

Decontaminating the Poisoned Pet

Amanda A Cavanagh, DVM, DACVECC

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In relation to this presentation, I declare I have no conflicts of interest.

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Road Map

- Gastrointestinal
- Vascular
 - Lipids
 - Hemodialysis
 - Hemoperfusion
 - Therapeutic Plasma Exchange

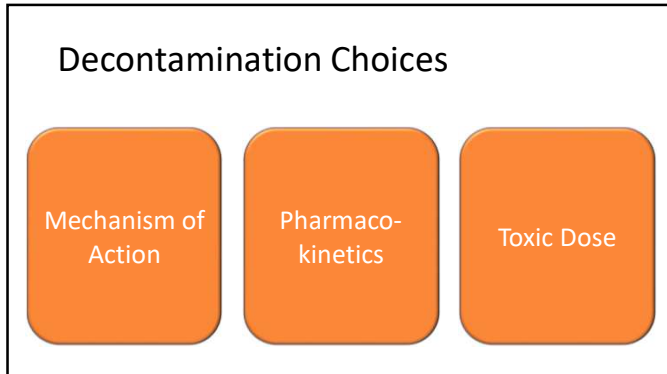
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Objectives

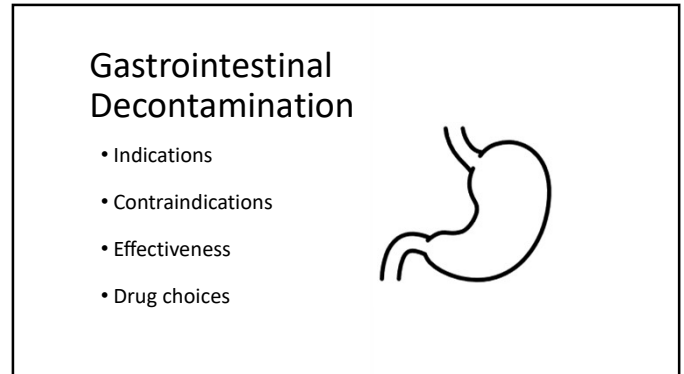
- Recognize patient and toxin specific indications and contraindications for GI decontamination
- Recognize which emetic drugs are used in dogs versus cats
- Describe indications for vascular decontamination



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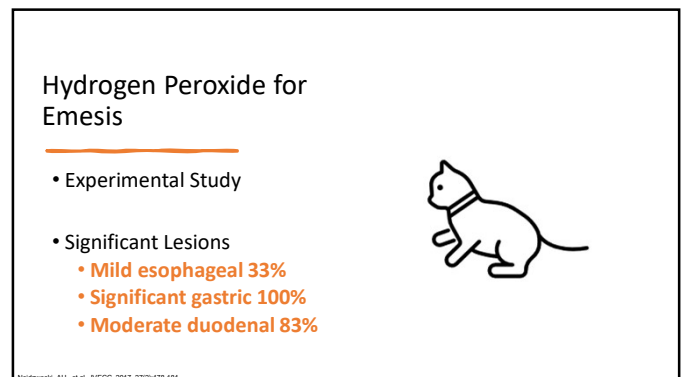
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GI Decontamination: Dogs

- Apomorphine: 0.02-0.04 mg/kg IV or IM
 - D2 Receptors in the CRTZ
- Reverse
 - Sedation: Naloxone*
 - Vomiting: Maropitant
 - **Caution with ondansetron (?)**

Chen et al., Int J of Neuroscience, 2011, 121:45-52
Sedlitz et al., J Pharm Ther, 2008, 31

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GI Decontamination: Dogs

- **Tranexamic Acid:** 50mg/kg IV
 - Anti-fibrinolytic agent
 - Tachykinin neurokinin 1 receptors
- Reverse
 - Vomiting: Maropitant

Kantyka et al., JVECC, 2017, 30:436-441
Kenshalo et al., J Vet Med Sci, 2017, 79:17

