TOXIN TOOLKIT

Everything you need to manage poisoning cases at your fingertips

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DÔMES PHARMA



PREPARED FOR POISONING BE PREPARED FOR POISONING

DÔMES PHARMA

CONTENTS



The Anti-Tox Range Product Glossary

Triage forms

Useful contact directory

Our Emergency Action Guidelines

Medicine Glossary

THE ANTI-TOX RANGE
BE PREPARED FOR POISONING
THE CARBODOTE RANGE

Vitamivet K1® TVM solution for injection for dogs, 10 mg/ml POM-V 1ml contains 10mg of Phytomenadione. **Indications for use:** In dogs: emergency treatment of anticoagulant rodenticide poisoning, before starting oral treatment. **Vitamivet K1® TVM 50 mg film-coated tablets for dogs** NFA VPS containing 50mg of Phytomenadione. **Indications for use:** In dogs: Treatment of anticoagulant poisoning, following parenteral treatment. **Emedog, 1 mg/ml, solution for injection for dogs** contains Apomorphine. Legal category POM-V For induction of emesis in dogs. **Ziapam 5mg/ml solution for injection for cats and dogs** contains Diazepam. **Legal category** POM-V. In cats and dogs for the short-term management of convulsive disorders and skeletal muscle spasms of central and peripheral origin. As part of a pre-anaesthetic or sedation protocol.

Use medicines responsibly. www.noah.co.uk/responsible. Prescription decisions are for the person issuing the prescription alone.

For further information and to view the full Summary of Product Characteristics, please contact Dômes Pharma Kirtlington Business Centre, Slade Farm, Kirtlington, Oxfordshire, UK. OX5 3JA. **Tel.** 0800 0385868. **Email** help@domespharma.com. Prescription decisions are for the person issuing the prescription alone. Dômes Pharma is the trading name of TVM UK Animal Health Ltd. *Registered trademark of Dômes Pharma Group Companies.

DÔMES PHARMA

THE ANTI-TOX RANGE



Vitamivet K1® >

Injectable & Tablets



Ziapam® >



Emedog® >

THE CARBODOTE RANGE



Carbodote® >

Gels & Liquid

Carbodote is a complementary foodstuff



THE ANTI-TOX RANGE

BE PREPARED FOR POISONING

THE CARBODOTE RANGE

CONTENTS

+ EMEDOG®

VETERINARY LICENSED APOMORPHINE TO INDUCE EMESIS IN DOGS

Product SPC

DOSING GUIDE - 0.1ML PER KG BODYWEIGHT SUBCUT

Easy dosing

- 0.1mg/kg=0.1ml/kg
- Subcutaneous use

Single use vials

- Use as per needed
- 4 year unopened shelf life

Convenience

- No special storage requirements
- Minimal wastage



1 VIAL OF 1ML — 10KG

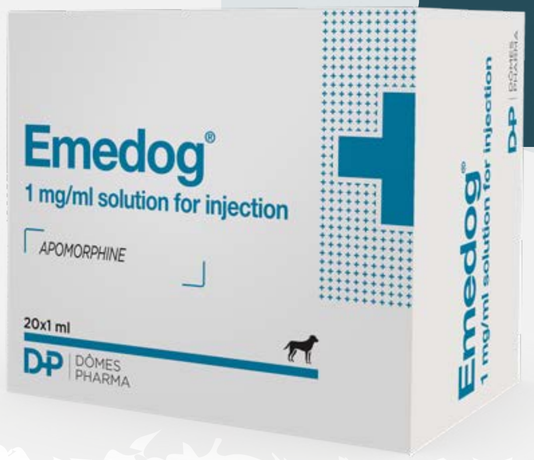


PACK OF 5 VIALS — 50KG

EMEDOG®

Also available in a 20 vial pack!

- Ensures you are stocked up and ready for a poisoning emergency
- Make a saving of 10% overall



PACK OF 20 VIALS — 4 X 50KG

THE ANTI-TOX RANGE

BE PREPARED FOR POISONING

+ CARBODOTE®

A REVOLUTION IN THE MANAGEMENT OF UNDESIRABLE SUBSTANCES

USE OUR HANDY GUIDE TO FIND OUT WHICH CARBODOTE PRODUCT YOU NEED TO USE FOR EACH CASE!

CARBODOTE GEL: GRAB, DIAL AND GO!

The only duo of pre-filled, activated charcoal syringes available to veterinary practices







STEP 1 Prime®

- Activated charcoal (30%)
  Sodium sulphate (6.25%)
- For first and single administration only
  Speeds up elimination of undesirable substances

STEP 2 Repeat®

- Activated charcoal only (30%)
  For when repeated administration required
- Administer every 4-6 hours for 24-48 hours

Administer the amount of product from the easy to use 'dial & dispense' syringe, according to the following table:

Animals weight (kg)	Prime	Repeat
≤ 2	1 ●	1 ●
2.1 - 4	2 ●●	2 ●●
4.1 - 6	3 ●●●	3 ●●●
6.1 - 8	4 ●●●●	4 ●●●●
8.1 - 10	5 ●●●●●	5 ●●●●●
10.1 - 12	6 ●●●●●●	6 ●●●●●●
12.1 - 14	7 ●●●●●●●	7 ●●●●●●●
14.1 - 16	8 ●●●●●●●●	8 ●●●●●●●●
16.1 - 18	9 ●●●●●●●●●	9 ●●●●●●●●●
18.1 - 20	10 ●●●●●●●●●●	10 ●●●●●●●●●●

Also Available:
Carbodote Liquid

1 bottle (100ml) per 20kg



THE CARBODOTE RANGE

+ VITAMIVET K1®

THE ANTIDOTE TO ANTICOAGULANT RODENTICIDE TOXICITY

Injectable SPC | Tablet SPC

Vitamin K1 will become IN 2025 Vitamivet K1

INJECTABLE VITAMIVET K1

- 50mg per 5ml vial
- Licensed for intravenous use at 5mg/kg
- Remember to inject slowly
- 1 vial per 10kg or 0.5ml/kg
- Pack containing 6 vials



VITAMIVET K1 50MG TABLETS

- 50mg per tablet
- Scored so can be divided into quarters
- Licensed for oral use at 5mg/kg once daily
- Give with a fatty meal
- 1 tablet per 10kg per day
- Available in packs of 14 tablets

THE ANTI-TOX RANGE
BE PREPARED FOR POISONING

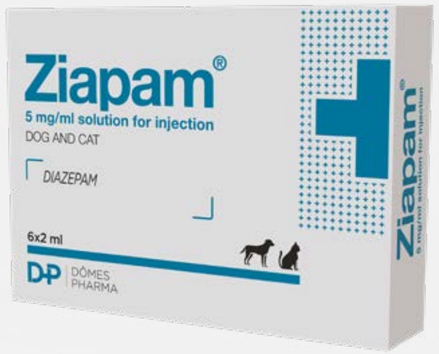
+ ZIAPAM®

THE FIRST LICENSED PRODUCT FOR THE ACUTE MANAGEMENT OF SEIZURES IN DOGS AND CATS

Product SPC

INTRODUCING ZIAPAM®

- Licensed for short-term control of convulsive disorders and muscle spasms of central and peripheral origin
- Presented in packs containing 6 x 2ml vials
- Licensed for both dogs and cats
- 5mg/ml intravenous injection
- Also licensed as part of a sedation or pre-anaesthetic protocol



	QUANTITY OF ACTIVE INGREDIENT (DIAZEPAM)	AMOUNT OF ZIAPAM	ONE 2ML VIAL OF ZIAPAM TREATS AN ANIMAL WEIGHING
SHORT-TERM MANAGEMENT OF SEIZURE DISORDERS	0.5mg/kg body weight	0.5ml/5kg	20kg
	Bolus dose administered up to 3 times, at least 10 minutes apart		
SHORT-TERM MANAGEMENT OF MUSCLE SPASMS	0.5-2mg/kg body weight	0.5-2ml/5kg	5kg to 20kg
SEDATION	0.2-0.6mg/kg body weight	0.2-0.6ml/5kg	17kg to 50kg
PRE-ANAESTHESIA	0.1-0.2mg/kg body weight	0.1-0.2ml/5kg	more than 50kg

THE ANTI-TOX RANGE
BE PREPARED FOR POISONING

TOXIN TRIAGE

DÔMES PHARMA

Simply print off, complete with as much detail as possible and pass to the clinical team.

Completed by: ..... Time of call: .....

Owner's name: ..... Contact no: .....

THE PATIENT

Name: .....

Body Weight (if known): ..... Age: .....

Species: ..... Breed: .....

Is your pet showing any symptoms? Y ☐ N ☐

If yes, what? .....

THE TOXIN

Name of product/substance: .....

Active ingredient(s): .....

Type of exposure: Oral/ingested ☐ Skin/topical ☐ Eye ☐

Are there any other pets that have/could have been exposed? Y ☐ N ☐
(If yes, obtain their details too on a separate form)

How much has your pet been exposed to? .....
(e.g. volume, weight, no. of tablets etc)

What is the strength/concentration of the toxin, including the unit? .....
(e.g. %, mg, mg/ml...)?

When did the exposure occur? .....

THE ACTION

1. Advise them to STOP any further ingestion/exposure of the toxin:
   - Remove the dangerous substance from the pet(s) or vice versa
   - It is NOT advisable for owners to try and make their pet(s) vomit at home
   - Fit an Elizabethan Collar or wrap in a towel if skin/fur contamination
2. Present this information to the vet team who will decide whether the patient needs to be seen immediately*
3. If instructed, book an emergency appointment for the pet(s) to be brought straight in. Estimated time of arrival: .....
4. Does the caller still have access to the toxic substance? Y ☐ N ☐
   - If Yes, instruct caller to bring in labels/packaging + secure sample of toxin.
   - If No, request they bring in a sample of vomit for testing if the pet has been sick.

***Further information/advice can be sought from:**
Dômes Pharma (0800 038 5868), the VPIS (0207 3055 055) or the VPG toxicology lab (0113 287 0175).

Dômes Pharma is the trading name of TVM UK Animal Health Ltd.

THE EPILEP3Y SYSTEM

STATUS EPILEPTICUS TRIAGE

Please fill the following information in as quickly as you can, then promptly hand to a member of the clinical team.

THE PATIENT

Name: _____ **Weight (kg):** _____ approx/actual

Age: _____ **Breed:** _____

SEIZURE QUESTIONNAIRE

When did your pet start seizuring? Time: _____ am/pm

Has your pet had a seizure before to your knowledge? Y ◯ N ◯ Unsure ◯

If you ticked yes, when was your pet's last seizure(s) and how long did they last?

Has your pet ingested or been exposed to any toxins? Y ◯ N ◯ Unsure ◯

Please circle any of the following your pet has or might have ingested/been exposed to:

- Chocolate
- Products containing the artificial sweetener xylitol (e.g., gum, dental hygiene products, low sugar foods/confectionery items, some peanut butters, human supplements... etc)
- Slug bait
- Mouldy food/compost
- Human medications such as tablets or creams (provide details in space below)
- Vitamins (A, D)
- Cats exposed to flea and tick products intended for dogs
- Horse or large animal wormers
- Illicit drugs (heroin, cocaine, marijuana, methamphetamine, GHB)
- Rat bait
- Plants (sago palm, rhododendron, brunfelsia)
- Anti-freeze (ethylene glycol)
- Coffee/tea (caffeine)
- Macadamia nuts
- Salt or homemade playdough
- Blue-green algae (found in still waters)
- Pesticides (organophosphates)
- Tea Tree oil
- Cooking or lighter fluids
- Pine oil disinfectants
- Furniture polish
- Lead
- Strychnine

Please use this space to provide further details if necessary:

Has your pet experienced head trauma in the last 48 hours? Y ◯ N ◯ Unsure ◯

Please use this space to provide further details if necessary:

Has your pet had any recent illness? Y ◯ N ◯ Unsure ◯

Please use this space to provide further details if necessary:

CURRENT MEDICATIONS

Is your pet receiving any medications for epilepsy? Y ◯ N ◯ Unsure ◯

If you ticked yes, please provide further details, including the following:

Name of medication: _____ **Amount given:** _____

Frequency of administration: _____ **Last dose received:** _____ am/pm

Name of medication: _____ **Amount given:** _____

Frequency of administration: _____ **Last dose received:** _____ am/pm

Is your pet receiving insulin therapy to treat diabetes? Y ◯ N ◯ Unsure ◯

If you ticked yes, please provide further details, including the following:

Name of the insulin: _____

Amount given: _____

Last dose received: _____ am/pm

Completed by: _____ Time & date: _____

Owner or guardian name: _____

FOR VETERINARY PROFESSIONAL USE ONLY:

Status epilepticus checklist	Information	Performed/result
Airway	Check patency	
Breathing	Respiratory rate and effort	
Circulation	Heart rate, pulse quality	
Administer anti-seizure medication	Diazepam @ 0.5mg/kg IV*	
Blood glucose	Normal 3.3-6.2mmol/L	
Temperature	Normal 38-39.2°C	

*or 0.5-1mg/kg IR if IV unobtainable. Double dose if on chronic phenobarbital therapy.

For further information and support, please refer to ‘Status Epilepticus Guidelines’ from Dômes Pharma

USEFUL CONTACT DIRECTORY



CONTACTS

DÔMES PHARMA Vet Tech Helpline: 0800 038 5868
Visit www.domepsharma.co.uk for additional resources
Social Media: @petdangers @domespharmauk

Veterinary Poisons Information Service (VPIS)
Vetline: 020 7305 5055
Animal Poison Line (Pet Owner Triage):
01202 509 000

Sourcing emergency drugs: ToxBox & Elixir
VPIS in collaboration with Vets Now, CVS and Independent Practices
020 7305 5055
www.vpisglobal.com/toxbox

Veterinary Pathology Group (VPG): Toxicology Testing
0113 287 0175
www.thevpg.co.uk

Pet Blood Bank
01509 232 222
www.petbloodbankuk.org/vet-professionals

OTHER USEFUL SOURCES

Harmful Plants
The Horticultural Trades Association (HTA)
Guide to Potentially Harmful Plants 3rd Edition
www.hta.org.uk/poisonousplants

Dogs Trust – Harmful Plants & Substances
www.dogstrust.org.uk

International Cat Care (ICC) – Cats & Poisons/ Poisonous Plants
www.icatcare.org

Electronic Medicines Compendium – Data Sheets for Human Medicines
www.medicines.org.uk/emc/

HSE Website – Rodenticides & Pesticides
www.hse.gov.uk

CONTENTS

OUR EMERGENCY ACTION GUIDELINES

Click on the tabs below to view the specific guidelines

- ALLIUM POISONING
- ALPHA-CHLORALOSE POISONING (NEW!)
- ANTICOAGULANT RODENTICIDE POISONING
- BLUE GREEN ALGAE POISONING (NEW!)
- CANNABINOID POISONING
- CHOCOLATE POISONING
- ETHYLENE GLYCOL POISONING
- GRAPES (OR THEIR DRIED FRUITS) POISONING
- IBUPROFEN POISONING
- LILY POISONING
- MACROCYCLIC LACTONE POISONING
- METALDEHYDE POISONING
- NICOTINE POISONING
- PARACETAMOL (ACETAMINOPHEN) POISONING
- PYRETHRIN (PYRETHROID) POISONING
- TREMORGENIC MYCOTOXINS POISONING
- VITAMIN D POISONING
- XYLITOL POISONING

- ACTIVATED CHARCOAL GUIDELINE
- STATUS EPILEPTICUS GUIDELINE



CONTENTS

ACTIVATED CHARCOAL GUIDE

Activated Charcoal (AC) coats the gastrointestinal wall and adsorbs undesirable substances, thus reducing their availability for absorption into the systemic circulation. For effective adsorption, it is important to administer a high quality AC in sufficient quantities, and utilise sodium sulphate with the first (or only) administration of AC.

SUBSTANCES THAT ADSORB TO AC

Single administration of AC (with sodium sulphate) recommended	Repeated administration of AC (initially with sodium sulphate, then without) is recommended
ACE inhibitors	Anti-coagulant rodenticides
Alliums (onion, garlic, etc.)	Aspirin
Alphachloralose, choralose	Atypical (second generation) anti-psychotics
Amphetamines	Beta-blockers (slow release formulations)
Anti-histamines	Cannabis
Neuroleptics (first generation anti-psychotics)	Calcium channel blockers
Baclofen	Cardiac Glycosides (Lily of the valley, Adenium obesum, Apocynum spp, Digitalis purpurea, Calatropis spp, Kalanchoe spp, Asclepias spp, Nerium Oleander, Ornithogalum umbellatum, Digitalis lantana, Thevatia peruviana)
Benzodiazepines	Chocolate
Beta-blockers (non slow release formulations)	Cholecalciferol (VitD3)
Brunfelsia spp	Digoxin
Cyanobacteria (A.K.A blue-green algae)	Grapes and their dried fruits*
Fipronil	Lilies*
Glyphosate	Macrocyclic lactones
Nicotine (repeated administration may be necessary in case of sustained release products e.g. transdermal patches)	Metaldehyde
Opioids	Mushrooms
Plant bulbs (except Lily of the valley)	Mycotoxins
Pyrethrin/pyrethroids	NSAIDS
Strychnine	Organophosphates, carbamates
SSRI/SARI (anti-depressants)	Paracetamol (acetaminophen)
Yew tree	Phenobarbital/barbiturates
	Phenylbutazone
	Sago palm
	Tacrolimus
	Tetracyclines
	Theophylline
	Tricyclic antidepressants

*Currently, the toxic mechanism is unknown and persistence within the gastrointestinal tract may occur.
Therefore, repeated administration of AC should be considered provided there is no contraindication to do so.

TOXINS WITH MINIMAL ADSORPTION TO AC

These toxins are minimally adsorbed by AC. Administration of AC is not necessary unless there is concurrent ingestion of a toxin that adsorbs to AC. Where uncertainty exists regarding toxin exposure or toxin adsorbency potential, AC administration should be considered to aid gastrointestinal decontamination
Alcohols & sugar alcohols (xylitol, ethanol, methanol, ethylene glycol, propylene glycol)
Cyanogenic plants
Caustic detergents or corrosive items
Electric batteries
Essential oils
Fertilisers
Frog toxicity/Toad venom
Glues and adhesives
Heavy metals (lead, zinc, copper, iron ...etc)
Hydrocarbons
Oak (acorns)
Processionary caterpillars
Raw dough and yeast
Salt
Strong acids or alkalis

AC CONSIDERATIONS:

- Black stools are expected following administration
- AC will stain fur and fabrics
- Concurrent adsorption of essential oral antidotes or routine medications
- AC is contraindicated prior to gastrointestinal surgery/endoscopy or with gastrointestinal perforation
- Administer with care in patients prone to aspiration
- Patients receiving AC, particularly with sodium sulphate use, should have their electrolytes monitored

ADMINISTER CARBODOTE PRIME ONCE

ADMINISTER CARBODOTE PRIME ONCE

FOLLOW WITH CARBODOTE REPEAT Q4-6HRS FOR 24-48HRS

SODIUM SULPHATE CONSIDERATIONS:

- Sodium sulphate speeds up gastrointestinal transit times, permitting rapid elimination of undesirable substances adsorbed to AC (and reducing the opportunity for substance desorption from AC).
- Sodium sulphate should only be administered ONCE, as repeated administration may result in dehydration +/- electrolyte disturbances.
- Sodium sulphate use may result in soft or watery faecal consistency.

Avoid usage of sodium sulphate in patients with:

- Clinical dehydration that can't be corrected easily
- Diarrhoea, electrolyte abnormalities, or hypotension
- Use with caution in patients with pre-existing renal or cardiac disease
- Presence of gastrointestinal obstruction, perforation or ileus
- Due to their small body size, avoid use in exotic pets

In patients where sodium sulphate use is inappropriate, substitute **Carbodote Prime** with **Carbodote Repeat**.

