tachycardia, hyperaesthesia, hyperthermia, tremor, twitching, seizures, respiratory distress
 - Death possible
 - Often dermal

Pyrethrins & Pyrethroids

- Treatment
 - Gut decontamination only if oral exposure
 - Activated charcoal
 - Dermal decontamination
 - Copious washing lukewarm water with mild detergent
 - Muscle tremor
 - Diazepam
 - Methocarbamol
 - Seizures
 - Diazepam
 - Phenobarbitone
 - CRI propofol
 - IV fluids

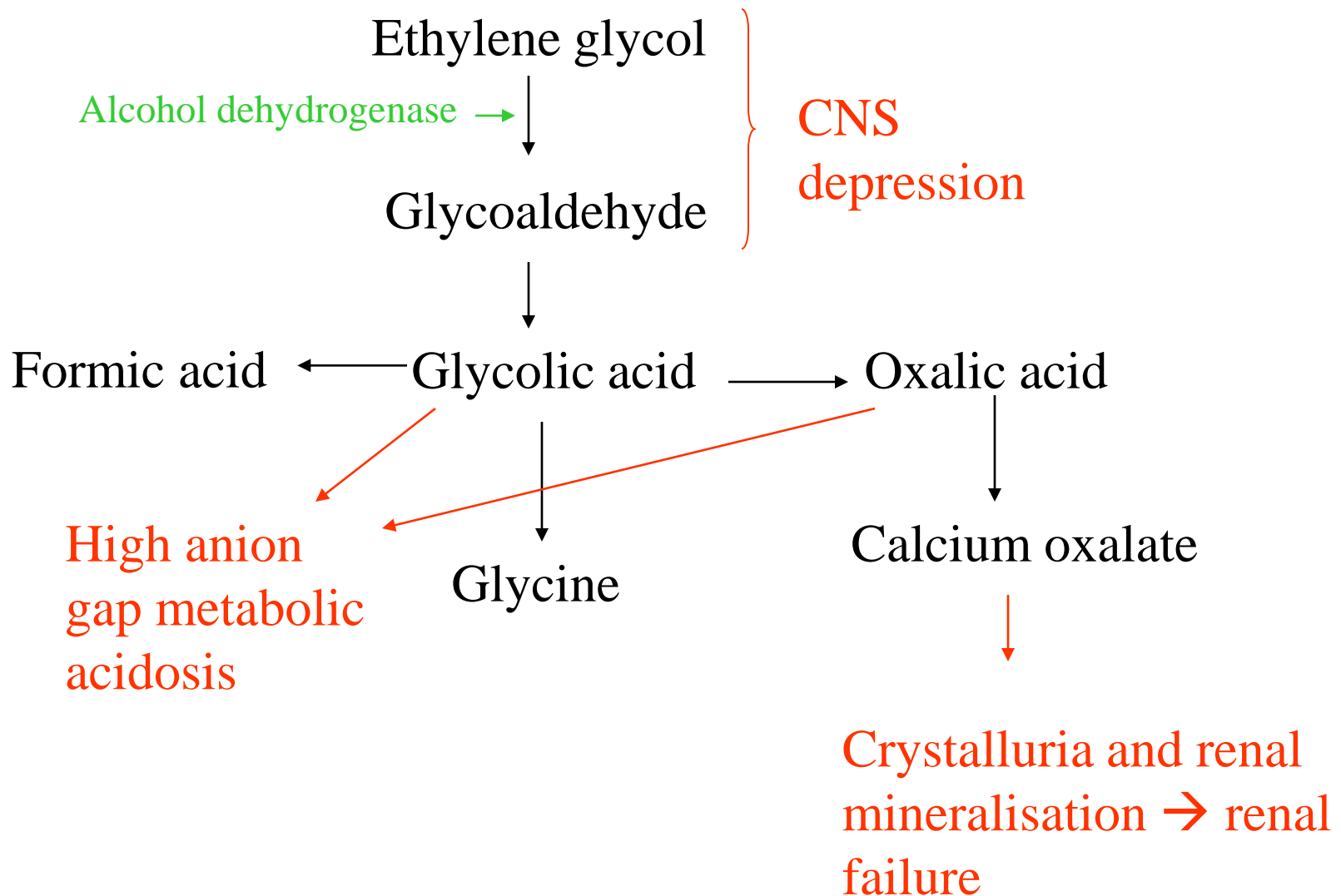
Ethylene Glycol

- Renal & metabolic effects
- Antifreeze & screen washes
- Sweet aromatic smell and taste
- Lethal dose:
- 4-6ml/kg (dog), 1.4ml/kg (cat)
- Effects are dose dependent

Signs

- Drunk for 1st few hours
- PU/PD and dehydration within 12 hours
- Oliguric renal failure within 24 hours (cats) to 72 hours (dogs)
- Hypocalcaemia, high anion gap acidosis, azotaemia, oxaluria, hyperglycaemia, hyperkalaemia, hyperphosphataemia
- Central nervous signs
- Death

Diagnosis – ETHYLENE GLYCOL TOXICITY



Specific Therapy

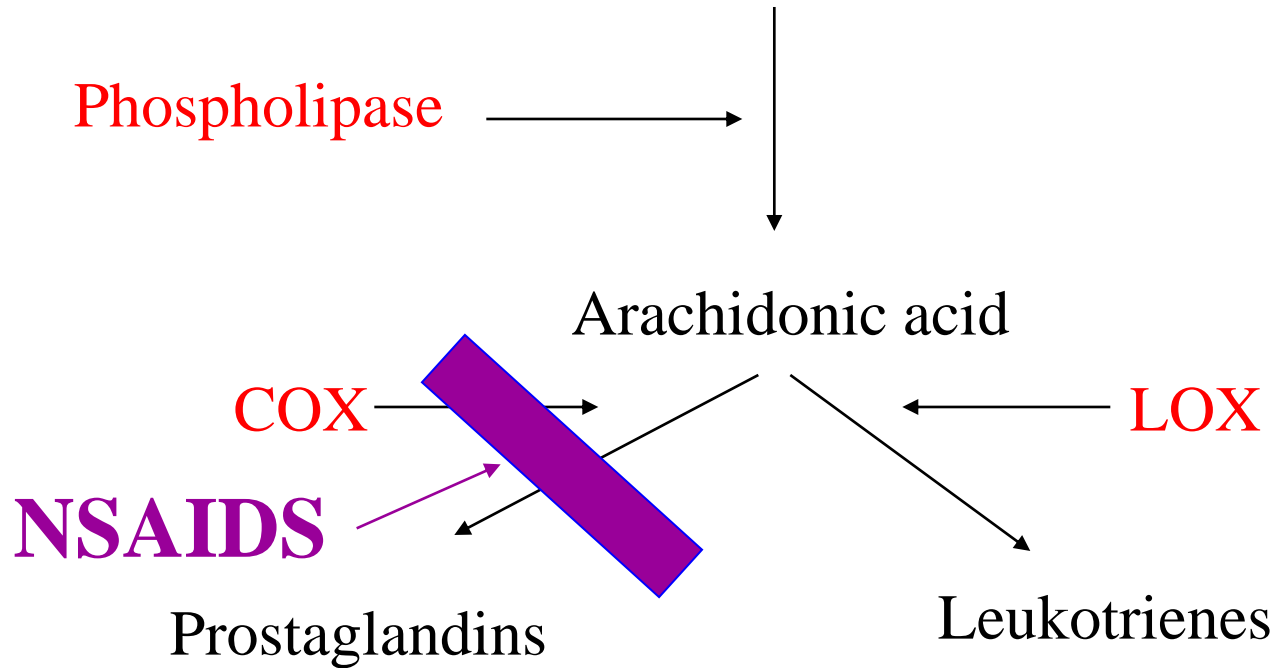
- Ethylene glycol metabolised by alcohol dehydrogenase
 - can give ethanol to compete for metabolism
 - Not if renal failure present
 - 4-methylpyrazole (Antizol)