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GI Decontamination: Dogs

- **Ropinirole: ocular drop**
 - D2 receptors in the CRTZ
- Wear Gloves
- Adverse Effects
 - Hypotension
 - Tachycardia
 - Tremors, ataxia

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GI Decontamination: Dogs

Vomiting

- **Metoclopramide**
- Maropitant

Dopaminergic Effect:

- **Metoclopramide**

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GI Decontamination: Cats

- Alpha₂ Adrenergic Agonist
 - **Dexmedetomidine 7-10* mcg/kg IV** or IM
 - Xylazine 0.5-1mg/kg IM or SQ
- Emesis Success
 - Dexmedetomidine: 58%-100%
 - Xylazine: 43%-100%



Thawley, VJ. JAVMA. 2015; 247(12):1415-1418
Wilson, HE. JAVMA. 2013; 243(1):103-108
Hansen, M. et al. JVECC. 2017; 26(4):66-70

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GI Decontamination: Cats

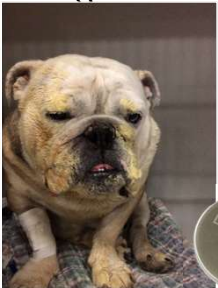
- Adverse Effects
- Reverse
 - Sedation: **Atipamezole**, Yohimbine
 - Vomiting: Maropitant



Thawley, VJ. JAVMA. 2015; 247(12):1415-1418
Wilson, HE. JAVMA. 2013; 243(1):103-108
Hansen, M. et al. JVECC. 2017; 26(4):66-70

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Surgical decontamination



- Batteries
- Bezoars
 - Gorilla Glue, iron tablets, bone meal
- Extended release products
 - Amitraz collars, nicotine patches, fentanyl patches, zinc pennies

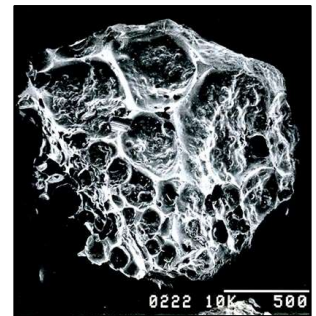


Blackwell's 5 Minute Veterinary Consult Clinical Companion: Small Animal Toxicology. Wiley-Blackwell. 2012

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Activated Charcoal

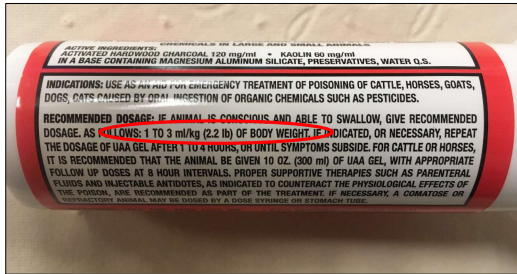
- Single Dose 1-5 g/kg PO
- Multi-dose 1-2 g/kg PO
- Combine with food
- **Cathartics are out (?)**



Koenigshof AN, et al. JVECCB. 2016; 25(5): 656-610
Wilson HE, et al. JVECC. 2013; 23(3):263-267
Miz, et al. JVECC. 2017; 26(4):66-70

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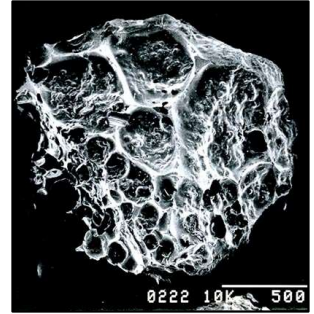
UAA Gel: 0.12 g/ml



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Activated Charcoal

- Single Dose 1-5 g/kg PO
- Multi-dose 1-2 g/kg PO
- Combine with food
- Cathartics are out (?)