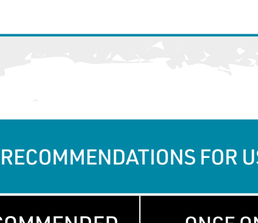
REPEATED ADMINISTRATION OF AC IS RECOMMENDED FOR UNDESIRABLE SUBSTANCES THAT PERSIST WITHIN THE GI TRACT

This may increase the absorption of undesirable substances (and therefore harm) and may occur as a result of:

- Enterohepatic recirculation
- Sustained release preparations or substances with delayed gastric emptying
- Substances with lower affinity or that easily desorb from activated charcoal

Enterohepatic Recirculation

Enterohepatic recirculation occurs when a substance enters the liver via the portal circulation (following intestinal absorption) or systemic circulation (following other routes of exposure - e.g., intravenous, dermal). The substance (+/- it's metabolites) then undergoes biliary excretion and is available for reabsorption in the small intestine.



OUR PRE-FILLED 'GRAB & GO' RANGE

CARBODOTE PRIME

- Activated charcoal (30%) plus sodium sulphate (6.25%)
- Unique, 2 in 1 activated charcoal gel plus sodium sulphate to speed up gastrointestinal decontamination of toxins
- Use ONCE per exposure



CARBODOTE REPEAT

- Activated charcoal (30%)
- Pure activated charcoal gel
- Use when repeated administration required



CARBODOTE LIQUID

- For situations where a liquid is preferable i.e. for use with a naso gastric tube



	PRODUCT	ACTIVATED CHARCOAL	SODIUM SULPHATE	READY TO USE	REPEAT USE	FORMAT	RECOMMENDATIONS FOR USE	
STEP 1	CARBODOTE PRIME	✓	✓	✓	✗	GEL	RECOMMENDED FOR USE IN CLINICS	ONCE ONLY, ADMINISTER IN CONSULTATION
STEP 2	CARBODOTE REPEAT	✓	✗	✓	✓	GEL	AT HOME BY PET OWNER	WHEN NECESSARY, CONTINUE EVERY 4-6 HOURS FOR 24-48 HRS*
OTHER APPLICATIONS	CARBODOTE LIQUID	✓	✗	✓	✓	LIQUID	IN SITUATIONS WHERE A LIQUID IS PREFERABLE	ADMINISTER AS ABOVE**

THE CARBODOTE RANGE

TO FIND OUT MORE ABOUT THE CARBODOTE RANGE FROM DÔMES PHARMA, VISIT WWW.DOMESPHARMA.CO.UK

DÔMES PHARMA

Carbodote is a complementary feed. Due to their small size, do not use CARBODOTE PRIME in exotic pets. When the use of sodium sulphate is inappropriate, Carbodote Repeat can be used. Study: TVM329CarbAd

* Frequency may differ, depending on undesirable substance. ** Can be used as a substitute for Prime or Repeat, follow instructions as necessary. For further information please contact Dômes Pharma, Kirtlington Business Centre, Slade Farm, Kirtlington, Oxfordshire, UK. OX5 3JA. **Tel.** 0800 0385868. **Email** help@domespharma.co.uk. Dômes Pharma is the trading name of TVM UK Animal Health Ltd.

AT-038-A3

ALLIUM POISONING

EMERGENCY ACTION GUIDELINES

SUSPECTED/WITNESSED/CONFIRMED INGESTION

of onion, garlic, spring onion, shallots, chives or leeks

Diagnosis is based on history of ingestion, clinical signs and Heinz body haemolytic anaemia +/- methaemoglobinaemia

TOXIC DOSES

- Garlic and onions are the most toxic of the Allium species
- Powdered forms are more toxic on a gram for gram basis than the actual plant material, due to their concentrated nature[1]

Toxic dose not fully understood.

Ingestion of > 5g/kg of Allium species is likely toxic.

ASYMPTOMATIC

INDUCE EMESIS

Dogs: Emedog @ 0.1mg/kg SC

Cats: Alpha 2 agonist[3]

ADMINISTER ACTIVATED CHARCOAL (AC)

Carbodote Prime: (AC + sodium sulphate), single administration.
(Refer to packaging for instructions on how much to administer)

TAKE BASELINE BLOOD AND URINE SAMPLES

Signs of haemolytic anaemia or methaemoglobinaemia may be delayed for 1-7 days post ingestion, so repeat testing is required

Clinicopathological abnormalities may include:

- **BIOCHEMISTRY:** Hyperbilirubinaemia, haemoglobinaemia, methaemoglobinaemia. An increased BUN level may be present caused by transient nephrosis
- **HAEMATOLOGY:** Decreased PCV, haematocrit and haemoglobin concentrations. Following a lag period of 3-5 days, a regenerative response to anaemia may be noted (reticulocytosis, increased MCV, decreased MCHC). Neutrophilia
- **BLOOD SMEARS:** Heinz bodies and eccentrocytosis
- **URINALYSIS:** Haemoglobinuria, bilirubinuria, proteinuria
- **URINE SEDIMENT EXAM:** Haemoglobin or haemosiderin casts

SUPPORTIVE CARE

There is no antidote for Allium toxicosis

- Isotonic crystalloid IVFT to replace fluid losses and provide ongoing fluid maintenance to help reduce the risk of haemoglobin-related nephrosis[5]
- Anti-emetics as necessary (e.g., maropitant)
- Gastroprotectants as necessary (e.g., omeprazole)
- Analgesia for abdominal discomfort (e.g., buprenorphine)
- Monitor temperature and treat aberrations appropriately
- Provide oxygenation where appropriate
- If the anaemia becomes severe, administer blood transfusions with whole blood or packed red blood cells

SYMPTOMATIC

CLINICAL SIGNS

1-7 days following ingestion

Ingestion of large quantities may result in clinical signs within 1-2 days of exposure, but typically clinical signs are delayed by up to 7 days[4]

If the ingestion was recent, a patient's breath may smell like onions or garlic

Initially patients may present with signs of gastroenteritis:

- Vomiting, diarrhoea, hypersalivation, abdominal pain, anorexia and dehydration

There is usually a lag of a couple of days before clinical signs secondary to anaemia and intra/extravascular haemolysis are seen:

- Pale mucous membranes, tachypnoea, dyspnoea, tachycardia, jaundice, lethargy, ataxia, exercise intolerance, dark coloured urine, cold sensitivity

MONITORING

Check the PCV and a blood smear daily for 5-7 days due to the lag time in clinical signs developing

ALLIUM POISONING KEY FACTS

- All parts of the plants are toxic (whether raw, dried or cooked)[4]
- Ingestion of a single large quantity, or ingestion of repeated small amounts can cause toxicity
- Cats are 2-3 times more prone to erythrocyte oxidative damage than dogs, so are extremely susceptible to Allium toxicity
- Due to the nature of the feline spleen and the susceptibility of cat's haemoglobin to form Heinz bodies, 5- 10% of erythrocytes in healthy cats may have Heinz bodies. Significant numbers of Heinz bodies can be seen in cats without signs of haemolytic anaemia due to diabetes mellitus, hyperthyroidism and lymphoma
- Certain breeds of dogs, particularly Japanese breeds such as the Akita and Shiba Inu, are more susceptible to Allium toxicity[4]
- Differential diagnoses of methaemoglobinaemia, Heinz bodies or haemolytic anaemia include: paracetamol (acetaminophen) toxicosis, local anaesthetic toxicosis, zinc toxicosis, immune mediated haemolytic anaemia, naphthalene (mothball) toxicosis, phenol toxicosis.

PROGNOSIS

- The prognosis is dependent on the type and quantity of Allium species ingested, the severity of the anaemia and the time between ingestion and supportive treatment[4]
- Heinz body haemolytic anaemia caused by Allium toxicity is usually regenerative and a full recovery occurs within 10-14 days with appropriate symptomatic and supportive care

USEFUL CONTACTS

DÔMES PHARMA
Your partner in poisoning.
www.domespharma.co.uk
T 0800 0385868 | **E** help@domespharma.com

VETERINARY PATHOLOGY GROUP
Toxicology testing.
www.thevpg.co.uk | **T** 0113 2870175

PET BLOOD BANK
Access to blood and plasma products.
petbloodbankuk.org | **T** 01509 232222

VETERINARY POISONS INFORMATION SERVICE (VPIS)
Dedicated poisoning information service.
www.vpisglobal.com | **T** 0207 30 55 055

TOX BOX/ELIXIR SERVICE
Immediate access to emergency poisoning products.
www.vpisglobal.com | **T** 0207 30 55 055

PRODUCTS

EMEDOG
- Veterinary licensed apomorphine for dogs
- Packs of 5 or 20x 1ml vials, with a 3-year, unopened shelf life



DON'T FORGET ACTIVATED CHARCOAL!

- Activated charcoal helps in the adsorption of multiple undesirable substances[6]
- Available as liquid or gel
- Repeated adminstrations will be required for substances that are enterohepatically recycled
- Take a look at our range of activated charcoals

THE CARBODOTE RANGE

Carbodote is a complementary feed.

THE ANTI-TOX RANGE
BE PREPARED FOR POISONING

TO FIND OUT MORE ABOUT THE ANTI-TOX RANGE FROM DÔMES PHARMA, VISIT WWW.DOMESPHARMA.CO.UK

DP | DÔMES PHARMA

Emedog, 1 mg/ml, solution for injection for dogs contains Apomorphine. **Legal category** POM-V . For the induction of emesis in dogs. **Use medicines responsibly. www.noah.co.uk/responsible.** For further information and to view the full Summary of Product Characteristics, please contact TVM-UK Animal Health Ltd, Kirtlington Business Centre, Slade Farm, Kirtlington, Oxfordshire, UK. OX5 3JA. **Tel.** 0800 0385868. **Email** help@domespharma.co.uk. Dômes Pharma is the trading name of TVM UK Animal Health Ltd. Prescription decisions are for the person issuing the prescription alone.

Reference: 1. Robertson J.E., Christopher M.M., Rogers Q.R. (1998). Heinz body formation in cats fed baby food containing onion powder. J Am Vet Med Assoc. Vol 212 (8) pp. 1260-6. **2.** Lee K-W, Yamato O, Tajima M, et al. (2000). Hematologic changes associated with the appearance of eccentrocytes after intragastric administration of garlic extract to dogs. Am J Vet Res. Vol 61 (11) pp. 1446-50. **3.** Harvey, A, Tasker, S (eds.) (2013) BSAVA Manual of Feline Practice. Gloucester: British Small Animal Veterinary Association Pp. 139. **4.** Salgado B.S., Monteiro L.N., Rocha N.S. (2011). Allium species poisoning in dogs and cats. J Venom Anim Toxins incl Trop Dis, 63 Refs ed. Vol 17 (1) pp. 4-11 **5.** Cope R.B. (2005). Alliumspecies poisoning in dogs and cats. Vet Med. 100 (8):562-566. **6.** TVM329CarbAd.

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EMERGENCY ACTION GUIDELINES

ANTICOAGULANT RODENTICIDE POISONING

SUSPECTED POISONING CONFIRMED

ASYMPTOMATIC (ACUTE INGESTION)

TOXIC DOSE CONSUMED (OR IF UNKNOWN)

INDUCE EMESIS

Dogs: Emedog @ 0.1mg/kg SC

Cats: Alpha 2 agonist[1]

ADMINISTER ACTIVATED CHARCOAL (AC)

Carbodote Prime: (AC + sodium sulphate), single administration.

Due to potential enterohepatic recirculation[2], this should be followed by:

Carbodote Repeat: (AC only), every 4-6 hours for 24-48 hours.

(Refer to packaging for instructions on how much to administer)

EITHER

OPTION A (PREFERABLE)

CHECK PT 48-72 HOURS FOLLOWING CONSUMPTION

If there is suspicion of chronic ingestion then check PT at time of presentation.

NORMAL PT → **NO FURTHER TREATMENT/ MONITORING REQUIRED**

PROLONGED PT → EITHER

OPTION B*

EITHER

START ORAL VITAMIN K1

Vitamivet K1 tablets @5mg/kg PO SID.

TOXIC DOSE NOT CONSUMED

NO INTERVENTION NECESSARY

SYMPTOMATIC

PROLONGED PT AND (a)PTT

- Haemorrhage (typically occurs 3-7 days following intoxication) and cardiovascular collapse/shock

STABILISE

- Oxygen therapy
- Fresh frozen or frozen plasma to replace vitamin K dependent clotting factors
  - → check PT/(a)PTT to monitor response
- RBC products may be required if clinically anaemic
- Drain haemorrhagic effusions?
  - → only if essential and following correction of delayed clotting

START PARENTERAL VITAMIN K1

Vitamivet K1 Injection @5mg/kg SLOW IV. Repeat dose 12-18 hours later if necessary.

CONTINUE WITH ORAL VITAMIN K1

Vitamivet K1 tablets @5mg/kg PO SID within 12 hours of last injection.

TREATMENT DURATION

Length of treatment depends on ingredient responsible and its length of action in the body. If active ingredient is unknown, consider testing. If you cannot test, 4-6 weeks of treatment is generally recommended.

TEST PT 48-72 HOURS AFTER LAST DOSE

Restart oral **Vitamin K1** therapy until results are returned, unless same day.

NORMAL PT → **STOP**

PROLONGED PT → **CONTINUE ORAL VITAMIN K1**

For at least another 7 days.

*Represents a compromise where PT testing may not be available for whatever reason.

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RODENTICIDE KEY FACTS

- Anticoagulant rodenticide active ingredients vary in their potency and length of activity in the body
- Knowing if a toxic dose has been consumed and which ingredient is implicated indicates what interventions may be needed, and how long you should treat symptomatic cases for (some can last up to 8 weeks).
  - Contact VPIS for advice if needed
  - If an ingredient label isn't available, it is possible to send sample of bait/blood/vomit to VPG for toxin identification.
- Haemorrhage most commonly occurs initially in the respiratory system (clinical signs; cough, tachypnoea, dyspnoea), but bleeding can occur anywhere!
- Increased PT alone, or disproportionally elevated compared to (a)PTT, is highly suggestive of anticoagulant rodenticide poisoning
- PT is your guide! Use it to tailor your treatment plan
- Not all rodenticides are anticoagulants e.g., cholecalciferol rodenticide causes hypercalcaemia rather than clotting disorders.

USEFUL CONTACTS

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VETERINARY PATHOLOGY GROUP
Toxicology testing.
www.thevpg.co.uk | **T** 0113 2870175

PET BLOOD BANK
Access to blood and plasma products.
petbloodbankuk.org | **T** 01509 232222

VETERINARY POISONS INFORMATION SERVICE (VPIS)
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www.vpisglobal.com | **T** 0207 30 55 055

TOX BOX/ELIXIR SERVICE
Immediate access to emergency poisoning products.
www.vpisglobal.com | **T** 0207 30 55 055

PRODUCTS

VITAMIVET K1 INJECTABLE
- Licensed for intravenous use at 5mg/kg
- Packs contain 6x 5ml vials of 10mg/ml



VITAMIVET K1 50MG TABLETS
- Licensed for oral use at 5mg/kg once daily
- Packs of 14x 50mg double divisible tablets

EMEDOG
- Veterinary licensed apomorphine for dogs
- Packs of 5 or 20x 1ml vials, with a 4-year, unopened shelf life



DON'T FORGET ACTIVATED CHARCOAL!
- Activated charcoal helps in the adsorption of multiple undesirable substances[6]
- Available as liquid or gel
- Repeated adminstrations will be required for substances that are enterohepatically recycled
- Take a look at our range of activated charcoals

THE CARBODOTE RANGE

Carbodote is a complementary feed.

THE ANTI-TOX RANGE
BE PREPARED FOR POISONING

TO FIND OUT MORE ABOUT THE ANTI-TOX RANGE FROM DÔMES PHARMA, VISIT WWW.DOMESPHARMA.CO.UK

DÔMES PHARMA

Carbodote is a complementary feedstuff. Vitamivet K1 TVM solution for injection for dogs, 10 mg/ml POM-V. 1ml contains 10mg of Phytomenadione. **Indications for use:** In dogs: emergency treatment of anticoagulant rodenticide poisoning, before starting oral treatment. **Vitamivet K1 TVM 50 mg film-coated tablets for dogs** NFA-VPS containing 50mg of Phytomenadione. **Indications for use:** In dogs: Treatment of anticoagulant poisoning, following parenteral treatment. **Emedog, 1 mg/ml, solution for injection for dogs** contains Apomorphine. **Legal category** POM-V. For induction of emesis in dogs.

Use medicines responsibly. www.noah.co.uk/responsible.
For further information and to view the full Summary of Product Characteristics, please contact TVM-UK Animal Health Ltd, Kirtlington Business Centre, Slade Farm, Kirtlington, Oxfordshire, UK. OX5 3JA. **Tel.** 0800 0385868. **Email** help@domespharma.co.uk. Dômes Pharma is the trading name of TVM UK Animal Health Ltd. Prescription decisions are for the person issuing the prescription alone.

Reference: 1. Harvey, A, Tasker, S (eds.) (2013) BSAVA Manual of Feline Practice. Gloucester: British Small Animal Veterinary Association Pp. 139. **2.** Horak K.E., Fisher P.M., Hopkins B. (2018) Pharmacokinetics of Anticoagulant Rodenticides in Target and Non-target Organisms. In: van den Brink N., Elliott J., Shore R., Rattner B. (eds) Anticoagulant Rodenticides and Wildlife. Emerging Topics in Ecotoxicology (Principles, Approaches and Perspectives), vol 5. Springer, Cham **3.** TVM329CarbAd.

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EMERGENCY ACTION GUIDELINES

CANNABINOID POISONING

SUSPECTED/WITNESSED/CONFIRMED EXPOSURE

Owners might be reluctant to admit/or ignorant of exposure. See below for communication tips and diagnosis

INTERVENTION REQUIRED

• In most cases, cannabinoid intoxication is benign.
The level of intervention required should be adapted to each patient based on the following:
• Low ingested dose, or mild to moderate clinical signs: Rest in a quiet environment and provide water and activated charcoal.
• High ingested dose, marked clinical signs, or a very young patient: hospitalisation for treatment and monitoring.

ASYMPTOMATIC

INDUCE EMESIS
IN CASE OF RECENT INGESTION AND UNALTERED MENTAL STATUS

THC may have a significant anti-emetic effect
Dogs: Emedog @ 0.1mg/kg SC
Cats: alpha 2 agonist[1,7]

PERFORM GASTRIC LAVAGE
IF EMESIS IS CONTRAINDICATED/UNSUCCESSFUL OR LARGE DOSE INGESTED

Under general anaesthesia followed by **Carbodote** administration via stomach tube

ADMINISTER ACTIVATED CHARCOAL (AC)
ORALLY IN CONSCIOUS ANIMALS ONLY, OR VIA NASOGASTRIC TUBE

Carbodote Prime: (AC + sodium sulphate), single oral administration.

Due to enterohepatic recirculation[1], this should be followed by:

Carbodote Repeat: (AC only), orally every 4-6 hours for 24-48 hours.

Consider **Carbodote Liquid:** (AC only), via nasogastric tube when necessary.

(Refer to packaging for instructions on how much to administer).

AND/OR

SYMPTOMATIC

SUPPORTIVE CARE AND MONITORING

Thermoregulation and nursing care:
- Keep the patient in an environment with reduced stimuli and risk of injury.
- Marijuana tends to cause hypothermia, synthetic cannabinoids tend to cause hyperthermia[3].
- Seizures can further increase the temperature and lead to heat stroke. Patients may require active cooling.
- If the patient is obtunded or profoundly sedated: rotate body and lubricate eyes every 4-6 hours.
- Place a urinary catheter and monitor urine output in cases of urinary incontinence.

In more severely affected patients:
- Monitor vitals including pulse and respiratory rate, blood pressure and temperature every 1-6 hours.
- Monitor neurological function.
- Obtain baseline blood parameters (incl. electrolytes/acid base status).