NSAIDs

- Ibuprofen common
- Rapidly absorbed
- Renal /Gastrointestinal effects within 2-12 hours
 - Nausea, Vomiting, gastrointestinal haemorrhage
 - Abdominal pain
 - Anorexia
 - Weakness/Ataxia
 - Acute renal failure (can be delayed up to 5 days)

Ibuprofen

Phospholipids in cell membranes



Therapy:

- Gastric decontamination
- Gastric protectants for 14 days
 - Antacids e.g. ranitidine or Proton-pump blocker (omeprazole)
 - Sucralfate
- Anti-emetics
- Misoprostol

Supportive care

- Fluid therapy
- Monitor urine output
- Monitor electrolytes, blood gases and renal function
- Aggressive treatment for acute renal failure if necessary

Paracetamol

- Metabolised in liver by glucuronidation, sulphation or oxidation
 - Glucuronide pathway lacking in cats
- Metabolite *N-acetyl-p-benzoquinone* causes
 - severe oxidative stress to hepatocytes and rbc → MetHb and Heinz body formation
- Particularly dangerous in cats
 - Oxidation of haemoglobin to methaemoglobin
- Main effect in dogs is hepatocyte damage

Signs

- Vomiting, depression, weakness
- Dyspnoea, facial oedema, muddy mucous membranes, tachycardia, tachypnoea (cats), hypothermia
 - Hours to develop signs
- Jaundice (dogs) – liver damage may take 1-5 days to develop

Therapy:

- Gastric decontamination
- N-acetylcysteine – provide cysteine for glutathione synthesis
 - Give orally or i/v
- Manage methaemoglobinaemia with vitamin C, sodium sulphate and methylene blue as needed
- Oxygen
- Supportive care e.g. blood transfusion

Chocolate toxicity

- Theobromine
 - Methylxanthine
- Increased muscle activity
- CNS stimulation
- Signs within 4 hrs
 - Vomiting
 - Abdominal pain
 - Hypersalivation
 - PU/PD
 - Hyperexcitable
 - Tachycardia
 - Ataxia
 - Mild hypotension
 - Muscle rigidity, seizures, tachypnoea, hyperthermia, cyanosis, arrhythmia, renal dysfunction

Chocolate toxicity calculator

- VIN.com
 - Vin mobile calculators
- Android and Apple apps

Chocolate poisoning - management

- Gastric decontamination/anti-emetics as appropriate
- Convulsions – diazepam
 - barbiturates or propofol may be necessary
- Treat arrhythmias if necessary
 - Beta blockers
- Supportive
 - Fluids if necessary
 - Anti-emetic
 - Sedation?
 - Monitor temperature, hydration, ECG and renal function
- Consider bladder lavage

Cannabis

- Most common plant poisoning enquiry in dogs
- Ingestion main route of toxicity
 - Occasionally seen in sniffer dogs
- Toxicity can be related to impurities
- Minimum lethal dose
 - 3mg/kg dog
- Majority intoxication have clinical signs
 - No reported fatalities

Clinical signs

Cannabis

- Seen within 1-3 hours, recovery 24-72 hours
- Weakness, ataxia, lethargy
- Dilated pupils
- Nystagmus
- Photophobia
- Tachycardia
- Urinary/faecal incontinence
- Hyperaesthesia & heightened senses
- Behavioural changes e.g. aggression, barking
- Later
 - depressed /stuporous
 - bradycardia

Sometimes

- Dogs can have
 - Heightened sense smell & hearing
- Dogs can obsessively investigate
 - Sights, sounds odours

Treatment Cannabis

- **Gastrointestinal decontamination**
 - Emesis if < 1 hour post ingestion
 - Repeated administration activated charcoal q 4hrs
 - THC undergoes enterohepatic recirculation
- **General supportive therapy**
 - Quiet, dark environment
 - Maintain normothermia
 - IV fluids if hypotensive
- **Sedation e.g. diazepam if very agitated**