Koenigshof AM, et al. JVECCS. 2015; 25(5): 606-610.
 Wilson HE, et al. JVECC. 2013; 23(3):263-267
 Wu et al. JVECC. 2012; 22(1):62-64

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CASE REPORT



Gastrointestinal obstruction secondary to activated charcoal granule impaction in a dog

Kate S. Farrell DVM, DACVECC¹ | Jamie M. Burkitt-Creedon DVM, DACVECC² |
 Laura G. Osborne BVSc, DACVECC¹ | Erin A. Gibson DVM¹ | Anna M. Massie DVM,
 DACVS-SA¹

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Journal of Veterinary Emergency and Critical Care

Original Study

Journal of Veterinary Emergency and Critical Care 25(5) 2015, pp 606-610
 doi: 10.1111/vec.12305

Effect of sorbitol, single, and multidose activated charcoal administration on carprofen absorption following experimental overdose in dogs

Amy M. Koenigshof, DVM, MS, DACVECC; Matthew W. Beal, DVM, DACVECC;
 Robert H. Poppenga, DVM, PhD, DABVT and L. Ari Jutkowitz, VMD, DACVECC

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Activated Charcoal

- Unbound Toxins
 - Alcohols
 - Xylitol
 - Heavy metals (iron, zinc)
- Metaldehyde (slug/snail bait)
- Corrosive and caustic acids/bases (detergents, bleach)
- Petroleum products (kerosene)
- Inorganic toxins (nitrates, ammonia)

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Cholestyramine

- Enterohepatically recirculated toxins
 - 0.1-1 grams/kg q6-8 hours
- Mechanism
 - Binds bile acids to insoluble complexes
- **Caution: may contain xylitol!**

Blackwell's 5 Minute Veterinary Consult: Clinical Companion: Small Animal Toxicology, Wiley Blackwell, 2016
<https://www.blackwell.com/9781119444444/9781119444444.pdf>

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Cholestyramine:
172mg/kg PO q24h

Treatment if liver damage from blue green algae bloom exposure


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Vascular Decontamination

- Intravenous Lipid Emulsion
- Extracorporeal Therapy
 - Hemodialysis
 - Hemoperfusion
 - Therapeutic Plasma Exchange



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Intravenous Lipid Emulsion

- 20% Lipid Emulsion
 - **Iso-osmolar**
- Lipophilic Toxins
- Lipid Sink and Metabolic Theory

Fernandez, AL, et al. JVECC. 2011. 21(4):300-200

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Intravenous Lipid Emulsion

Lidocaine (reverse cardiovasc collapse)	Pyrethrins permethrins (resolution of signs)	Moxidectin ivermectin (return of vision)	Ibuprofen (100% decreased serum conc)
Naproxen (60%-76% decreased serum conc)	Ca Channel Blockers Beta Blockers	Baclofen	Bromethalin (75% decreased serum conc)
	Tremorgenic mycotoxins (reduced recovery time)	Marijuana Cocaine	

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Intravenous Lipid Emulsion

- Technique
 - 2mL/kg IV bolus
 - 0.25 – 0.5 mL/kg/minute CRI for 60 minutes




Fernandez, AL, et al. JVECC. 2011. 21(4):309

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Intravenous Lipid Emulsion

- Technique
- Re-dose?
 - Clear serum
 - 1.5ml/kg IV bolus q4-6hours
 - 0.5 ml/kg/hour until signs improve
 - Don't exceed 24h



Fernandez, AL, et al. JVECC. 2011. 21(4):309


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Intravenous Lipid Emulsion

- Adverse Effects
 - Drug interference
 - Bacteremia
 - Pancreatitis
 - Fat emboli
 - Coagulopathy
 - ARDS


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Intravenous Lipid Emulsion

- Adverse Effects
 - Extravasation
 - Warm compress

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Intravenous Lipid Emulsion

- Adverse Effects
 - Extravasation
 - Warm compress
 - Overdose


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Manual plasma exchange to treat an accidental overdose of intravenous lipid emulsion in a dog with baclofen toxicosis

Steven E. Epstein, DVM*, Kate Hopper, DVM, PhD;

- Hypertriglyceridemia
- Cardiovascular depression
- Hypoglycemia
- AKI
- Intravascular hemolysis
- Coagulopathy