MEDICATION

1. Anti-emetics (as needed):
Be careful if the patient is at risk of foreign body obstruction.

2. IV fluids:
Administer IV crystalloids @ 1-1.5x the maintenance rate. Adapt rate to the patient's hydration status.

3. Tremors:
Ziapam (diazepam) 0.5-2mg/kg IV **OR** Methocarbamol 55–220 mg/kg, slow IV[3] (no more than 2ml/min) or 20-45mg/kg PO[5] q8h. Do not exceed 330mg/kg/day.

4. Seizures:
Ziapam (diazepam) 0.5mg/kg slowly IV (up to 3 times, at least 10 minutes apart). Phenobarbital or injectable anaesthetics may be required based on severity.

5. Bradycardia:
Atropine[5] (0.01-0.03mg/kg IV).

6. Agitation:
In case of severe agitation, consider sedating the patient (e.g. butorphanol) or using benzodiazepines.

7. Consider the use of Intravenous Lipid Emulsions (IVLEs) for the most severe cases:
20% lipid emulsion: 1.5 ml/kg IV bolus followed by 0.25 ml/kg/min for 30-60 minutes.
Can be repeated after approx. 4 hrs (check for lipaemia).

TIPS FOR COMMUNICATING WITH THE OWNER

- Ask them privately about possible exposure [inhalation/ingestion] to cannabinoids (at home or in public places such as parks, concert venues, social places).
- Ask about possible cannabinoid use by neighbours, children, etc.
- Do not judge or blame and remind them that you are not the police.
- Clarify that for them to be honest is in their pet's best interest and recovery.
- Educate about intoxication risk of cannabinoids after recovery/diagnosis.

CANNABINOIDS KEY FACTS

- Toxicity can occur via ingestion or inhalation.
- Common sources:
  - fresh and dried plant material (concentration of toxins depends on part of the plant i.e. flowers > leaves > stalk)
  - smoke
  - baked goods
  - oils
  - vape liquids
- Baked goods can also contain other harmful substances (chocolate, sweeteners, nicotine, raisins,...).
- Cannabinoids are lipophilic substances. Several case reports suggest a benefit of IVLE therapy in cannabis poisoning[1].
- Toxic doses:
  - Dog oral >84.7mg dried leaves/kg[8]
  - Dog oral >3g THC/kg[4,8]
- Cannabinoids undergo enterohepatic recirculation so consider repeated activated charcoal.
- When ingested, cannabinoids undergo a first pass effect. Inhalation is unaffected by this.
- Cannabinoids rapidly distribute in fatty tissue and are eliminated quickly from peripheral blood.
- Clinical signs are common but mortality is low. Recovery takes 24-36 hours, up to 72 hours in the most severe cases[1].
- The prognosis is usually favourable to good.

CLINICAL SIGNS[1,3,4,8]

Clinical signs typically occur:
- 6-12 mins following inhalation.
- 30 mins-3 hours following ingestion

Neurological clinical signs predominate:
- Apathy, CNS depression, ataxia, urinary incontinence, hyperaesthesia, mydriasis, bradycardia, increased sensitivity to motion or sound.

Less often:
- Agitation, aggression, bradypnoea, hypotension, tachycardia, nystagmus.

Rarely:
- Seizures and coma, death.

Also:
- Gastrointestinal signs (vomiting, ptyalism).
- Pancreatitis (ingestion of baked goods contaning cannabis oil/butter).

Synthetic cannabinoids have more potent psychotropic effects than naturally occurring cannabinoids.

Occasionally, clinical signs can alternate between CNS depression and CNS stimulation.

DIFFERENTIAL DIAGNOSIS[1]

CNS depression:
alcohols, opiates, benzodiazepines, muscle relaxants, alphachloralose, macrocyclic lactones

GI and CNS signs:
ethylene glycol

CNS stimulation:
bromethalin, macrocyclic lactones, other illicit drugs, metaldehyde, organophosphates, carbamates, nicotine, amphetamines, tremorgenic mycotoxins

Urinary incontinence is rarely seen in other intoxications.

DIAGNOSIS

The diagnosis is based on history of ingestion/inhalation, clinical signs and/or demonstration of the toxin in blood, urine or faeces.

Human OTC urine test kits detect a metabolite, THC-COOH, produced in low or negligible amounts by dogs, making those tests unreliable[2].

The LC/MS analysis method can detect THC and several of its metabolites in serum. False negatives are more frequent when testing urine with LC/MS[2].

USEFUL CONTACTS

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References: 1. Brutlag, A. G.; Hommerding, H. (2018) Toxicology of Marijuana, Synthetic Cannabinoids, and Cannabidiol in Dogs and Cats. In: Vet Clin North Am Small Anim Pract, vol.48, n°6, p.1087–1102. **2.** Fitzgerald, Alyson H.; Zhang, Yuntao; Fritz, Scott; Whitehouse, William H.; Brabson, Tamera; Pohlman, Lisa et al. (2021) Detecting and quantifying marijuana metabolites in serum and urine of 19 dogs affected by marijuana toxicity. In: Journal of Veterinary Diagnostic Investigation : Official Publication of the American Association of Veterinary Laboratory Diagnosticians, Inc,vol.33, n°5, p.1002–1007. **3.** Ramesh C. Gupta, éd. (2018) Veterinary toxicology. Basic and clinical principles. 3e édition. London, United Kingdom:Elsevier/Academic Press. **4.** Janeczek, Agnieszka; Zawadzki, Marcin; Szpot, Pawel; Niedzwiedz, Artur (2018) Marijuana intoxication in a cat. In: Acta Veterinaria Scandinavica, vol.60, n°1, p.44. **5.** Allerton, F. (2023). Small Animal Formulary, 11th Edition. Part A: Canine and Feline. *British Small Animal Veterinary Association*. **6.** TVM329CarbAd. **7.** Harvey, A, Tasker, S (eds.) (2013) BSAVA Manual of Feline Practice. Gloucester: British Small Animal Veterinary Association Pp. 139. **8.** Janczyk, Pawel, Caroline W. Donaldson, and Sharon Gwaltney. "Two hundred and thirteen cases of marijuana toxicoses in dogs." Veterinary and human toxicology 46.1 (2004): 19-20.

EMERGENCY ACTION GUIDELINES

CHOCOLATE POISONING

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FACTS

- Chocolate contains methylxanthines (theobromine and caffeine) which are toxic to dogs and cats
- Theobromine is the predominant toxin and the amount varies depending on the type of chocolate

Toxic doses of theobromine[1]:

- 20mg/kg = mild signs (vomiting, diarrhoea, polydipsia)
- 40-50mg/kg = severe signs (cardiovascular)
- ≥60mg/kg = seizures
- LD_{50} = 100-200mg/kg

LD50 (median lethal dose) is the amount of a substance that causes mortality in 50% of a group of animals.

TYPE OF CHOCOLATE	THEOBROMINE CONTENT[2]
White chocolate	Insignificant (note: high sugar and fat content can cause GI upset +/- pancreatitis)
Milk chocolate	Very variable. Typically, 100–210 mg/100g. Refer to theobromine formula.
Dark or semi-sweet chocolate	530mg/100g
Unsweetened baking chocolate	1360-1600 mg/100g
Dry cocoa powder	2600mg/100g

FORMULA FOR THEOBROMINE CONTENT

1600 x % cocoa = theobromine in mg/100g

e.g. 65% chocolate is 1600 x 0.65 = 1040mg/100g

CLINICAL SIGNS

Clinical signs typically occur within 2-4 hours[3,4] following ingestion, but may occur after 6-12 hours[1] and have been reported <1hr following ingestion[5].

Initially:

- Vomiting, diarrhoea, abdominal discomfort +/- distention, restlessness, PUPD

Progression:

- Tremors, hyperactivity, ataxia, seizures, agitation, rigidity, tachycardia, arrythmias (VPCs), tachypnoea, cyanosis, hypertension, hyperthermia, AKI, coma
- Occasionally bradycardia and hypotension

Death may occur as a consequence of hyperthermia, respiratory failure or cardiac arrhythmias.

SYMPTOMATIC

- Stabilize patient as required (see box below)
- Establish minimum database: PCV, TS, urea, creatinine, electrolytes, urinalysis (USG).
- Blood pressure and ECG

When possible, start gastrointestinal decontamination.

ASYMPTOMATIC

If a toxic dose has been consumed, gastrointestinal decontamination is indicated.

INDUCE EMESIS

Dogs: Emedog @ 0.1mg/kg SC

Cats: Alpha 2 agonist[6]

(Unless contraindicated or already vomited. Where emesis is contraindicated, such as patients who are sedated following anticonvulsant medication, consider gastric lavage)

ADMINISTER ACTIVATED CHARCOAL (AC)

Carbodote Prime: (AC + sodium sulphate), single administration. Methylxanthines undergo enterohepatic recirculation therefore this should be followed by...

Carbodote Repeat: (AC only), every 4-6 hours for up to 72 hours.

(Refer to packaging for instructions on how much to administer)

CONSIDER THE BELOW AND TREAT AS NECESSARY

TREMORS/MILD SEIZURES

Tremors

Ziapam (diazepam) 0.5-2mg/kg IV

OR

Methocarbamol 55–220 mg/kg, slow IV[7] (no more than 2ml/min) or 20-45mg/kg PO q8h (do not exceed 330mg/kg/day)[8].

Seizures

Ziapam (diazepam) @ 0.5mg/kg slowly IV (up to 3 times, at least 10 minutes apart).

CARDIAC ARRHYTHMIAS

Monitor closely (including ECG) and treat cardiac dysrhythmias appropriately.

Tachycardia - β blockers e.g., metoprolol (0.5-1mg/kg PO q8h in dogs or 0.2–0.4 mg/kg slow IV) or propranolol (0.02–0.08 mg/kg, slow IV).

Bradyarrhythmia - Atropine (0.01-0.03mg/kg IV).

Premature ventricular contractions should be treated with lidocaine (initially slow IV) bolus of 2-8mg/kg in dogs followed by a CRI of 0.025-0.1mg/kg/min[8]

FLUIDS

IV crystalloids should be given to reduce renal damage secondary to rhabdomyolysis.

Fluid diuresis may assist in stabilizing cardiovascular function and hastening urinary excretion of methylxanthines.

Correct any acid-base and electrolyte abnormalities.

SUPPORTIVE CARE

Urinary catheterisation - may be useful to increase clearance of methylxanthines as reabsorption can occur across the bladder wall[1].

Hyperthermia - check temperature and treat aggressively.

- Rapid resolution expected once tremors/seizures are under control and IV fluids administered.
- Monitor for subsequent hypothermia in a sedated or inactive patient.

Advanced - haemoperfusion or haemodialysis can also increase methylxanthine clearance.

USEFUL CONTACTS

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AT-002-A3.

EMERGENCY ACTION GUIDELINES

ETHYLENE GLYCOL POISONING

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SUSPECTED / CONFIRMED / WITNESSED INGESTION
(MINIMAL LETHAL DOSE: CATS: 1.5ML/KG; DOGS 4ML/KG[1])

ASYMPTOMATIC

INDUCE EMESIS

(very fast absorption therefore may not be useful if > 30min post ingestion; however, food may slow down absorption[2])

Cats: Alpha 2 Agonist[3]

Dogs: Emedog @0.1mg/kg SC

UNLESS CONTRAINDICATED

EFFECTIVE

CRI

Calculate how much ethanol you need to add to a 1000ml bag of fluids, to make a 7% solution:

Number of mls to be added = 7% x 1000ml / % of available ethanol (e.g. 40% vodka)

(to achieve 7% ethanol solution one needs to add 175ml of 40% ethanol to the 1000ml bag of fluids, removing 175ml of fluid from the bag first)

Give 8.6ml/kg of 7% ethanol as an initial bolus and follow by CRI at 1.43ml/kg/hr for 24-36 hours

Consider use of dextrose (Ethanol can cause hypoglycaemia)

BOLUSES

Make 20% ethanol solution
(dilute vodka 40% 1:1 with IV fluids)

DOGS: 5.5ml/kg of 20% ethanol
IV q 4hrs for 5 treatments then q 6hrs for 4 treatments[4].

CATS: 5ml/kg of 20% ethanol
q 6 hrs for 5 treatments then q 8hrs for 4 treatments[4].

IMPORTANT EARLY LABORATORY FINDINGS:

- **CHANGE IN OSMOLALITY** Reference range for osmolality: For dogs: 290-310mOs/kg; For cats: 290-330mOs/kg. Therefore consider hyperosmolar sample if osmolality is: > 320mOs/kg in dogs and > 330mOs/kg in cats.
- **HIGH ANION GAP AND A NORMOCHLORAEMIC METABOLIC ACIDOSIS** (develops within 3 hrs, peaks at 6 hrs and may last up to 48hrs) very low serum bicarbonate
- **CALCIUM OXYLATE CRYSTALLURIA** (can be seen within 3 hrs of ingestion in cats and 4-6hrs in dogs - duration is highly variable but can last days)
- **SERUM ETHYLENE GLYCOL** concentration peaks 1-6hrs after ingestion and it is rarely present in the blood or urine after 48-72hrs

LATER LABORATORY FINDINGS:

- **HYPERPHOSPHATAEMIA** and **AZOTAEMIA** - observed with progression of AKI (phosphorus levels can also increase initially due to phosphorus containing rust-inhibitors in anti-freeze)
- **HYPERKALAEMIA** is seen with progression into oliguria/anuria and can be exacerbated by metabolic acidosis
- **IONISED HYPOCALCAEMIA** - thought to be secondary to chelation with oxalic acid and formation of calcium oxalate crystals
- **HYPERGLYCAEMIA** is thought to be related to aldehyde-induced inhibition of glucose metabolism, increased epinephrine and endogenous cortisol , and uraemia.
- **URINE: ISOSTHENURIA** often within 3 hrs due to osmotic diuresis and polydipsia, at later stages related to **AKI: GLUCOSURIA, HAEMATURIA, PROTEINURIA, PYURIA, GRANULAR AND CELLULAR CASTS.**
- **FLUORESCENCE MAY BE PRESENT** (on the coat or in a urine sample) - check with a Wood's lamp

INEFFECTIVE OR CONTRAINDICATED

CONSIDER GASTRIC LAVAGE

IV CATHETER PLACEMENT + BLOOD & URINE SAMPLING

(BLOOD: acid-base, osmolality, pH, electrolytes, BUN, Creat, Phosphorus, Ca^{2+}, PCV/TS
URINE: SG, dipstick, calcium oxalate crystaluria)

IV FLUIDS

@ 2-3x MAINTENANCE to induce diuresis[2]
(till the rate can be adapted to hydration and urine production).

START TREATMENT

ETHANOL CRI OR BOLUSES OR **4-METHYLPYRAZOLE (FOMEPIZOLE[1])**

CONSIDER VITAMIN B1 + B6[5,6]
THIAMINE @ 100mg/dog IM/SC/PO q24h and
PYRIDOXINE @ 1-2mg/kg SLOW IV q 6hrs (consider separate line for vitamin B to ethanol as stability not established)
Dose & efficacy of supplemental Thiamine and Pyridoxine has not been fully established

- MONITOR URINE OUTPUT + BLOOD PARAMETERS
  - GLUCOSE q 4-6hrs whilst on ETHANOL
- SUPPORTIVE CARE
  - anti-emetics, gastroprotectants, managing hypothermia
  - continue fluids and treatment
- For at least 48 hrs:
  - until clinically normal for at least 24hrs
  - normal kidney parameters
  - normal acid-base balance

CONTINUE IV FLUIDS AND TREATMENT

NO ← **DETERIORATION OF BLOOD VALUES AND/OR DECREASED URINE OUTPUT** → YES

ACUTE RENAL FAILURE

Treat accordingly.

SYMPTOMATIC

LETHARGY, ATAXIA, DISORIENTATION, VOMITING, SEIZURES

Any cat presented with an acute onset of clinical signs during the "anti-freeze season" should raise a suspicion of ethylene glycol toxicity

INEBRIATION PHASE

30min-12hrs[2]
(Some animals may appear to 'recover')

CARDIOPULMONARY STAGE

12-24hrs metabolic acidosis[2]

OLIGURIC KIDNEY INJURY

24-72hrs (as early as 12hrs in cats[2])

SEIZURES

NO / YES

TREAT WITH ZIAPAM (DIAZEPAM)

@0.5mg/kg IV, repeated up to 3 times, 10min apart

DOG

20mg/kg IV followed by 15mg/kg 12 and 24hrs after the initial dose, then 5mg/kg q12h until recovery.

CAT

125mg/kg IV initially, followed by 31.25mg/kg IV at 12, 24 and 36hrs after the initial dose (may cause ataxia and depression).

USEFUL CONTACTS

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PRODUCTS

EMEDOG
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ZIAPAM
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- Packs contain 6 x 2ml vials of 5mg/ml





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EMEDOG, 1 mg/ml, solution for injection for dogs contains Apomorphine. Legal category POM-V. For the induction of emesis in dogs. **Ziapam 5mg/ml solution for injection for cats and dogs** contains Diazepam. Legal category POM-V CD Sch. 4.
In cats and dogs for the short-term management for convulsive disorders and skeletal muscle spasms of central and peripheral origin. As part of a pre-anaesthetic or sedation guidelines. Please refer to the product packaging and leaflets for information about side effects, precautions, warnings and contra-indications.
Use medicines responsibly. www.noah.co.uk/responsible For further information and to view the full Summary of Product Characteristics, please contact TVM-UK Animal Health Ltd, Kirtlington Business Centre, Slade Farm, Kirtlington, Oxfordshire, UK. OX5 3JA. **Tel.** 0800 0385868. **Email** help@domespharma.co.uk. Dômes Pharma is the trading name of TVM UK Animal Health Ltd. Prescription decisions are for the person issuing the prescription alone.

Reference: 1. Connally, H. E., Thrall, M. A., & Hamar, D. W. (2010). Safety and efficacy of high-dose fomepizole compared with ethanol as therapy for ethylene glycol intoxication in cats. *Journal of veterinary emergency and critical care (San Antonio, Tex. : 2001)*, *20*(2), 191–206. **2.** Bates, N. (2016) HYPERLINK "https://www.magonlinelibrary.com/doi/abs/10.12968/coan.2016.21.2.95" Ethylene glycol poisoning. UK Vet Companion Animal. 21 (2). **3.** Harvey, A, Tasker, S (eds.) (2013) BSAVA Manual of Feline Practice. Gloucester: British Small Animal Veterinary Association Pp. 139. Little, S. (ed) (2012) **4.** Allerton, F. (2023). Small Animal Formulary, 11th Edition. Part A: *Canine and Feline. British Small Animal Veterinary Association*. **5.** Mathews, K. A. (ed.) 2006 Veterinary Emergency and Critical Care Manual. 2nd ed. Guelph: Lifelearn Inc. **6.** Silverstein, D. C., Hopper, K. (eds) 2009 Small Animal Critical Care Medicine. St. Louis: Saunders Elsevier.

AT-004-A3.

EMERGENCY ACTION GUIDELINES

GRAPE
(OR THEIR DRIED FRUITS)
POISONING

SUSPECTED/CONFIRMED INGESTION

ASYMPTOMATIC

INDUCE EMESIS

Emedog @ 0.1mg/kg SC.

Emesis should ideally be induced within 4 hours of ingestion, however grapes/raisins have been successfully retrieved up to 24 hours post-ingestion[1,2].

ADMINISTER ACTIVATED CHARCOAL (AC)

Carbodote Prime: (AC + sodium sulphate), single administration.

Enterohepatic recirculation may occur[3] therefore repeat administration of AC is recommended.

Carbodote Repeat: (AC only), every 4-6 hours for 24-48 hours.

(Refer to packaging for instructions on how much to administer)

ESTABLISH BASELINE

Minimum database inc.
Urinalysis (inc. SG) BUN, CREAT, SDMA PCV/TS, Na+, K+, Cl-, Ca^{2+}, phosphate.

Establishment of baseline is very important to be able to interpret the findings during the monitoring period.

IV FLUIDS (CRYSTALLOIDS) FOR 48 - 72 HRS

1.5-2x maintenance, tailor ongoing fluid therapy rates according to patient needs (monitor 'ins & outs')

MONITOR BLOOD VALUES AND URINE OUTPUT (UOP) DAILY

Patients developing AKI may not be azotaemic initally. Rising creatinine levels within the normal range and/or reduction in UOP may be recognised first in early cases (refer to IRIS AKI guidelines).

TOXICITY

- Grapes and their dried fruits are potentially toxic to cats, but this is not well documented.
- Toxic mechanism remains unclear. Suspected toxic agent is Tartaric Acid
- Toxicity (AKI) has been reported in grape ingestion of as little as 1g/kg[1]
- Clinical signs typically develop between 6-24hours post-ingestion[1,2]
- These include; vomiting, lethargy, anorexia, diarrhoea, decreased UOP, abdominal discomfort, polydipsia, polyuria, ataxia, weakness[1,2].

Vomiting is the most common clinical sign, however if not already vomiting, then emesis can be considered.

INEFFECTIVE OR CONTRAINDICATED

GASTRIC LAVAGE

SYMPTOMATIC

Vomiting, hypersalivation, diarrhoea, haematemesis, blood in stool, anorexia.

+/- Azotaemia (or rising renal parameters) and reduced urine output (UOP)

FULL BLOOD PROFILE

Include electrolytes and urinalysis.

RULE OUT OTHER CAUSES OF CLINICAL SIGNS

For example, ethylene glycol, leptospirosis, pancreatitis, GI obstruction.

ACUTE KIDNEY INJURY (AKI)

Treat accordingly.

YES

DETERIORATION OF BLOOD VALUES AND/OR REDUCED URINE OUTPUT

NO

DISCHARGE HOME AFTER 48-72 HRS

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THERAPY

- **IV Fluids:** gentle rather than forced aggressive diuresis (potential benefits: promoting toxin excretion, minimising tubular exposure).
  - Recommended in all cases due to the potential gravity of this poisoning syndrome.
- **Activated charcoal:** Due to the unknown toxin associated with this syndrome it has been advised to err on the side of caution and assume the toxin is enterohepatically recycled. Therefore you should consider giving activated charcoal q4-6 hours for 24hrs (or longer if grapes/raisins etc are still being passed in the faeces after this time).
- Biochemical findings will depend on timing and severity:
  - Dehydration (increased PCV/TS) +/- HYPOkalaemia secondary to vomiting.
  - Mild pre-renal azotaemia.
  - Later stages:
    - Severe azotaemia/hyperphosphataemia.
    - +/- Hyperkalaemia.
    - Urinalysis: isosthenuria (USG 1.008- 1.012), proteinuria/albuminuria, presence of granular casts.

USEFUL CONTACTS

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DON'T FORGET ACTIVATED CHARCOAL!

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- Available as liquid or gel
- Repeated adminstrations will be required for substances that are enterohepatically recycled
- Take a look at our range of activated charcoals

THE CARBODOTE RANGE

Carbodote is a complementary feed.

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Reference: 1. Reich, C. F., Salcedo, M. C., Koenigshof, A. M., Hopp, M. M., Walker, J. M., Schildt, J. C., & Beal, M. W. (2020). Retrospective evaluation of the clinical course and outcome following grape or raisin ingestion in dogs (2005-2014): 139 cases. Journal of veterinary emergency and critical care. 30(1), 60–65 **2.** Croft, R., Clementi, E., Farmer, H., Whalley, R., Dunning, M., & Firth, A. (2021). Retrospective evaluation of Vitis vinifera ingestion in dogs presented to emergency clinics in the UK (2012-2016): 606 Cases. Journal of veterinary emergency and critical care. 31(1), 74–79. **3.** Sutton, N. M., Bates, N., & Campbell, A. (2009). Factors influencing outcome of Vitis vinifera (grapes, raisins, currants and sultanas) intoxication in dogs. The Veterinary record, 164(14), 430–431. **4.** TVM329CarbAd.

AT-003-A3.

EMERGENCY ACTION GUIDELINES

IBUPROFEN POISONING

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SUSPECTED/CONFIRMED INGESTION

25-100 MG/KG (DOG)

GASTROINTESTINAL EFFECTS[1,4]

Clinical signs → can be seen within 2-24 hours of ingestion:

- Lethargy and anorexia
- Nausea and vomiting
- Diarrhoea
- Abdominal pain
- GIT ulceration/perforation

100-200 MG/KG (DOG)

ACUTE KIDNEY INJURY (AKI)[1,4]

Renal impairment occurs from 12 hours onwards. In addition to GIT symptoms clinical findings may include:

- Elevated urea, creatinine*, SDMA, phosphorus
- Polyuria, oliguria or anuria depending on stage of renal injury
- Tubular casts on urinalysis
- Renomegaly with pain on palpation
- Hypo or hyperkalaemia (depending on stage)

Older patients or those with pre-existing renal disease, hypovolaemia or hypotension may show signs at lower ingested doses

Patients developing AKI may not be azotaemic initally

*Rising creatinine levels within the normal range and/or reduction in UOP (urine output) may be recognised first in early cases (refer to IRIS AKI guidelines)

> 400MG/KG (DOG)

CNS SIGNS[1,4]

Clinical signs → may occur within 30 mins of ingestion:

- Ataxia
- Depression
- Seizures
- Coma

Minimum lethal dose in dog is 600mg/kg

NO ← **SEIZURES**

YES

TREAT WITH ZIAPAM (DIAZEPAM)

@ 0.5mg/kg IV (up to 3 doses at least 10 min apart)

INDUCE EMESIS

- **Dogs: Emedog** @0.1mg/kg SC (if not already vomiting and neurologically stable)
- **Cats:** Alpha 2 agonist[3]
- Likely not useful > 3 hours following ingestion (peak plasma concentrations in dogs from 30 minutes to 3 hours, depending on the formulation – liquid formulations absorbed faster than tablets, presence of food decreases and slows absorption)
- Consider gastric lavage followed by Carbodote administration via stomach tube if contraindications exist such as CNS depression (see Emedog SPC for list of contraindications to inducing emesis)

OTHER CONSIDERATIONS

- Provide oxygenation and assisted ventilation where necessary
- Monitor temperature and treat aberrations appropriately
- Maintenance of blood pressure
- Monitor cardiac function
- Acid base status

ADMINISTER ACTIVATED CHARCOAL (AC)

Carbodote Prime: (AC + sodium sulphate), single administration.
Due to enterohepatic recirculation, this should be followed by:
Carbodote Repeat: (AC only), every 4-6 hours for 24-48 hours
(Refer to packaging for instructions on how much to administer)

RECOVERY

TREAT GIT DISTURBANCES

1. Maintain hydration and blood pressure
   - Replace fluid losses and provide ongoing fluid maintenance
2. Protection of gastrointestinal mucosa
   - Required for at least 7-14 days
   - Omeprazole q12-24 hours (+/- ranitidine q12 hours)
   - Misoprostol (synthetic prostaglandin) – 2-5µg/kg PO q8-12 hours (dog), 5µg /kg PO q8 hours (cat)
   - Sucralfate q8-12 hours
3. Analgesia for abdominal discomfort (e.g., buprenorphine)
4. Antiemetics as necessary (e.g., maropitant, metoclopramide)
5. Dietary support
6. Monitor haematology, biochemistry and electrolytes- frequency dependent on severity of clinical signs

TREAT AKI

1. Ensure any concurrent nephrotoxic drugs have been discontinued
2. Place IV catheter (consider jugular catheter as facilitates measurement of CVP (central venous pressure) and repeated blood sampling)
3. Place urinary catheter and monitor UOP via closed collection system (normal UOP = 1-2 ml/kg/h). This will help with early identification of olig/anuria and tailoring of IVFT requirements (matching 'ins & outs')
4. Replace fluid losses with isotonic crystalloid (e.g., Hartmanns) to correct existing dehydration or hypovolaemia
5. Continue maintenance rate appropriate to maintain hydration, support renal blood flow and GFR (forced diuresis will not potentiate elimination of ibuprofen)
6. Serial monitoring of haematology, biochemistry, electrolytes, acid base status, BP - treat disturbances as required

Where oliguria (UOP <1-2ml/kg/h in a well hydrated patient) or anuria (no urine production) present, fluid overload is a common complication.

Clinical signs of fluid overload:

- Chemosis, exophthalmos, serous nasal discharge
- Peripheral oedema (easier to detect around Achilles tendon)
- Tachypnoea/dyspnoea with pulmonary crackles
- Weight gain (ensure patients are weighed frequently)
- Elevated systolic BP or CVP (normal CVP: 0-5 cm H20; >10 cm H20 suggestive of fluid overload)

If olig/anuria is refractory to fluid therapy consider attempting diuretic therapy (e.g., furosemide) or referral for renal replacement therapy.

FACTS

- Severity of clinical signs is dose dependent but not exclusive (i.e. clinical signs may develop at lower/higher doses than stated – doses as low as 5mg/kg can be toxic and require treatment)
- **Cats** (and ferrets) are thought to be at least twice as sensitive as dogs
- Common formulations: 200 or 400mg strength tablets, 5% or 10% gel, 40mg/ml liquid
- Ibuprofen is sometimes combined with other potential toxins (e.g., paracetamol or xylitol in cold/flu medication)

USEFUL CONTACTS

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Reference: 1. Dunayer, E. (2004). Ibuprofen toxicosis in dogs, cats, and ferrets. Veterinary Medicine; July: 580–585. **2.** TVM329CarbAd. **3.** Harvey, A, Tasker, S (eds.) (2013) BSAVA Manual of Feline Practice. Gloucester: British Small Animal Veterinary Association Pp. 139. Little, S. (ed) (2012). **4.** Butty EM et al. (2022) Outcomes of nonsteroidal anti-inflammatory drug toxicosis treated with therapeutic plasma exchange in 62 dogs. J Vet Intern Med.

AT-008-A3.

EMERGENCY ACTION GUIDELINES

LILY POISONING

THIS DOCUMENT IS INTENDED FOR USE AS A GUIDELINE ONLY. DOSES ARE REFERENCED AS AT THE PUBLICATION DATE. INDIVIDUAL CASES AND TOXIC DOSES MAY VARY.

SUSPECTED/CONFIRMED/WITNESSED INGESTION

TRUE LILES NEPHROTOXIC TO CATS

LILIUM AND HEMEROCALLIS SP.	
Easter/Trumpet lily	Day lily
Stargazer/Oriental lily	Royal lily
Western/Wood lily	Panther lily
Japanese Show lily	Rubrum lily
Tiger lily	Leopard lily
Asiatic lily	Devil lily
Yellow lily	White lily
Madonna lily	Turk's cap lily

CLINICAL SIGNS 1-36 HOURS POST-INGESTION[1,2,3]

- Salivation
- GIT irritation
- Vomiting
- Anorexia
- Lethargy
- Depression
- Dehydration
- Polyuria
- Polydipsia
- Oliguria → Anuria
- Pancreatitis
- Hepatic lipidosis
- Seizures
- Death (3-7days)

TRUE LILIES MAY CAUSE GIT UPSET IN DOGS

HYBRID LILIES TOXIC TO DOGS & CATS

COMMON NAME*	CLINICAL SIGNS (CODED) ALL MAY CAUSE GIT UPSET ±
Peruvian lily (a+b)	a) Oral pain/Stomatitis (rarely dysphagia or dyspnoea)
Peace lily (a+b)	b) Dermatitis/Allergic dermal reaction
Calla lily (a+b)	c) Cardiac: hypotension, cardiac arrhythmia/arrest
Impala Lily (c)	d) Neurological: tremors/seizures
Lily of the valley (c+d)	e) Bone marrow suppression
Clivia Lily (c+d)	
Barbados Lily (c+d)	
Glory lily (c,d,e)	

*There can be many alternative names

STOP INGESTION & DECONTAMINATE

1. Brush off pollen with a dry disposable cloth/paper towel
2. Clipping may be helpful for cats with heavy contamination
3. Wash coat and paws thoroughly, or wipe with a damp cloth

INDUCE EMESIS

Dogs: **Emedog** @ 0.1mg/kg SC

Cats: Alpha 2 agonist[4]

(If no contraindications and further gastric evacuation is required)

ADMINISTER ACTIVATED CHARCOAL (AC)

Carbodote Prime: (AC + sodium sulphate), single administration.

Due to unknown toxicant and potential for gastrointestinal persistence/ enterohepatic recirculation[5], this should be followed by:

Carbodote Repeat: (AC only), every 4-6 hours for 24-48 hours.

(Refer to packaging for instructions on how much to administer)

OTHER TREATMENT CONSIDERATIONS AS NECESSARY

GIT	MISC
• Maintain hydration and blood pressure	• O2 ± IPPV
• Gastroprotectants	• Monitor and regulate temperature
• Antiemetics	• Monitor CBC/Biochemistry → depending on severity of clinical signs
• Analgesia	• Acid base status
• Dietary support	• Manage the recumbent patient

SEIZURES	CARDIAC
Ziapam (diazepam) @ 0.5mg/kg IV repeated up to three times 10 min apart.	• ECG and blood pressure • Anti-arrhythmic drug(s)

APPROACH TO NEPHROTOXIC LILY INGESTION IN CATS

TAKE BASELINE BLOODS → POSSIBLE AKI LABORATORY CHANGES

Bloods:

<18 hours → initially only a stress leukogram may be observed

24-72 hours → renal function can start to deteriorate → often moderate to severe increases in BUN, creatinine, SDMA, phosphorus, and potassium

>48hrs → May develop increases in AST + ALT, likely due to pronounced anorexia → hepatic stress → hepatic lipidosis

Urine: (aberrations here can precede changes in blood biochemistry)

>12 hours → isosthenuria, proteinuria, haematuria, glycosuria and numerous renal tubular epithelial casts[1,3]

PREVENTION AND TREATMENT OF AKI

1. Discontinue any concurrent nephrotoxic drugs
2. Place IV catheter if not already done so (consider jugular catheter to facilitate measurement of CVP and repeated blood sampling)
3. Start IVFT ASAP with isotonic crystalloid (e.g., Hartmann's) initially at 2-3x maintenance[1]. Calculate and adjust fluid rate appropriate to patient's needs to maintain hydration, support renal blood flow and GFR. **48-72 hours of timely fluid diuresis can prevent lethal effects[1]**
4. Place urinary catheter if possible and monitor urine output (UOP) via closed collection system (normal UOP = 1-2ml/kg/h). This will help with early identification of olig/anuria and tailoring of IVFT requirements (matching 'ins & outs')
5. Serial (at least daily) monitoring of: BP, haematology, biochemistry (especially renal parameters and electrolytes) and ideally acid base status → treat disturbances
6. Drugs, such as furosemide and mannitol have NOT proven to be effective in the treatment of Lily induced anuric renal failure[1,2]

OUTCOME FOR CATS

Good to excellent prognostic indicators:

- Early presentation, decontamination and prompt IVFT (<18 hours)
- Present with only GIT signs
- Following a minimum of 48-72 hours fluid therapy, if stable and no signs of kidney injury → Discharge

Poor to grave prognostic indicators:

- Delayed presentation or implementation of treatment (>18 hours[1,3])
- Reduction in UOP as kidney injury advances
- Development of anuria → peritoneal dialysis/haemodialysis are the only option[2,6], otherwise strongly consider euthanasia
- Chronic renal insufficiency may occur as a long-term consequence

NEPHROTOXIC LILY FACTS

- All parts of the true Lily plants (Lilium sp. and Hemerocallis sp.) are nephrotoxic to cats
- CARE! Many plants are called "lilies" but are not true lilies, yet still may be toxic in other ways
- Lily-induced nephrotoxic syndrome has only been observed in cats, not dogs
- Cats are extremely sensitive – even small ingestions can result in AKI/death
- The true Lily toxin is unknown and therefore undetectable
- Toxin elimination appears to occur within 2 days

USEFUL CONTACTS

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DON'T FORGET ACTIVATED CHARCOAL!

- Activated charcoal helps in the adsorption of multiple undesirable substances[6]
- Available as liquid or gel
- Repeated adminstrations will be required for substances that are enterohepatically recycled
- Take a look at our range of activated charcoals

THE CARBODOTE RANGE

Carbodote is a complementary feed.

THE ANTI-TOX RANGE

BE PREPARED FOR POISONING

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For further information and to view the full Summary of Product Characteristics, please contact TVM-UK Animal Health Ltd, Kirtlington Business Centre, Slade Farm, Kirtlington, Oxfordshire, UK. OX5 3JA. **Tel.** 0800 0385868. **Email** help@domespharma.co.uk. Dômes Pharma is the trading name of TVM UK Animal Health Ltd. Prescription decisions are for the person issuing the prescription alone.

Reference: 1. Fitzgerald KT (2010) TOPICAL REVIEW: Lily Toxicity in the Cat. Published by Elsevier. **2.** Hall JO (2007) Nephrotoxicity of Easter Lily (Lilium longiflorum). In: Poisonous Plants: Global Research and Solutions. 271-278. **3.** Rumbeiha WK et al. (2004) A comprehensive study of Easter lily poisoning in cats. J Vet Diagn Invest., 16(6):527-41. **4.** Harvey, A, Tasker, S (eds.) (2013) BSAVA Manual of Feline Practice. Gloucester: British Small Animal Veterinary Association Pp. 139. Little, S. (ed) (2012) **5.** Bennett, A. J., & Reineke, E. L. (2013). Outcome following gastrointestinal tract decontamination and intravenous fluid diuresis in cats with known lily ingestion: 25 cases (2001-2010). Journal of the American Veterinary Medical Association, 242(8), 1110–1116. **6.** Berg RI, et al. (2007) Resolution of acute kidney injury in a cat after lily (lilium longiflorum) intoxication. J Vet Int Med 21(4):857-859. **7.** TVM329CarbAd.

AT-011-A3

EMERGENCY ACTION GUIDELINES

MACROCYCLIC LACTONE POISONING

SUSPECTED/WITNESSED/CONFIRMED INGESTION/DERMAL APPLICATION

ASYMPTOMATIC

GASTROINTESTINAL DECONTAMINATION

INDUCE EMESIS

(If presenting <2 hours following ingestion)

Dogs: Emedog @ 0.1mg/kg SC

Cats: Alpha 2 agonist[4]

ADMINISTER ACTIVATED CHARCOAL (AC) (ORAL OR DERMAL EXPOSURE)

Carbodote Prime: (AC + sodium sulphate), single administration.

Due to enterohepatic recirculation[1,6] this should be followed by:

Carbodote Repeat: (AC only), every 4-6 hours for 24-48 hours.

(Refer to packaging for instructions on how much to administer)

MONITOR

Suggest hospitalisation for 24 hours to monitor for development of symptoms.

AVERMECTINS/MILBEMYCINS
E.G., IVERMECTIN, SELAMECTIN, MOXIDECTIN, MILBEMYCIN, DORAMECTIN, EPRINOMECTIN, ABAMECTIN

Lowest reported toxic doses[1,2,3]

Ivermectin: 0.1-0.4mg/kg PO in susceptible dogs, 0.2-2.5mg/kg PO non-susceptible dog breeds, 0.3-1.3mg/kg SC cats

Moxidectin: 0.09-1mg/kg PO in susceptible dogs, 1.9-2.8mg/kg PO in non-susceptible dog breeds

Clinical signs: May occur within 2-24 hours

Neurological manifestations predominate: ataxia, hyperaesthesia, vocalisation, mydriasis, disorientation, blindness (typically temporary), paresis, respiratory paralysis, tremors, seizures, coma

Also: Hypersalivation, bradycardia, vomiting, dyspnoea, hypothermia or hyperthermia

DERMAL DECONTAMINATION

!If symptomatic, ensure tremors are controlled first as handling may potentiate tremor or seizure activity!

- Wear gloves and bathe the patient with lukewarm water and washing up liquid
- Dry after bathing to avoid hypothermia
- If necessary, clip the fur to ensure adequate decontamination
- Use a buster collar to prevent oral ingestion from coat/skin

SYMPTOMATIC

CONTROL MUSCLE TREMORS[5]

Methocarbamol @ 55-220mg/kg IV @ rate no more than 2ml/min (maximum dose 330mg/kg/day IV as it can cause respiratory muscle depression)

IV route preferred, however can be given PO or IR (note: delayed action via these routes).

- 20-45mg/kg PO q8h (do not exceed 330mg/kg/day)[6]
- 100-150mg/kg crushed and administered with water rectally, repeated q4-8hrs as required.

Ziapam (diazepam) @ 0.5-2.0mg/kg IV

CARE: Benzodiazepines **and** Barbiturates **may exacerbate seizures/CNS depression[1,2,7,8].** If proceed, do so with caution. Consider lower doses, monitor closely, avoid if deterioration

CONTROL SEIZURES[5,7]

Ziapam (diazepam) @ 0.5mg/kg IV bolus (up to 3 doses at least 10 minutes apart)

Phenobarbital @12mg/kg loading dose slow IV. If required, 4-6mg/kg slow IV 20 mins later (max 2 doses, 20min apart)

Propofol @ Bolus of 1-4mg/kg to effect followed by CRI of 0.1-0.4mg/kg/min

+/- gaseous anaesthesia

INTRAVENOUS LIPID EMULSION[9,10]

(obtain baseline blood samples first)

Intralipid 20% @ 1.5ml/kg IV bolus over 1-5 minutes, followed by CRI @ 0.25ml/kg/min over 30-60 minutes. Can be repeated 1-2 times if no improvement

(note: efficacy of lipid soluble anti-seizure medications may be reduced by ILE)

CONSIDER GASTRIC LAVAGE

(once seizures under control if appropriate)

+

ADMINISTER ACTIVATED CHARCOAL

via stomach tube (care aspiration risk)

LABORATORY SAMPLES

Baseline blood samples usually non-specific

- Increased CK (due to increased muscle activity)
- Possible evidence of dehydration and azotaemia
- Hypoglycaemia may be present if tremors/seizures are prolonged

Acid-base status may reveal respiratory acidosis due to hypoventilation

Urinalysis can help to distinguish pre-renal and renal azotaemia. Myoglobinuria may be present from long lasting seizure activity and this could lead to acute renal failure

Toxicological testing can be performed on: blood, gastric contents or source material

RECOVERY

- Slowly withdraw anticonvulsant medication, monitoring for responsiveness to external stimuli and recurrence of tremor/seizure activity
- Reduce the propofol/inhalant anaesthetic dose by 25% every 2 hours until the patient is completely weaned and seizure free
- Paddling of legs may occur during recovery due to drug withdrawal or seizure activity. Salivation and orofacial muscle twitching are suggestive of seizure activity, whilst paddling should stop once the patient is placed in sternal recumbency if it is due to drug withdrawal
- To help manage marked agitation/paddling consider[6]:
  - a bolus of either dexmedetomidine or medetomidine 1 µg/kg IV[6] or acepromazine 5µg/kg IV

MACROCYCLIC LACTONES KEY FACTS

- Toxicosis may occur following ingestion of large animal deworming products or contaminated faeces, or through inappropriate exposure to topical products
- Toxic dose varies according to: route of exposure, the patient and their genetics
  - Collies and other herding breeds commonly have P-glycoprotein dysfunction, (a defect in the MDR1 gene), making them more susceptible
- Elimination half-lives: ivermectin = 2 days; moxidectin = 19 days[2]

Prognosis

- Favourable with supportive care,
- Severely affected patients may require prolonged medical and nursing care (full recovery may be 2-3 weeks)
- Guarded if the ivermectin dose received is >5mg/kg[2]

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Reference: 1. Merola V.M., Eubig, P.A. (2012). Toxicology of Avermectins and Milbemycins (Macrocyclic lactones) and the role of P-glycoprotein in dogs and cats. Vet Clin Nrth Am Small Anim Pract. 42(2): 313-vii. **2.** Platt S, Garosi L (2012) Small Animal Neurological Emergencies (1st edn). Chp 28; Pp 509 &517 **3.** Mealey K.L. (2013). Ivermectin: Macrolide Antiparasitic Agents. Small Animal Toxicology (3rd edn). Chp 52; Pp 601-607. **4.** Harvey, A, Tasker, S (eds.) (2013) BSAVA Manual of Feline Practice. Gloucester: British Small Animal Veterinary Association Pp. 139. **5**. Platt S.R., Olby N.J (2004) Neurological emergencies. In: Platt SR, Olby NJ (eds), BSAVA Manual of Canine and Feline Neurology (3rd edn). BSAVA, Gloucester, Pp P333-P335. **6.** Allerton, F. (2023). Small Animal Formulary, 11th Edition. Part A: Canine and Feline. British Small Animal Veterinary Association. **7.** BSAVA/VPIS (2012) Guide to Common Canine and Feline Poisons. **8.** Hopper K., et al. (2002) Ivermectin Toxicity in 17 Collies. J Vet Intern Med, Volume 16, Issue 1, Pp 89-94. **9.** Robben J.H., Dijkman M.A. (2017) Lipid Therapy for Intoxications. Vet Clin Small Anim: 47; 435–450. **10.** Londono L.A., et al. (2017) Clearance of plasma ivermectin with single pass lipid dialysis in 2 dogs. Journal of Veterinary Emergency and Critical Care 27(2), Pp 232–237. **11.** TVM329CarbAd

AT-013-A3.

EMERGENCY ACTION GUIDELINES

METALDEHYDE POISONING

SUSPECTED/WITNESSED/CONFIRMED INGESTION

Diagnosis based on history of ingestion, clinical signs and/or demonstration of toxin in vomitus, blood, urine or liver

Metaldehyde pellets are often radiopaque therefore radiographs may aid diagnosis.

Any ingestion > 2mg/kg warrants decontamination

ASYMPTOMATIC

INDUCE EMESIS
IN CASE OF RECENT INGESTION AND UNALTERED MENTAL STATUS

Dogs: Emedog @ 0.1mg/kg SC

Cats: Alpha 2 agonist[1]

ADMINISTER ACTIVATED CHARCOAL (AC)

Carbodote Prime: (AC + sodium sulphate), single administration.

Due to suspected enterohepatic recirculation[2], this should be followed by:

Carbodote Repeat: (AC only), every 4-6 hours for 24-48 hours.

(Refer to packaging for instructions on how much to administer)

PERFORM GASTRIC LAVAGE

Under general anaesthesia followed by Carbodote administration via stomach tube

TAKE BASELINE BLOOD SAMPLES

Common findings:

- Evidence of dehydration
- Increased CK (due to increased muscle activity)
- Metabolic acidosis with compensatory respiratory alkalosis
- Increased ALKP and ALT in some cases

SYMPTOMATIC

CLINICAL SIGNS

Clinical signs → typically occur 3 mins - 3 hours following ingestion, but can occur up to 24 hours post-ingestion[3]

Neurologic manifestations predominate

- Seizures are the most common clinical sign[3,4]
- Anxiety, hyperaesthesia, ataxia, nystagmus, mydriasis
- Severe muscle tremors
- Opisthotonos

Also:

- Hyperthermia
- Hypersalivation
- Vomiting/diarrhoea
- Tachycardia
- Tachypnoea

Affected animals may have a mild formaldehyde smell on their breath
Some may pass bright green/blue faeces due to the dye contained in some slug pellets

CONTROL SEIZURES

1. **Ziapam (diazepam)** @ 0.5mg/kg IV bolus (up to 3 doses at least 10 min apart)
2. **Propofol** Bolus of 1-4mg/kg to effect followed by CRI of 0.1-0.4mg/kg/min
3. **Inhalational gas anaesthesia**

Avoid barbiturates as they can slow down the metabolism of metaldehyde

CONTROL TREMORS

Methocarbamol @ 55-220MG/KG IV @ rate no more than 2ml/min

(maximum dose 330mg/kg/day IV as it can cause respiratory muscle depression).
IV route preferred, however can be given PO or IR (note: delayed action via these routes).

- 20-45mg/kg PO q8h (do not exceed 330mg/kg/day)[5]
- 100-150mg/kg crushed and administered with water rectally, repeated q4-8hrs as required.

Ziapam (diazepam) @ 0.5-2.0mg/kg IV

TREAT HYPERTHERMIA

- Hyperthermia often severe and can result in DIC. Consider coagulation testing (PT/aPTT) and evaluating for thrombocytopenia.
- Cool water bathing and enemas (enemas may also help eliminate the toxin from the GIT)
- Intravenous fluid therapy
- Stop active cooling when patient reaches 39.4°C to prevent hypothermia
- Continue to monitor in the recovery period

OTHER CONSIDERATIONS

- Maintain oxygenation/respiratory function
- Monitor electrolytes and acid base status and treat accordingly
- Maintain hydration – forced diuresis will not potentiate excretion of metaldehyde however diuresis may be required to prevent renal damage if myoglobinuria is present secondary to excessive muscle activity
- Support blood pressure
- Antiemetics for gastrointestinal upset (metaldehyde is a gastric irritant)

RECOVERY

RECHECK LIVER PARAMETERS

- Patients may go on to develop liver failure 2-3 days after ingestion of metaldehyde
- Monitor clinical signs and liver parameters for 2-3 days following ingestion
- Treat accordingly

METALDEHYDE KEY FACTS

- Most cases seen in spring/summer[3]
- Common formulations
  - Liquids, pellets, powders, granules.
  - Colour varied (often blue, green or brown)
  - Concentration varied but usually between 1.5-8% in pellets, up to 20% in liquid forms[3]
  - Addition of palatable substances to some slug/ snail baits may make them highly attractive to pets
- Toxicity can occur via ingestion, inhalation or dermal absorption
- LD_{50}: Dogs 100 mg/kg, Cats 207 mg/kg
- Metabolism of metaldehyde takes 4 days or longer - most patients will require hospitalisation for at least 24-72 hours
- In untreated symptomatic cases death often occurs due to respiratory failure 4-24 hours after ingestion, with mortality rates of 16% reported[3,4]
- If caught early and treated aggressively most patients recover

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AT-007-A3.

EMERGENCY ACTION GUIDELINES

NICOTINE POISONING

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THE FACTS

NICOTINE CONTAINING PRODUCTS INCLUDE CHEWING TOBACCO, BIDIS, CIGARETTES, CIGARS, NICOTINE REPLACEMENT PRODUCTS (PATCHES, GUM, E-CIGARETTES, E-LIQUID REFILLS)

Toxic doses:

- Toxic dose of nicotine is unclear. Clinical signs have been reported as low as 1mg/kg[1,2]
- Canine (oral) LD50: 9–12 mg/kg[1] +
- A typical cigarette contains 9-30mg nicotine (average cigarette 15-20mg)[3]
- E-liquids are available in various flavours (making them appealing to pets) and various strengths of nicotine (3-36mg/ml). The highest strength legally available in the UK is 20mg/ml[2]
- Cigarette butts may also cause intoxication

Some products may expose pets to other harmful toxins[1]

- Xylitol can be found in nicotine gum
- E-cigarettes contain lithium-ion batteries which may also be chewed or swallowed
- E-cigarette casings can result in oral injury and pose a risk of foreign body obstruction[2]

TREATMENT IS AIMED AT REMOVING THE SOURCE OF NICOTINE, LIMITING ABSORPTION AND SUPPORTIVE CARE

THE ASYMPTOMATIC PATIENT

INDUCE EMESIS
IN CASE OF RECENT INGESTION AND UNALTERED MENTAL STATUS

Nicotine is an emetic so vomiting may have already occurred[1]

Dogs: Emedog @ 0.1mg/kg SC

Cats: alpha 2 agonist[8]

ADMINISTER ACTIVATED CHARCOAL (AC)
IF NO CONTRAINDICATIONS

Carbodote Prime: (AC + sodium sulphate), single oral administration.

If ingestion of sustained-release products (e.g. transdermal patches - discarded patches can still have high nicotine concentration), this should be followed by[1]:

Carbodote Repeat: (AC only), orally every 4-6 hrs for 24 hrs

(Refer to packaging for instructions on how much to administer).

EXPOSURE TYPE

ORAL EXPOSURE: Rinse mouth with water

OCULAR EXPOSURE: Copiously irrigate eyes with water or saline for at least 20 minutes[6]

DERMAL EXPOSURE: Nicotine is absorbed through skin – bathe with soapy water[6]

PHARMACOKINETICS

- Nicotine, an alkaloid, binds to nicotinic acetylcholine receptors (nAChRs) found in both the peripheral and central nervous system
- It causes cholinergic effects, with CNS stimulation, followed by depression[4]
- Nicotine is absorbed slowly in the acidic gastric environment, but well absorbed in the small intestine (alkaline environment)[1,3]
- It is also readily absorbed through the respiratory tract, skin and mucous membranes[3]
- Metabolised by the liver
- Elimination via the kidneys – excretion is enhanced by a low urinary pH[5]

+ LD50 (median lethal dose) is the amount of a substance that causes mortality in 50% of a group of animals.

THE SYMPTOMATIC PATIENT

CLINICAL SIGNS[1,2,6]

- **Clinical signs are dose dependent**
- **Rapid onset within 15-30 mins, may be delayed up to 4 hours[2]**

Gastrointestinal signs

- Throat irritation, vomiting (common shortly after ingestion), salivation, diarrhoea

Neurological signs

- CNS stimulation followed by depression is common
- Hyperexcitability, disorientation, ataxia, weakness, mydriasis, tremors, seizures (rare)

Cardiopulmonary signs

- Hyper- / hypotension, tachycardia, reflex bradycardia, tachypnoea, cyanosis, respiratory depression.
- Pericardial effusion has been reported in one case[5]

SUPPORTIVE CARE AND MONITORING

1. **IV fluids** if hypotension: Administer IV crystalloids
   IV fluids may also speed up elimination of nicotine from the kidneys[1] (fluid diuresis is not recommended due to risk of fluid overload)
2. **Anti-emetics** (as needed): Care with Metoclopramide as may speed up gastric emptying and enhance nicotine absorption[5]
3. **Diazepam (Ziapam)** if tremors (0.5-2mg/kg IV) or seizures (0.5mg/kg IV up to 3 times, 10 mins apart)
4. **Supplemental oxygen** may be necessary if respiratory distress
5. **Cardiovascular support:** Caution with cardiac medications - tachycardia can switch to bradycardia
   Atropine 0.01-0.03mg/kg IV as needed for bradycardia[7]
   Beta-blockers (e.g. Propranolol 0.02-0.08mg/kg slow IV) for tachycardia[7]
6. **Urine acidification** may increase excretion as long as the patient is not acidotic[3]
7. **Surgical consideration:** Endoscopic retrieval of extended-release nicotine patches to prevent further absorption[1]

Antacids should be avoided as they may enhance nicotine absorption (by increasing gastric pH)

Monitor vitals closely including pulse, respiratory rate, blood pressure, ECG and CNS status. A blood screen/ urinalysis may be appropriate to rule out underlying conditions e.g. renal disease which may prolong recovery

Toxicological analysis of serum, urine, or vomit is available but rarely useful due to the need for prompt diagnosis and management[6]

PROGNOSIS

- Excellent to poor prognosis depending on dose ingested. If high dose ingested, prognosis improves if the animal survives the first four hours (nicotine has a short half-life – approx. 2 hours in humans)[2,3]
- Recovery usually occurs within a few hours; up to 24 hours if exposed to a high dose[2]
- Young or geriatric patients and those with pre-existing renal or cardiovascular disease may be more severely affected[1]

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References: 1. Hovda, L R, et al. Chapter 46: Nicotine and Tobacco. Blackwell's Five Minute Veterinary Consult Clinical Companion: Small Animal Toxicology, Second Edition. s.l. : John Wiley & Sons, Inc., 2016. **2.** Bates, N and Talcott, P. Electronic cigarettes. Vetlexicon. [Online] https://www.vetlexicon.com/canis/toxicology/articles/electronic-cigarettes/. ISSN 2398-2942. **3.** The dangers of nicotine ingestion in dogs. Hackendahl, N C and Sereda, C W. s.l. : Toxicology Brief, 2004. **4.** BSAVA, VPIS. Nicotine exposure in dogs. BSAVA/VPIS Guide to Common Canine and Feline Poisons. s.l. : British Small Animal Veterinary Association, 2017. **5.** Kim, J H. Acute fatal pericardial effusion induced by accidental ingestion of cigarette butts in a dog. 2016. **6.** E-cigs: toxic threat to dogs. El Bahri, L. s.l. : Vet Times, 2015. **7.** Allerton, F. Small Animal Formulary, 11th Edition. Part A: Canine and Feline. . s.l. : British Small Animal Veterinary Association, 2023. **8.** Harvey, A, Tasker, S (eds.). BSAVA Manual of Feline Practice. s.l. : British Small Animal Veterinary Association, 2013, p. 139.

EMERGENCY ACTION GUIDELINES

PARACETAMOL (ACETAMINOPHEN) POISONING

THIS DOCUMENT IS INTENDED FOR USE AS A GUIDELINE ONLY. DOSES ARE REFERENCED AS AT THE PUBLICATION DATE. INDIVIDUAL CASES AND TOXIC DOSES MAY VARY.

SUSPECTED/WITNESSED/CONFIRMED INGESTION

Diagnosis based on history of ingestion, compatible clinical signs & laboratory findings

TOXICITY

DOG
Toxicity occurs at >50mg/kg
Hepatic necrosis at >100mg/kg[1]
Methaemoglobinaemia at >200mg/kg[1]
Rarely: renal injury

CAT
Any dose potentially toxic!
Methaemoglobinaemia occurs at >10mg/kg
Rarely: hepatotoxicosis

Some medications can upregulate CYT P450 therefore make the animal more susceptible to toxicity (e.g., phenobarbital[2])

DOGS

LIVER NECROSIS
(the main presentation)[3,4]

Icterus, increased liver enzymes (AST commonly first to rise) hepatic encephalopathy, coagulation disorders.

CLINICAL SIGNS

Cyanosis, muddy brown mucous membranes, lethargy, anorexia, respiratory distress (tachypnoea/dyspnea), pulmonary oedema, weakness, hypothermia, vomiting, oedema (face & paws), pigmenturia, jaundice, coma, seizures
Early signs from 4-7hrs, late signs 2-7days post exposure:
METHAEMOGLOBINAEMIA: 1-4hrs post exposure, lasting 12-48hrs (or until death if not treated within 18-36hrs)
HEPATOTOXICOSIS: occurring approx. 24-48hrs post exposure
RENAL INJURY (rare): occurs 24-48hrs post onset of liver failure
DECREASED TEAR PRODUCTION: (documented in dogs) detected 48-72hrs post exposure[5]

CATS

METHAEMOGLOBINAEMIA
(the main presentation)[3,4]

CYANOSIS and/or MUDDY BROWN MUCOUS MEMBRANES
Brown tinge to whole blood, Heinz Body anaemia and haemolytic anaemia.

ASYMPTOMATIC

TREAT ANY EXPOSURE!

SYMPTOMATIC

SYMPTOMATIC

INDUCE EMESIS

Dogs: Emedog @ 0.1mg/kg SC
Cats: Alpha 2 agonist[6,7]

ADMINISTER ACTIVATED CHARCOAL (AC)

Carbodote Prime: (AC + sodium sulphate), single administration.
Due to enterohepatic recirculation, this should be followed by[1]:
Carbodote Repeat: (AC only), every 4-6 hours for 24-48 hours.
(Refer to packaging for instructions on how much to administer)

SUPPORTIVE TREATMENT

- 02 supplementation
- Cage Rest
- If clinical signs of anaemia blood transfusion (whole blood or packed red blood cells)[1]
- IV Fluids

ADJUNCTIVE TREATMENT

SPECIFIC TREATMENT (replenish glutathione levels)

CRUCIAL

ADDITIONAL

NAC (N-ACETYLCYSTEINE)

- NAC has been shown to reduce methaemoglobinaemia and Heinz Body anaemia in cats[8] and increase elimination in dogs[9]

NAC is available as 200mg/ml solution and should be diluted to a 5% solution (50mg/ml) to avoid phlebitis*.

- 140-280mg/kg+ given slowly IV over 15-20 minutes[10]
- Follow with further 70mg/kg slow IV every 6 hours for at least 5-7 doses[10]

+Note: Depending on dose of paracetamol consumed or evidence of methaemoglobinaemia..

PROTOCOL CAN BE ADMINISTERED PO IF NO OTHER OPTION, DILUTE THE N-ACETYLCYSTEINE to 5% solution to avoid oesophagitis/vomiting

*1ml of 200mg/ml NAC + 3ml of 5% dextrose or 0.9% NaCl = 5% NAC solution)

SAMe (S-ADENOSYLMETHIONINE)

- SAMe has demonstrated beneficial effects in the management of acetaminophen toxicity in both cats[11] and dogs[12].

Dogs: At least 10mg/kg PO q24hs[16]
Cats: 100mg/cat PO q24h[16]

METHAEMOGLOBINAEMIA REVERSAL

Vitamin C (ascorbic acid) @ 30-40mg/kg SC or PO q6hrs for 7 treatments[10]

SILYMARIN

Silymarin may be beneficial as an adjunct therapy in acetominophen toxicosis[14]

MONITOR

HAEMATOCRIT
(Methaemoglobinaemia resolves within 5-7 days)
LIVER PARAMETERS
(during hospital stay and immediately after)-repeat after 2-3 weeks to monitor progress
GLUCOSE/ALBUMIN/ RENAL PARAMETERS & TEAR PRODUCTION
for 1-2 weeks[5]

PROGNOSIS

Prognosis is generally good with prompt treatment. Where higher doses of acetaminophen have been ingested, or there is a delay in treatment and hepatotoxicity or methaemoglobinaemia has developed, the prognosis is poor-guarded.[1]

USEFUL CONTACTS

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- Activated charcoal helps in the adsorption of multiple undesirable substances[6]
- Available as liquid or gel
- Repeated adminstrations will be required for substances that are enterohepatically recycled
- Take a look at our range of activated charcoals

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EMERGENCY ACTION GUIDELINES

PYRETHRIN (PYRETHROID) POISONING

SUSPECTED/WITNESSED/CONFIRMED INGESTION/DERMAL APPLICATION

ASYMPTOMATIC

GASTROINTESTINAL DECONTAMINATION

INDUCE EMESIS
IN CASE OF RECENT INGESTION AND UNALTERED MENTAL STATUS

Dogs: **Emedog** @ 0.1mg/kg SC
Cats: Alpha 2 agonist[4]

ADMINISTER ACTIVATED CHARCOAL (AC) (ORAL INGESTION ONLY)

Carbodote Prime: (AC + sodium sulphate), single administration.
(Refer to packaging for instructions on how much to administer)

MONITOR

Suggest hospitalisation for 24 hours to monitor for development of symptoms. Initiate supportive care as necessary

PYRETHROIDS (E.G., PERMETHRIN, ALLETHRIN)

Toxic dose: Minimal toxic dose is unknown, toxicity can be seen with exposure to small amounts[1,2]

Clinical signs: May occur within minutes – 72 hours

Mild-moderate signs:
Hypersalivation, mild tremors, hyperexcitability or depression, vomiting and diarrhoea, paraesthesia (e.g., ear twitching, paw licking, repeated contractions of the superficial cutaneous musculature), mydriasis

Severe signs:
Disorientation, hyperthermia, muscle fasciculations, ataxia, temporary blindness, generalised weakness, respiratory distress, tremors, seizures, urinary retention[3]

DERMAL DECONTAMINATION

! If symptomatic, ensure tremors are controlled first as handling may potentiate tremor or seizure activity !

- Wear gloves and bathe the patient with lukewarm water and washing up liquid
- Dry the patient after bathing to avoid hypothermia
- If necessary, clip the fur to ensure adequate decontamination
- Use a buster collar to prevent oral ingestion from coat/skin

SYMPTOMATIC

CONTROL MUSCLE TREMORS[3,5,6]

Methocarbamol @ 55-220mg/kg IV @ rate no more than 2ml/min (maximum dose 330mg/kg/day IV as it can cause respiratory muscle depression)

IV route preferred, however can be given PO or IR (note: delayed action via these routes).

- 20-45mg/kg PO q8h (do not exceed 330mg/kg/day)[7]
- 100-150mg/kg crushed and administered with water rectally, repeated q4-8hrs as required

Ziapam (diazepam) @ 0.5-2.0mg/kg IV

CONTROL SEIZURES[1,3,8]

Ziapam (diazepam) @ 0.5mg/kg IV bolus (up to 3 doses at least 10 minutes apart)

Phenobarbital @ 12mg/kg loading dose slow IV. If required, 4-6mg/kg slow IV 20 mins later (max 2 doses, 20min apart)

Propofol Bolus of 1-4mg/kg to effect followed by CRI of 0.1-0.4mg/kg/min

+/- gaseous anaesthesia

INTRAVENOUS LIPID EMULSION[2,6,9]

(obtain baseline blood samples first)
Intralipid 20% @ 1.5ml/kg IV bolus over 1-5 minutes, followed by CRI @ 0.25ml/kg/min over 30-60 minutes. Can be repeated 1-2 times if no improvement
(note: efficacy of lipid soluble anti-seizure medications may be reduced by ILE)

RECOVERY

- Slowly withdraw anticonvulsant medication, monitoring for responsiveness to external stimuli and recurrence of tremor/seizure activity
- Reduce the propofol/inhalant anaesthetic dose by 25% every 2 hours until the patient is completely weaned and seizure free
- During withdrawal, patients may start to paddle their legs, which can be confusing in the seizure recovery phase. To help differentiate seizure activity, check for signs of salivation and orofacial muscle twitching. The patient may also be placed in sternal recumbency – if the paddling stops, this is suggestive of drug withdrawal
- To help manage marked agitation/paddling consider:
  - dexmedetomidine or medetomidine 1 µg/kg IV[7] or acepromazine 5µg/kg IV

LABORATORY SAMPLES

Baseline blood samples usually non-specific
- Increased CK (due to increased muscle activity)
- Possible evidence of dehydration and azotaemia
- Hypoglycaemia may be present if tremors/seizures are prolonged

Urinalysis can help to distinguish pre-renal and renal azotaemia. Myoglobinuria may be present from long lasting seizure activity and this could lead to acute renal failure

Toxicological testing no practical diagnostic tests available for pyrethroid intoxication

Acid-base status may reveal respiratory acidosis due to hypoventilation

PYRETHRIN KEY FACTS

- Toxicosis typically occurs in cats following incorrect topical application of a canine spot-on, or through contact with a recently treated dog or dog's bedding[3]
- Permethrin undergoes minimal enterohepatic recirculation (although other pyrethroids may be more extensively recirculated)[1]
- Cats are very susceptible but pyrethrins have a low toxicity in dogs
- Hypothermia may exacerbate the clinical signs of toxicity[1]

Prognosis
- Good in mildly tremoring patients. Most recover within 2-3 days
- In more severely affected cases, survival rates can be good if patients receive early, aggressive management and continuous supportive care
- Poor if treatment is delayed or uncontrollable seizure activity

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- Packs contain 6 x 2ml vials of 5mg/ml





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AT-014-A3

EMERGENCY ACTION GUIDELINES

TREMORGENIC MYCOTOXINS POISONING

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SUSPECTED / CONFIRMED MOULDY FOOD/GARBAGE INGESTION

SOME MYCOTOXINS CAN ALSO CAUSE LIVER FAILURE - MONITOR

ASYMPTOMATIC

INDUCE EMESIS

Emedog @0.1mg/kg SC
UNLESS CONTRAINDICATED

ADMINISTER ACTIVATED CHARCOAL (AC)

Carbodote Prime: (AC + sodium sulphate), single administration.

Due to suspected enterohepatic recirculation, this should be followed by:[1]

Carbodote Repeat: (AC only), every 4-6 hours for 24-48 hours.

(Refer to packaging for instructions on how much to administer)

FUTURE MONITORING

1-2 WEEKS LATER

Consider running a blood profile
if possibility of toxin affecting liver (aflatoxin)[5]
CBC, biochemistry (inc. hepatic enzymes, cholesterol, bilirubin, bile acid stimulation) and urinalysis

FUTURE MONITORING AND INVESTIGATION DEPENDING ON THE SUSPECTED TOXIN, THE LEVEL OF EXPOSURE AND PREVIOUS VALUES

ONLY IF VERY MILD SYMPTOMS

HYPERTHERMIA
EXHAUSTION
DEHYDRATION
METABOLIC ACIDOSIS (MILD)
RHABDOMYOLYSIS (RARE)

LEADING TO

SYMPTOMATIC

Clinical signs usually occur within 30 minutes, but can be delayed.[1,2,3]

RESTLESNESS, PANTING, EXCESSIVE SALIVATION, MILD TO MODERATE WHOLE-BODY MUSCLE TREMORS, HYPERSENSITIVITY TO EXTERNAL STIMULI (TOUCH/NOISE), SEIZURES, NYSTAGMUS, ATAXIA, VOMITING, DIARRHOEA, COLLAPSE, TACHYCARDIA

CONTROL TREMORS +/- SEIZURES
(OBTAIN IV ACCESS AS SOON AS POSSIBLE)

CONTROL TREMORS

Methocarbamol @ 55-220mg/kg IV[1] @ rate no more than 2ml/min (maximum dose 330mg/kg/day IV as can potentially cause respiratory muscle depression)

IV route preferred, however can be given PO or IR (note: delayed action via these routes)

- 20-45mg/kg PO q8h (do not exceed 330mg/kg/day)[4]
- 100-150mg/kg crushed and administered with water rectally, repeated q4-8hrs as required

Ziapam (diazepam) @ 0.5-2.0mg/kg IV

CONTROL SEIZURES

Ziapam (diazepam) @ 0.5mg/kg IV bolus (up to 3 doses at least 10 min apart)

Phenobarbital @ 12mg/kg loading dose slow IV. If required, 4-6mg/kg slow IV 20 mins later (max 2 doses, 20min apart)

Propofol Bolus of 1-4mg/kg to effect followed by CRI of 0.1-0.4mg/kg/min

CONSIDER INTRAVENOUS LIPID EMULSION

Intralipid 20% @ 1.5ml/kg IV bolus over 1-5 minutes, followed by CRI @ 0.25ml/kg/min over 30-60 minutes. Can be repeated 1-2 times if no improvement

(note: efficacy of lipid soluble anti-seizure medications may be reduced by ILE)

Supportive treatment

- IVFT
- Manage HYPERTHERMIA (if present). Stop active cooling once temperature reaches 39.4°C to avoid hypothermia
- Ongoing management of the tremors/seizures

MINIMUM DATABASE

CBC, biochemistry, electrolytes, acid-base, urinalysis

GA + GASTRIC LAVAGE
(IF SYMPTOMS MEAN EMESIS IS CONTRAINDICATED, OR IF SUSPECT STOMACH NOT FULLY EMPTIED FOLLOWING EMESIS)

May be useful in patients already anaesthetised for seizure management[1]
Followed by Carbodote administration via stomach tube before waking up the patient
(Refer to 'Administer activated charcoal' box)

Most animals recover within 24-48hrs
(in severe cases up to 4-5 days)
WITHOUT AGGRESSIVE TREATMENT
THE ANIMAL MAY DIE

5-7 DAYS AFTER THE DISCHARGE FROM THE CLINIC

USEFUL CONTACTS

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Reference: 1. Schell, M.M. (2000). Tremorgenic Mycotoxin Intoxication. Veterinary Medicine; 95 (4) 285-286. **2.** Boysen, S. R., Rozanski, E. A., Chan, D. L., Grobe, T. L., Fallon, M. J., & Rush, J. E. (2002). Tremorgenic mycotoxicosis in four dogs from a single household. *Journal of the American Veterinary Medical Association, 221*(10), 1441–1420.
3. Eriksen, G. S., Jäderlund, K. H., Moldes-Anaya, A., Schönheit, J., Bernhoft, A., Jaeger, G., Rundberget, T., & Skaar, I. (2010). Poisoning of dogs with tremorgenic Penicillium toxins. Medical mycology, 48(1), 188–196. **4.** Allerton, F. (2023). Small Animal Formulary, 11th Edition. Part A: Canine and Feline. *British Small Animal Veterinary Association.*
5. Hussein, H. S., & Brasel, J. M. (2001). Toxicity, metabolism, and impact of mycotoxins on humans and animals. *Toxicology, 167*(2), 101–134. **6.** TVM329CarbAd.

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EMERGENCY ACTION GUIDELINES

VITAMIN D POISONING

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SUSPECTED/WITNESSED/CONFIRMED INGESTION

Diagnosis based on history, clinical signs and biochemistry aberrations

TOXIC DOSES

Calcipotriol (contained in psoriasis creams): 0.01mg/kg

Cholecalciferol (Vitamin D3) found in supplements: 0.5mg/kg (20,000 IU/kg)[2]

ASYMPTOMATIC

INDUCE EMESIS

Dogs: Emedog @ 0.1mg/kg SC

Cats: Alpha 2 agonist[1]

ADMINISTER ACTIVATED CHARCOAL (AC)

Carbodote Prime: (AC + sodium sulphate), single administration*.

Due to enterohepatic recirculation, this should be followed by:

Carbodote Repeat: (AC only), every 4-6 hours for 24-48 hours

(Refer to packaging for instructions on how much to administer)

*Do not use Carbodote Prime if dehydrated. These patients often have vomiting/diarrhoea and are at risk of acute kidney injury, therefore its use should be cautious.

SYMPTOMATIC

CLINICAL SIGNS

May occur 6 – 36 hours following ingestion

Initial signs are vague and non-specific:

- Polyuria and polydipsia
- Anorexia
- Lethargy, weakness, recumbency
- Profuse vomiting and diarrhoea

Once total serum calcium levels rise above 3.0mmol/L (usually 24-36 hours post ingestion), signs become more pronounced:

- Ataxia
- Dyspnoea, tachypnoea
- Muscle spasms, twitching and convulsions

In severe cases, deposition of calcium in the tissues may cause:

- Renal insufficiency/failure
- Haematemesis and haemorrhagic diarrhoea from calcification of the gastrointestinal tract
- Dysrhythmias (initial tachycardia then bradycardia, ventricular arrhythmias)
- Hypercalcaemic cardiac failure may occur if total serum calcium concentration is >3.5mmol/L
- Death can occur from acute renal failure or calcification of tissues

CONTROL TREMORS AND/OR SEIZURES

Ziapam (diazepam)

Skeletal muscle spasms: @ 0.5-2.0mg/kg IV

Seizures: @ 0.5mg/kg IV bolus (up to 3 doses at least 10 min apart)

TAKE BASELINE BLOOD SAMPLES

Common findings (changes may not occur until 12-72 hours post ingestion):

- Elevation in phosphorus concentration (>1.7mmol/L from 12-72 hours, and can precede hypercalcaemia)
- Elevation in total serum calcium (Dog: >3.0mmol/L Cat: >2.7mmol/L)
- Elevation in ionised calcium (Dog: >1.45mmol/L Cat: >1.4mmol/L)
- Rising values of urea and creatinine can be indicative of acute kidney injury and impending azotaemia
- Metabolic acidosis
- If vitamin D toxicity is suspected but not confirmed, measurement of blood PTH, PTHrp and ionised calcium can help to differentiate other causes of hypercalcaemia

TREATMENT

1. If total serum calcium level is <3.0mmol/L and the patient is asymptomatic, perform decontamination and then monitor the complete blood count and serum biochemistry daily for 4 days. If values stay within reference range and the patient remains asymptomatic, no further monitoring or treatment is required[3]

2. If total serum calcium concentration is >3.0mmol/L (dog) or >2.7mmol/L (cat), or a toxic dose has been ingested, or the patient is showing clinical signs, treatment should be initiated

- The goal of treatment is to keep the total serum calcium within normal limits, ionised calcium <1.3mmol/L, and phosphorus <2.3mmol/L
- **IVFT: NaCl (0.9%)** at 2-3x maintenance (+ potassium supplementation as required)

If hypercalcaemia develops:

- **Furosemide** once hydration status has been corrected (initial IV bolus of 0.66mg/kg followed by 0.5mg/kg/hour CRI)
- **Corticosteroids** (prednisolone 1-2mg/kg PO every 12 hours)

If hypercalcaemia does not resolve with the above treatments, consider adding in:

- **Bisphosphonates** (Pamidronate: Dogs 0.65-2mg/kg; Cats 1-2mg/kg given IV as an infusion with 0.9% NaCl over 4 hours). Calcium levels should reduce within 24-48 hours[4]

OR*

- **Calcitonin** (4-6IU/kg SC every 6-8 hours, continue until serum total calcium stabilises <3.0mmol/L which can take 3-4 weeks)[4]

*Do not give bisphosphonates and calcitonin together or sequentially.

OTHER CONSIDERATIONS

- Maintain oxygenation/respiratory function
- Monitor urine output (normal UOP 1-2ml/kg/hr) and perform urinalysis (USG may become isosthenuric)
- Monitor electrolytes and acid base status and treat accordingly
- In symptomatic patients monitor the patient's ECG
- Radiography to check for signs of tissue mineralisation
- Antiemetics as necessary
- Gastroprotectants (e.g., omeprazole)
- Phosphate binders for animals with hyperphosphataemia that are eating (aluminium hydroxide 30-90mg/kg/day divided and given PO with meals)

VITAMIN D KEY FACTS

- Causes of toxicosis: human psoriasis creams containing vitamin D compounds, rodenticides containing cholecalciferol, vitamin D supplements and plants containing glycosides of calcitriol
- Selontra® is a rodenticide containing 0.075% cholecalciferol (0.75mg/g). It comes in 20g blocks. Treatment is required if ≥0.67g/kg is ingested.
- All cases should be treated aggressively
- Vitamin D compounds are lipophilic but due to their long half-life the use of lipid infusions can't be recommended
- Signs may last for weeks as a result of lipid storage and slow elimination of vitamin D metabolites
- **Prognosis** is good if treatment is started early and calcium concentrations are controlled, poor if clinical signs are severe/advanced and if tissue calcification has occurred
- In adult animals, the product of serum total calcium and phosphorus concentrations (measured in mmol/L) can help to predict if tissue mineralisation will occur. If [Ca] x [P] is >6-7, there is an increased risk of soft-tissue mineralisation[4]
- Survivors may develop chronic renal failure due to tissue calcification

ONGOING CARE

- IV fluids should be continued until the calcium concentration has normalised and then slowly decreased
- Total and ionised serum calcium should be monitored every 12 hours, then once daily for 4 days or more (depending on clinical signs)
- Once the calcium concentration has stabilised, calcium, phosphorus and renal function should be assessed at 24, 48 and 72 hours and then 2-3 times a week for 2 weeks and finally once a week for 2 weeks after the cessation of treatment
- Switch to oral dosing of furosemide and taper over 2-4 weeks (stop sooner if hypocalcaemia develops)
- Taper prednisolone dose over 2-4 weeks
- Phosphate binders may be required for 4 weeks
- In dogs, if calcium levels start to rise, saline diuresis should be restarted and a single repeat dose of bisphosphonate given (5-7 days after the first)
- A low phosphorus, low calcium diet should be given for 4 weeks
- Avoid sunlight (as UVB causes cholecalciferol formation)
- If renal impairment occurs, treat appropriately

USEFUL CONTACTS

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ZIAPAM

- The first veterinary licensed injectable diazepam for dogs and cats
- Packs contain 6 x 2ml vials of 5mg/ml



DON'T FORGET ACTIVATED CHARCOAL!

- Activated charcoal helps in the adsorption of multiple undesirable substances[6]
- Available as liquid or gel
- Repeated adminstrations will be required for substances that are enterohepatically recycled
- Take a look at our range of activated charcoals

THE CARBODOTE RANGE

Carbodote is a complementary feed.

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EMEDOG, 1 mg/ml, solution for injection for dogs contains Apomorphine. Legal category POM-V. For the induction of emesis in dogs. **Ziapam 5mg/ml solution for injection for cats and dogs** contains Diazepam. Legal category POM-V (Sch. 4).
In cats and dogs for the short-term management for convulsive disorders and skeletal muscle spasms of central and peripheral origin. As part of a pre-anaesthetic or sedation guidelines. Please refer to the product packaging and leaflets for information about side effects, precautions, warnings and contra-indications.
Use medicines responsibly. www.noah.co.uk/responsible For further information and to view the full Summary of Product Characteristics, please contact TVM-UK Animal Health Ltd, Kirtlington Business Centre, Slade Farm, Kirtlington, Oxfordshire, UK. OX5 3JA. **Tel.** 0800 0385868. **Email** help@domespharma.co.uk. Dômes Pharma is the trading name of TVM UK Animal Health Ltd. Prescription decisions are for the person issuing the prescription alone.

Reference: 1. Harvey, A, Tasker, S (eds.) (2013) BSAVA Manual of Feline Practice. Gloucester: British Small Animal Veterinary Association Pp. 139. **2.** Peterson, M.E, Fluegeman, K (2013) Cholecalciferol. Topics in Companion Animal Medicine 2013; 28 p24-27. **3.** Peterson, M.E (2013) Toxicological decontamination. In: Peterson, M.E, Talcott, P.A, eds. Small Animal Toxicology 3rd edition. St Louis, Missouri: Elsevier Saunders, 2013; pp73-85. **4.** Alonzi, C, Tappin, S (2018). Approaching the hypercalcaemic patient. Veterinary Journal Ireland April 2018; Vol 8 No.4. p234-240 **5.** TVM329CarbAd

AT-012-A3

EMERGENCY ACTION GUIDELINES

XYLITOL POISONING

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SUSPECTED OR WITNESSED INGESTION

- Xylitol is a potent stimulator of insulin release in dogs, resulting in hypoglycaemia
- Fast absorption, peak plasma concentration approx. 30 min following ingestion[1]
- Hypoglycaemia within 1hr (but may be delayed to 12-48hrs)
- Hepatotoxicity can occur at doses >0.5g/kg and is idiosyncratic Hepatic failure typically occurs between 9-72 hrs post-ingestion and can occur in patients that do not develop an initial hypoglycaemia[2,3,4]

CALCULATING AN EXPOSURE DOSE*:

- **CHEWING GUM: If xylitol is the first sugar alcohol listed = dose will be the total amount of sugar alcohol per piece of gum; if not - assume 0.3-1g of xylitol/piece[2]**
- **BAKED GOODS/POWDERED XYLITOL: assume 1 cup of xylitol approx. 190g[2]**
- **XYLITOL MAY BE LISTED AS E-NUMBER E967 OR KNOWN AS BIRCH SUGAR**
- **XYLITOL can also be found in sugar free confectionery, oral care products (e.g., toothpaste) as well as some medications and supplements**

ASYMPTOMATIC

>0.05G/KG[1]

note: hypoglycaemia has been reported in ingestion of 0.03g/kg so decontamination <0.05g/kg should be considered.[3]

> 0.5G/KG

monitor for signs of liver toxicity

HOSPITALISATION

INDUCE EMESIS

Emedog @0.1mg/kg SC (unless contraindicated)

CHECK BLOOD GLUCOSE

High carbohydrate diet orally
(if 0.05-0.5g/kg of Xylitol exposure)

5% IV Dextrose infusion even if blood glucose normal on presentation
(if >0.5g/kg of Xylitol exposure)[4]

CONTINUE TO MONITOR BLOOD GLUCOSE Q 1-2HRS FOR 12HRS[1]

BLOOD GLUCOSE STABLE

NO → PLACE IV CATHETER BOLUS OF GLUCOSE IV

YES

DISCONTINUE TREATMENT 24 HOURS AFTER INITIAL EXPOSURE

IDEALLY

TEST LIVER VALUES 24HRS AND 72HRS AFTER THE EXPOSURE

SYMPTOMATIC

Clinical signs related to hypoglycaemia and/or hepatic dysfunction; lethargy, vomiting, ataxia, tremors, collapse and seizure activity; petechiae, ecchymoses and gastrointestinal haemorrhage (if coagulopathy present).

BLOOD GLUCOSE + ELECTROLYTES

- Blood glucose (normal 3.3-6.3mmol/L)
- Ideally CBC (although non-specific)
- Biochemistry (in particular hepatic markers)
- Electrolytes (hypokalaemia, initial hypophosphataemia and subsequent hyperphosphatamia common)
- Coagulation profile (PT, aPTT)

HYPOGLYCAEMIA

PLACE IV CATHETER BOLUS OF GLUCOSE IV

Administer 0.25-5g/kg of 50% dextrose/glucose IV over 10 minutes (i.e., 0.5-1ml/kg of 50% solution).

Dilute 1:4 with 0.9% NaCl, Hartmann's or water for injection

FOLLOWED BY

5% DEXTROSE/GLUCOSE IV INFUSION (CRI)

(EASY CALCULATION: 100ML OF 50% DEXTROSE/GLUCOSE TO 1LITRE OF IV FLUID AFTER REMOVING 100ML FROM IV FLUID BAG)

MONITOR BLOOD GLUCOSE Q 1-2HRS + MONITOR ELECTROLYTES + PHOSPHORUS Q 4-6HRS

CONSIDER LIVER PROTECTANTS

SAMe, Silymarin, N-acetylcysteine, Vitamin E
(not evidence-based but potential benefit)

SIGNS OF HEPATOPATHY

NO → CONTINUE CRI UNTIL SYMPTOMS RESOLVE

YES → CONTINUE GLUCOSE CRI AND RULE OUT OTHER CAUSES OF ACUTE LIVER FAILURE

Increased liver enzymes, hypoalbuminaemia, hypocholesterolaemia, decreased BUN, hyperammonaemia, hyperbilirubinaemia.

Coagulopathy may occur secondary to hepatic failure or disseminated intravascular coagulation (DIC). Monitor for signs; petechiation, ecchymosis, suspected GI bleed, HCT drop, increase in PT & aPTT, decreased fibrinogen

Once asymptomatic and glucose stable-continue for 24hrs and reassess.

Including other hepatotoxic agents (acetaminophen, aflatoxins, Amanita mushrooms, blue-green algae, sago palms, heavy metals such as iron, copper, and zinc)

TREAT ACUTE LIVER FAILURE ACCORDINGLY

(including plasma transfusion/replacement of coagulation factors & Vitamin K1)

Prognosis is poor to guarded in cases of acute hepatic failure, requiring early aggressive treatment[5]. Hyperphosphosphataemia is a negative prognostic indicator[5].

RULE OUT OTHER CAUSES OF HYPOGLYCAEMIA

Insulin overdose, oral hypoglycaemia medication overdose, B-blockers, anabolic steroids, ethanol, sepsis, hepatic failure (PSS, cirrhosis), starvation, fasted small/toy breed dogs, hunting dog hypoglycaemia, pregnany/neonatal hypoglycaemia, glycogen storage disease, hypoadrenocorticism, insulinoma, growth hormone deficiency, and neoplasia.

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Reference: 1. Murphy, L. A., & Coleman, A. E. (2012). Xylitol toxicosis in dogs. The Veterinary clinics of North America. Small animal practice, 42(2), 307–vii. **2.** Dunayer, E.K. (2006). New findings on the effects of xylitol ingestion in dogs. Vet Med; 12:791–796 **3.** DuHadway, M. R., Sharp, C. R., Meyers, K. E., & Koenigshof, A. M. (2015). Retrospective evaluation of xylitol ingestion in dogs: 192 cases (2007-2012). Journal of veterinary emergency and critical care (San Antonio, Tex. : 2001), 25(5), 646–654. **4.** Dunayer, E. K., & Gwaltney-Brant, S. M. (2006). Acute hepatic failure and coagulopathy associated with xylitol ingestion in eight dogs. Journal of the American Veterinary Medical Association, 229(7), 1113–1117. **5.** Murphy, L. A., & Dunayer, E. K. (2018). Xylitol Toxicosis in Dogs: An Update. The Veterinary clinics of North America. Small animal practice, 48(6), 985–990.

AT-006-A3.

EMERGENCY ACTION GUIDELINES

BLUE-GREEN ALGAE POISONING

SUSPECTED/WITNESSED/CONFIRMED EXPOSURE

- Blue-green algae, also known as cyanobacteria thrive in a warm environment (typically from May to September) and **all cases should be reported to the Environment Agency.**
- They form blooms (excessive bacterial growth) in warm, stagnant water bodies e.g. lakes and ponds, often appearing as blue-green or greenish-brown scum/mats on the water surface. Blooms typically accumulate near shorelines making them more accessible to animals.[1,4]
- Many (but not all) cyanobacteria species produce toxins (cyanotoxins) that are harmful to animals. The two main types of cyanotoxins are neurotoxins (anatoxins) and hepatotoxins (microcystins and nodularins).
- These toxins have a high acute toxicity. Any exposure requires immediate veterinary intervention.[2,5]
- Exposure can occur through drinking or swimming in contaminated water, or by licking their fur after contact. Toxicity has been reported in dogs following ingestion of blue-green algae supplements.[4]
- As toxins are released after cell death, treatment of water to eliminate blue-green algae can temporarily increase the risk of toxicity to animals.[4]

ASYMPTOMATIC

GUT DECONTAMINATION

INDUCE EMESIS
UNLESS CONTRAINDICATED

Only if ingestion was recent (< 1 hour) and the patient is asymptomatic.[4]

Dogs: Emedog @ 0.1mg/kg SC

Cats: alpha 2 agonist[3]

ADMINISTER ACTIVATED CHARCOAL (AC)

- **Carbodote Prime:** (AC + sodium sulphate) once.

Due to potential enterohepatic recirculation,[1] this should be followed by:

- **Carbodote Repeat** or **Carbodote Liquid** (AC only) every 4-6 hours for 24-48 hours.

  (refer to packaging for instructions on how much to administer)[1]

DERMAL DECONTAMINATION

- Stabilise the symptomatic patient first.
- Wash skin and fur thoroughly.
- Wear protective clothing (risk of dermatitis).

SYMPTOMATIC

CLINICAL SIGNS[1,2,4,5]

Clinical signs depend on the type of cyanobacteria and toxin. More than one type could be involved at the same time.

It is not possible to identify the species by visual inspection. Confirmation of exposure (e.g. vomit or stool samples) is rarely performed due to the rapid onset of signs.

Gastrointestinal effects:

- Salivation, vomiting, haematemesis, abdominal pain, sometimes diarrhoea.

Dermal effects:

- Rarely dermatitis, pruritus, urticaria.

Neurotoxins:

- Rapid onset of signs (within minutes, up to 1 hour). Sudden death is possible.
- Muscle tremors, muscle rigidity, ataxia, paralysis, seizures, bradycardia, respiratory failure.

Hepatotoxins (most common):

- Signs usually within 24 hours. Dehydration, vomiting, inappetence, lethargy, hypotension, haemorrhage, pale or icteric mm., anuria, renal impairment, liver failure with coagulopathy. Death may occur within a few hours-days due to hypovolaemic shock.

LABORATORY FINDINGS[2,4]

Establish baseline. Monitor regularly

- Elevated liver enzymes, BAs, bilirubin (within 24 hours)
- Prolonged clotting times, thrombocytopenia
- Hypoalbuminaemia
- Hypoglycaemia
- Elevated BUN, creatinine. Low USG

DIFFERENTIAL DIAGNOSES[2,4]

Neurotoxins: metaldehyde, bromethalin, tremorgenic mycotoxins, theobromine, permethrin

Hepatotoxins: xylitol, paracetamol, aflatoxins, Death Cap mushroom (amatoxin)

TREATMENT

There is no specific antidote. Treatment is aimed at aggressive supportive care.[2,4]

IV fluids: Rate based on signs of hypotension, hydration, shock and oliguria.

Antiemetics, gut protectants, nutritional support (as needed).

Analgesia: Avoid NSAIDs.

Urinary catheterisation: if oliguria / anuria

Neurotoxins:

- **Mechanical ventilation:** for respiratory depression.
- **Ziapam (Diazepam):** tremors (0.5-2mg/kg IV) or seizures (0.5mg/kg IV up to 3 times, 10 mins apart).
- **Atropine:** If cholinergic signs e.g. hypersalivation, bradycardia.[4]

Hepatotoxins:

- **Liver protectants:** Acetylcysteine (see paracetamol guideline) and/or SAMe 20mg/kg orally every 24 hours.[4,6]
- **Dextrose:** If hypoglycaemic. 0.5–1ml 50% dextrose slow IV over 10 mins then recheck.
- **Vitamin K1:** if coagulopathy is present.
- **Blood transfusion:** If required.

PROGNOSIS

- Prognosis is generally guarded. Toxicity is often fatal.[2,5]
- Surviving patients may be left with chronic hepatitis or renal failure.[4]
- For patients with only dermatological signs prognosis is good.[4]

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References: 1. CNITV (Centre National d'Informations Toxicologiques Vétérinaires). Monographie – Les intoxications animales aux cyanobactéries. 2023. **2.** Peterson ME, Talcott PA. (2006) Small Animal Toxicology. Second Edition. Saunders Elsevier, p.685-689. **3.** Harvey, A., & Tasker, S. (Eds.). (2013). BSAVA Manual of Feline Practice. Gloucester: British Small Animal Veterinary Association, p. 139. **4.** Cyanobacteria (blue-green algae) exposure in dogs. Bates, Nicola. 2021. The Veterinary Nurse, pp. 271-277. **5.** Blue-green algae exposure in dogs. BSAVA/VPIS Guide to Common Canine and Feline Poisons. S.l.: British Small Animal Veterinary Association, 2017. **6.** Allerton F. (2023) Small Animal Formulary, 11th Edition Part A: Canine and Feline. British Small Animal Veterinary Association

EMERGENCY ACTION GUIDELINES

ALPHA-CHLORALOSE POISONING

SUSPECTED/WITNESSED/CONFIRMED EXPOSURE

Alpha-chloralose is a toxic compound currently used as a rodenticide and as an anaesthetic in laboratory animals. Restrictions on anticoagulant rodenticides have led to an increased use of alpha-chloralose, resulting in higher exposure among non-target species. At low doses, alpha-chloralose causes increased motor activity while higher doses produce characteristic CNS depression.[1,2]

- A provisional diagnosis can often be made based on the patient's history and clinical signs. In some cases, abdominal radiography may aid in identifying bones of ingested rodents in the gastrointestinal tract.[3]
- Alpha-chloralose can be detected in serum, urine, stomach contents, or directly in the bait sample (if provided).[1,3,4]
- The minimum lethal dose (LD) is 600-1000mg/kg bodyweight (BW) in dogs and approximately 100mg/kg BW in cats.[1,3]
- There is no antidote or specific treatment for alpha-chloralose poisoning. Treatment is supportive and symptomatic, and may include gut decontamination, temperature support, and anticonvulsants. [3,5]

ASYMPTOMATIC

EMESIS INDUCTION OR GASTRIC LAVAGE IS RECOMMENDED WITHIN 4 HOURS OF INGESTION.[3]

INDUCE EMESIS
UNLESS CONTRAINDICATED

Dogs: Emedog @ 0.1mg/kg SC
Cats: alpha 2 agonist[6]

PERFORM GASTRIC LAVAGE
IF EMESIS IS CONTRAINDICATED

ADMINISTER ACTIVATED CHARCOAL (AC)[3,7]
ORALLY IN CONSCIOUS ANIMALS ONLY, OR VIA STOMACH TUBE UNDER GA

- **Carbodote Prime:** (AC + sodium sulphate), single oral administration.
- (Refer to packaging for instructions on how much to administer).

SUPPORTIVE CARE[2,3,7]

Hypothermia: active warming using warm IV fluids, warming blankets, heat pads, or heat lamps. Ensure even heat distribution to prevent burns.

Hyperthermia: may occur secondary to seizures; patients may require active cooling.

Respiratory changes (e.g. bradypnoea): administer oxygen therapy.

In severely affected or profoundly sedated patients:

- Oxygen therapy - intubate if necessary
- Close monitoring of vital signs: pulse, respiratory rate, blood pressure and temperature
- Consider placement of a urinary catheter
- Lubricate eyes every 4-6 hours
- Gently clean oral secretions as needed
- Rotate patient every 4 hours

SYMPTOMATIC

CLINICAL SIGNS [2,3,5,7]

- Clinical signs typically develop within 1-2 hours and may persist for 1-3 days.
- **At low doses:** ataxia, hyperactivity, salivation, tremors, and drowsiness.
- **At high doses (severe cases):** hypothermia (more common in cats), respiratory changes (e.g. bradypnoea), bradycardia, weak pulse, convulsions, and coma.
- Death may occur as a consequence of respiratory failure.

CONTROL TREMORS[2,9]

- **Ziapam (diazepam):** 0.5-2mg/kg IV.
- **Methocarbamol:** 55–220 mg/kg, slow IV (no more than 2ml/min)[8] or 20-45mg/kg PO q8h (do not exceed 330mg/kg/day).

CONTROL SEIZURES[2,5,7,9]
REFER TO OUR STATUS EPILEPTICUS GUIDELINE

- **Ziapam (diazepam):** 0.5mg/kg IV bolus (up to 3 doses, 10 minutes apart).
- **Phenobarbital**: 12mg/kg loading dose slow IV, then up to two doses of 4-6mg/kg slow IV, 20 minutes apart (care as may cause respiratory depression).
- **If seizures are uncontrolled, consider the use of Levetiracetam or a third line anti-seizure medication:**
- **Propofol:** 1-4mg/kg IV bolus to effect followed by CRI of 0.1-0.4mg/kg/min.
- **Levetiracetam:** 30-60mg/kg IV bolus every 8 hours or CRI of 5mg/kg/hr (or higher to effect).
- Intravenous lipid emulsion therapy has not been shown to impact the progression of clinical signs.[10]

RECOVERY[3,4,5]

- The average duration of hospitalisation is less than 48 hours, regardless of intoxication severity.
- Recovery typically occurs within 1-4 days following the onset of clinical signs.
- Prognosis is favourable with prompt treatment and close monitoring.

THIS DOCUMENT IS INTENDED FOR USE AS A GUIDELINE ONLY. DOSES ARE REFERENCED AS AT THE PUBLICATION DATE. INDIVIDUAL CASES AND TOXIC DOSES MAY VARY.

USEFUL CONTACTS

DÔMES PHARMA
Your partner in poisoning.
www.domespharma.co.uk | **T** 0800 0385868 | **E** help@domespharma.com

VETERINARY PATHOLOGY GROUP
Toxicology testing.
www.thevpg.co.uk | **T** 0113 2870175

VETERINARY POISONS INFORMATION SERVICE (VPIS)
Dedicated poisoning information service.
www.vpisglobal.com | **T** 0207 30 55 055

TOX BOX/ELIXIR SERVICE
Immediate access to emergency poisoning products.
www.vpisglobal.com | **T** 0207 30 55 055

PRODUCTS

EMEDOG
- Veterinary licensed apomorphine for dogs
- Packs of 5 or 20 x 1ml vials, with a 4-year, unopened shelf life

ZIAPAM
- The first veterinary licensed injectable diazepam for dogs and cats
- Packs contain 6 x 2ml vials of 5mg/ml





DON'T FORGET ACTIVATED CHARCOAL!

- Activated charcoal helps in the adsorption of multiple undesirable substances
- Available as liquid or gel
- Take a look at our range of activated charcoals

THE CARBODOTE RANGE

Carbodote is a complementary feed.

THE ANTI-TOX RANGE
BE PREPARED FOR POISONING

TO FIND OUT MORE ABOUT THE ANTI-TOX RANGE FROM DÔMES PHARMA, VISIT WWW.DOMESPHARMA.CO.UK

DP | DÔMES PHARMA

Carbodote is a complementary feed. **Emedog, 1 mg/ml, solution for injection for dogs** contains Apomorphine. Legal category POM-V. For the induction of emesis in dogs. **Ziapam 5mg/ml solution for injection for cats and dogs** contains Diazepam. Legal category POM-V CD SCHED 4. In cats and dogs for the short-term management for convulsive disorders and skeletal muscle spasms of central and peripheral origin. As part of a pre-anaesthetic or sedation guidelines. **Use Medicines Responsibly. www.noah.co.uk/responsible.** For further information and to view the full Summary of Product Characteristics, please contact TVM-UK Animal Health Ltd, Kirtlington Business Centre, Slade Farm, Kirtlington, Oxfordshire, UK. OX5 3JA. **Tel.** 0800 0385868. **Email** help@domespharma.com. Dômes Pharma is the trading name of TVM UK Animal Health Ltd. Prescription decisions are for the person issuing the prescription alone.

References: 1. Windahl, Ulrika, et al. "Alpha-chloralose poisoning in cats in three Nordic countries-the importance of secondary poisoning." BMC Veterinary Research 18.1 (2022): 334. **2.** Alphachloralose exposure in dogs. BSAVA/VPIS Guide to Common Canine and Feline Poisons. (2017): 6. **3** Diplovets. Alpha-chloralose poisoning in dogs and cats. **4**. Tegner, Cecilia, et al. "Alpha-chloralose poisoning in cats: clinical findings in 25 confirmed and 78 suspected cases." Journal of feline medicine and surgery 24.10 (2022). **5.** Segev, Gilad, et al. "Alpha-chloralose poisoning in dogs and cats: a retrospective study of 33 canine and 13 feline confirmed cases." The Veterinary Journal 172.1 (2006): 109-113. **6.** Harvey, Andrea, et al. BSAVA Manual of Feline Practice. Gloucester: British Small Animal Veterinary Association (2013): 139. **7.** El-Bahri, Lotfi. "Canine chloralose toxicosis case." (2020): 6-6. **8.** DeClementi, Camille. "Prevention and treatment of poisoning." Veterinary Toxicology. Academic Press (2018): 1141-1159. **9.** Allerton, Fergus. Small Animal Formulary, 11th Edition Part A: Canine and Feline. British Small Animal Veterinary Association (2023). **10**. Lundgren, Sandra, et al. "Alpha-chloralose poisoning in 25 cats: clinical picture and evaluation of treatment with intravenous lipid emulsion." Journal of Feline Medicine and Surgery 26.4 (2024).

THE EPILEP3Y SYSTEM

STATUS EPILEPTICUS GUIDELINES

STATUS EPILEPTICUS

Seizure lasting >5 minutes in duration
or
2 or more seizures with incomplete recovery of consciousness interictally

Assess airway, breathing, circulation

Obtain rapid IV access

Start anti-seizure medication quickly

Attempt to determine cause of seizures

Use **'Status epilepticus triage'** form from Dômes Pharma

- Toxin or unintentional drug exposure?
- Medication history (e.g., insulin)?
- Evidence of head trauma?
- Metabolic disease and/or electrolyte imbalance?
- Is there previous history of epilepsy (idiopathic or acquired)?

Take blood samples

- Minimum: PCV/TP, biochemistry, glucose, electrolytes
- Assessment of anti-seizure medication serum levels
- Toxicological screening

Treat specific causes of the seizure as appropriate. If prognosis deemed immediately hopeless consider euthanasia

Suspected liver disease or portosystemic shunt?

NO

YES

Second-line medication[1]

Levetiracetam* 30-60mg/kg IV bolus q8 hrs[2]

Uncontrolled seizures

Levetiracetam* CRI @ 5mg/kg/hr IV (or higher to effect)[2]

Control of seizures

Start oral maintenance therapy as required

Consider the use of Levetiracetam* or a third-line anti-seizure medication[1]

- **Third-line: Propofol IV**
- Bolus of 1-4 mg/kg to effect followed by CRI of 0.1 - 0.4 mg/kg/min[2]
- **+/- Inhalational gas anaesthesia** if required
- The propofol dose can be decreased by 25% every two hours until the patient is completely weaned and seizure free
- **Consider Ketamine or Dexmedetomidine IV** if seizure activity has lasted >30 mins[1]

Other considerations

- **Airway**– check patency, intubate if necessary
- **Oxygenation and ventilation** – provide 100% O2
- **Circulation** – place on IVFT, replace fluid losses and maintain hydration (care with NaCl in patients on potassium bromide therapy as this will increase its excretion via the kidneys)
- **Blood pressure** – maintain MAP at 80-100 mmHg to maintain cerebral blood flow
- **Treatment of hyperthermia** (cool water bathing, IVFT, fans – stop active cooling when temperature reaches 39.4°C to prevent development of hypothermia)
- **Correction of ongoing acid base and electrolyte abnormalities**
- **ECG monitoring for cardiac arrhythmias**
- **Urine monitoring for myoglobinuria**
- **Turning recumbent patients**
- **Eye lubrication**
- **Attention to increased intracranial pressure** Signs include: stupor or coma, abnormal pupil diameter and response to light, bradycardia with arterial hypertension

If IV route initially unavailable

Rectal diazepam @ 0.5-1mg/kg (double dose if on chronic PB)

OR **Midazolam rectal or intranasal***

Uncontrolled seizures

First-line medication: Benzodiazepines[1]

Diazepam ziapam.

@ 0.5mg/kg IV (double dose if on chronic PB)

OR **Midazolam IV***

Repeat after 10 minutes for up to 3 doses

Uncontrolled seizures

Diazepam CRI 0.5-2mg/kg/hr
OR **Midazolam CRI***

Consider the use of a second-line anti-seizure medication in patients poorly responsive to the first or second dose of benzodiazepine[1]

Patient on chronic phenobarbital therapy?

NO

Phenobarbital @ loading dose of 12mg/kg slow IV

followed 20 minutes later by maximum of 2 further doses of 4-6 mg/kg slow IV given 20 minutes apart (if required)[2]

YES

Phenobarbital @ 4-6 mg/kg slow IV

(take blood for phenobarbital level assessment prior to administering)[2]

Uncontrolled seizures

* these medications are not currently licensed for dogs and cats

soliphen.

- Now available as 15mg, 60mg and 120mg to allow for more accurate dosing across a range of patient sizes
- Unique divisible tablets
- Pork liver flavour to aid compliance
- Pack size of 60



And... with proven bioequivalence to the market leading phenobarbital tablet[3]

vetbromide.

- The only potassium bromide product licensed for adjunct and monotherapy use in the UK!
- 600mg divisible by 4
- Packs of 60, blister packed tablets
- Extended shelf life (4 years)



ziapam.

- Licensed for both dogs and cats.
- 5mg/ml intravenous injection.
- Presented in packs containing 6 x 2ml vials.
- Licensed for short-term control of convulsive disorders and muscle spasms of central and peripheral origin.
- Also licensed as part of a sedation or pre-anaesthetic guidelines.



Separate guidelines available
soliphen. vetbromide. ziapam.

Soliphen® 15mg, Soliphen® 60mg and Soliphen® 120mg tablets for oral use in dogs. Tablets contain phenobarbital and can be divided into halves and quarters for Soliphen® 60mg and 120mg, and into halves for Soliphen® 15mg Legal category POM-V. For the prevention of seizures due to generalised epilepsy in dogs. Vetbromide® 600mg tablets for dogs contains potassium bromide. Legal category POM-V. An antiepileptic agent for use in the control of idiopathic epileptic seizures, either as a single agent or adjunct to phenobarbital in the control of refractory cases of idiopathic epilepsy. Ziapam® 5mg/ml solution for injection for cats and dogs contains Diazepam. Legal category POM-V. In cats and dogs for the short-term management for convulsive disorders and skeletal muscle spasms of central and peripheral origin. As part of a pre-anaesthetic or sedation protocol. Please refer to the product packaging and leaflets for information about side effects, precautions, warnings and contra-indications. 1. Charalambous, Marios, et al. "ACVIM Consensus Statement on the management of status epilepticus and cluster seizures in dogs and cats." Journal of veterinary internal medicine (2023). 2. Allerton, F. (2023). Small Animal Formulary, 11th Edition. Part A: Canine and Feline. British Small Animal Veterinary Association. 3. TVM Study A123737. Pivotal bioequivalence study of two formulations of phenobarbital in the dog. ®Registered trademarks of the Dômes Pharma Group of companies.

Use medicines responsibly. www.noah.co.uk/responsible. Prescription decisions are for the person issuing the prescription alone.

For further information and to view the full Summary of Product Characteristics, please contact Dômes Pharma. Dômes Pharma is the trading name of TVM-UK Animal Health Ltd, Kirtlington Business Centre, Slade Farm, Kirtlington, Oxfordshire, UK. OX5 3JA. Tel. 0800 0385868. Email help@domespharma.com. EPI-015-A3

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MEDICINE GLOSSARY

Acepromazine: *Seizure recovery – management of marked agitation/paddling*
Bolus 5µg/kg IV

Aluminium Hydroxide: *Hyperphosphataemia*
30-90mg/kg/day divided and given PO with meals

Apomorphine (Emedog): *Emesis in dogs (see dexmedetomidine, medetomidine & xylazine for cats)*
0.1mg/kg SC

Atropine: *Bradyarrhythmia*
0.01-0.03mg/kg IV

Buprenorphine: *Analgesia*
Dogs: 0.02mg/kg IV, IM, SC q6h[1]
Cats: 0.02–0.03mg/kg IV, IM, SC q6h.
Also well tolerated and effective when given oral transmucosally[1]

Calcitonin: *Hypercalcaemia*
4-6IU/kg SC every 6-8 hours, continue until serum total calcium stabilises <3.0mmol/L which can take 3-4 weeks

Dexmedetomidine: *Emesis in cats (see also; medetomidine & xylazine/alpha-2 agonists)*
7mcg/kg IM.[2]

Dexmedetomidine: *Seizure recovery – management of marked agitation/paddling*
Bolus 1µg/kg IV

Diazepam (Rectal): *Seizures*
0.5-1mg/kg (double dose if on chronic phenobarb therapy)

Diazepam (Ziapam): *Seizures*
0.5mg/kg IV, repeated up to 3 times, 10min apart (double dose if on chronic phenobarb therapy)
For uncontrolled seizures: Continuous rate infusion (CRI) 0.5-2mg/kg/hr

Diazepam (Ziapam): *Tremors*
0.5-2.0mg/kg IV

Ethanol: *Ethylene Glycol Toxicity*
CRI: Calculate how much ethanol you need to add to a 1000ml bag of fluids, to make a 7% solution:
NUMBER OF MLS TO BE ADDED = 7% x 1000ml/% of available ethanol (e.g. 40% vodka)
(to achieve 7% ethanol solution one needs to add 175ml of 40% ethanol to the 1000ml bag of fluids *REMOVING 175ML OF FLUID FROM THE BAG FIRST*)
Consider using 5% dextrose 0.9% NaCl fluids (do not use lactated Ringer's or Ringer's fluids)
Give 8.6ml/kg of 7% ethanol as an initial bolus and follow by CRI at 1.43ml/kg/hr for 48hrs

Boluses: Make 20% ethanol solution (dilute vodka 40% 1:1 with sterile saline. Always dilute 20% ethanol further to minimum 1:2 with sterile saline before administration as a bolus.
DO NOT ADMINISTER IN RINGER'S OR LACTATED RINGER'S FLUIDS.
Dogs: 5.5ml/kg of 20% ethanol (DILUTED minimum 1:2 solution) IV q4hrs for 5 treatments then q6hrs for 4 treatments.
Cats: 5ml/kg of 20% ethanol (DILUTED minimum 1:2 solution) q6 hrs for 5 treatments then q8hrs for 4 treatments.

Fomepizole: *Ethylene glycol toxicity*
Dogs: 20mg/kg IV infusion over 30 min initially, then 15mg/kg IV slowly over 15-30 min 12h and 24h later, then 5mg/kg IV q12h until ethylene glycol concentration is negligible or the dog has recovered. Most effective if started within 8 hours of intoxication.[1]
Cats: 125mg/kg slow IV then 31.25mg/kg IV q12h for 3 additional doses. Efficacy has been shown if treated within 3 hours of ingestion.[1]

Furosemide: *Hypercalcaemia*
Initial IV bolus of 0.66mg/kg followed by 0.5mg /kg/hour CRI
2-4 mg/kg PO q8hrs (titrate to patient)[1]

Glucose (Dextrose): *Hypoglycaemia*
0.25-5g/kg of 50% dextrose/glucose IV over 10 minutes (i.e., 0.5-1ml/kg of 50% solution).
Dilute 1:4 with 0.9% NaCl, Hartmann's or water for injection
Followed by: 5% Dextrose/Glucose IV Infusion (CRI)

Intralipid 20%: *Intravenous lipid emulsion*
1.5ml/kg IV bolus over 1-5 minutes, followed by CRI @ 0.25ml/kg/min over 30-60 minutes. Can be repeated 1-2 times if no improvement

Levetiracetam: *Seizure Control*
30-60mg/kg IV bolus q8 hours
Uncontrolled seizures: 5mg/kg/hr IV (or higher to effect)

Lidocaine: *Premature ventricular contractions*
(initially slow IV) bolus of 2-8mg/kg in dogs followed by a CRI of 0.025-0.1mg/kg/min

Maropitant: *Anti-emetic for vomiting*
Dogs: 1mg/kg IV or SC q24h or 2mg/kg PO q24h
Cats: 1mg/kg IV, SC or PO q24h

Medetomidine: *Emesis in cats (see also; dexmedetomidine & xylazine / alpha-2 agonists)*
5-20mcg/kg IM/IV.[3]

Medetomidine: *Seizure recovery – management of marked agitation/paddling*
Bolus 1µg/kg IV

Methocarbamol: *Tremors/mild seizures*
55–220mg/kg, slow IV (no more than 2ml/min) or 20-45mg/kg PO q8h (do not exceed 330mg/kg /day), 100-150mg/kg crushed and administered with water rectally, repeated q4-8hrs as required. IV route preferred, however can be given PO or IR (note: delayed action via these routes).

Metoclopramide: *Anti-emetic for vomiting*
0.25-0.5mg/kg IV, IM, SC, PO q12h or 0.17-0.33mg/kg IV, IM, SC, PO q8h or 1-2mg/kg IV over 24 hours as a constant rate infusion.

Metoprolol: *Tachycardia (see also Propranolol/ ß blockers)*
0.5-1mg/kg PO q8h in dogs or 0.2–0.4mg/kg slow IV

Misoprostol: *Gastroprotectant*
2-5µg/kg PO q8-12hours (dog), 5µg /kg PO q8 hours (cat)

NAC (N-Acetylcysteine): *Hepatotoxicity*
NAC is available as 200mg/ml solution and should be diluted to a 5% solution (50mg/ml) to avoid phlebitis. (1ml of 200mg/ml NAC + 3ml of 5% dextrose or 0.9% NaCl = 5% NAC solution)
- 140-280mg/kg+ given slowly IV over 15-20 minutes
- Follow with further 70mg/kg slow IV every 6 hours for at least 5-7 doses

+Note: Depending on dose of paracetamol consumed or evidence of methaemoglobinaemia.
PROTOCOL CAN BE ADMINISTERED PO IF NO OTHER OPTION, DILUTE THE N-ACETYLCYSTEINE to 5% solution to avoid oesophagitis/vomiting

Omeprazole: *Gastroprotectant*
Dogs: 0.5–1.5mg/kg IV, PO q12-24h for a maximum of 8 weeks.[1]
Cats: 0.75–1mg/kg PO q24h for a maximum of 8 weeks.[1]

Pamidronate: *Hypercalcaemia*
Dogs 0.65-2mg/kg; Cats 1-2mg/kg given IV as an infusion with 0.9% NaCl over 4 hours. Calcium levels should reduce within 24-48 hours

Phenobarbital: *Status Epilepticus*
loading dose of 12mg/kg slow IV followed 20 minutes later by maximum of 2 further doses of 4-6 mg/kg slow IV given 20 minutes apart (if required)
If patient on chronic phenobarbital therapy: 4-6 mg/kg slow IV

Prednisolone: *Hypercalcaemia*
1-2mg/kg PO every 12 hours

Propofol: *Seizure control*
Bolus of 1-4mg/kg to effect followed by CRI of 0.1-0.4mg/kg/min

Propranolol: *Tachycardia (see also Metoprolol/ ß blockers)*
0.02-0.08mg/kg, slow IV

Pyridoxine (Vitamin B6): *Ethylene glycol toxicity*
1-2mg/kg SLOW IV q6hrs. Dose & efficacy of supplemental Pyridoxine has not been fully established

Ranitidine: *Gastroprotectant*
Dogs: 2mg/kg slow IV, SC, PO q8-12h[1]
Cats: 2mg/kg/day constant IV infusion, 2.5mg/kg IV slowly q12h, 3.5mg/kg PO q12h[1]

SAMe (S-Adenosylmethionine): *Hepatotoxicity*
Dogs: At least 10mg/kg PO q24h
Cats: 100mg/cat PO q24h

Silymarin (Silybin, Milk Thistle, Silibinin): *Paracetamol & Xylitol toxicity*
Therapeutic dosage is unknown, but suggested doses range from 50-250 mg/kg PO q24h.
Refer to individual products for dosing advice.[1]

Sucralfate: *Gastroprotectant*
Dogs: 500mg/dog PO q6-8h (dogs up to 20 kg); 1-2g/dog PO q6-8h (>20 kg)
Cats: 250mg/cat PO q8-12h

Vitamin B1 (Thiamine): Ethylene glycol toxicity
100mg/dog IM SC PO q24h

Vitamin C (Ascorbic Acid): *Methaemoglobinaemia Reversal*
30-40mg/kg SC or PO q6hrs for 7 treatments

Vitamin E: *Xylitol toxicity*
Dogs: 1.6-8.3mg/kg PO q24h for the first 30 days, then as needed. An alternative dose is 100-400 IU/dog.
Cats: 1.6-8.3 mg/kg PO for the first 30 days, then as needed. An alternative dose is 30 IU/cat.

Vitamin K1 (Vitamivet K1: *Rodenticide toxicity*
Injection: 5mg/kg SLOW IV. Repeat dose 12-18 hours later if necessary
Oral: 5mg/kg PO q24h

Xylazine: *Emesis in cats (see also; dexmedetomidine & medetomidine / alpha-2 agonists)*
0.44mg/kg IM/SC.[4]

1. Allerton, F. (2023). Small Animal Formulary, 11th Edition. Part A: Canine and Feline. British Small Animal Veterinary Association
2. Thawley, V. J., & Drobatz, K. J. (2015). Assessment of dexmedetomidine and other agents for emesis induction in cats: 43 cases (2009-2014). Journal of the American Veterinary Medical Association, 247(12), 1415-1418.
3. BSAVA/VPIS Guide to Common Canine and Feline Poisons, appendix: decontamination.
4. Willey, J. L., Julius, T. M., Claypool, S. P., & Clare, M. C. (2016). Evaluation and comparison of xylazine hydrochloride and dexmedetomidine hydrochloride for the induction of emesis in cats: 47 cases (2007-2013). Journal of the American Veterinary Medical Association 248(8), 923-928

References for all other doses can be found on the relevant guidelines contained within this booklet. This document is intended for use as a guideline only. Doses are referenced as at the publication date. Individual cases and toxic doses may vary. Prescription decisions are for the person issuing the prescription alone

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