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Intravenous Lipid Emulsion

- Adverse Effects
- **Extravasation**
 - Warm compress
- **Overdose**
 - Unfractionated Heparin 75-250 u/kg SQ q6h
 - Therapeutic plasma exchange

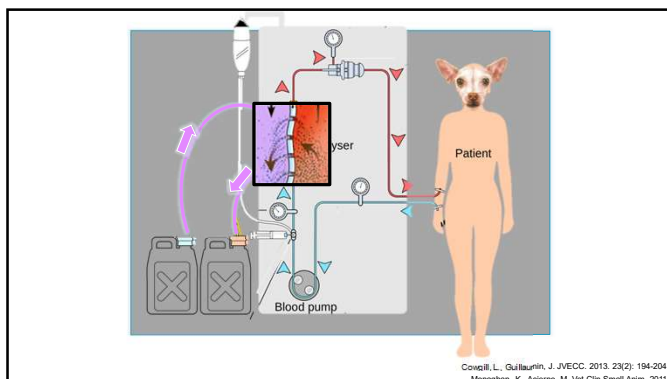
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Extracorporeal Therapies

- Indications
 - Severe, progressive signs
 - Severe consequences
 - Improved plasma clearance
 - Delayed medical treatment
 - Absence of antidotes
 - Acid Base/lyte abnormalities



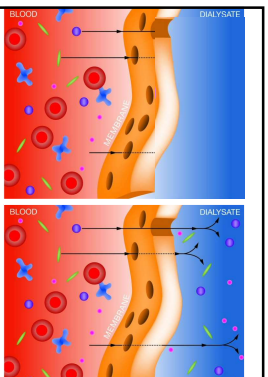
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Hemodialysis

- Ideal Toxin
 - Small molecular size
 - Low protein binding
 - Water soluble
 - Low Vd
 - No first pass hepatic metabolism



Monaghan, K., Acerno, M. Vet Clin Small Anim. 2011

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Hemodialysis

• Ideal Toxin

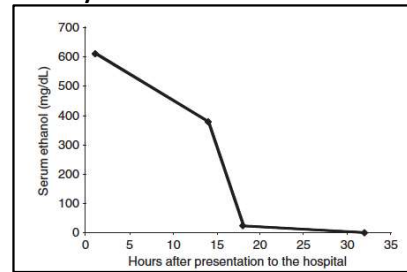
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Monaghan, K., Acerno, M. Vet Clin Small Anim. 2011

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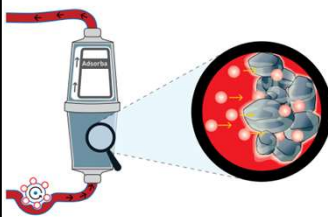
Hemodialysis



Keno, L., Langston, K. JVECC. 2011

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Hemoperfusion



- Adsorbent
- Nonselective, irreversible binding
 - Large MW
 - Highly protein bound
 - Lipid soluble
 - Low Vd

Ghannoun, M. et al. Seminars in Dialysis. 2014. 27(4): 350-361
<http://onlinelibrary.wiley.com/doi/10.1111/sdi.12188>

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Hemoperfusion

- NSAIDs
- Baclofen
- Salicylates
- Barbiturates
- Metaldehyde
- Antimicrobials
- Anti-depressants
- Chemotherapeutics

Photo Credit: Amanda Cavanagh

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Therapeutic Plasma Exchange

- Separate blood to components
 - Discard plasma
 - Replace with donor plasma, crystalloids, colloids
- Remove toxin and byproducts

RBC

WBC
and
Platelets

Plasma

Schub, RC, et al. Seminars in Dialysis. 2023; 201-206
 Mack, RM. Extracorporeal Plasma Exchange for CNS Demyelinating Diseases. May 21, 2014

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Conclusions

- Rapid and early intervention is key
- Toxin MOA and pharmacokinetics matter
- GI decontamination remains essential, even with extracorporeal therapy



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1. Cholestyramine can be used in dogs experiencing blue green algae toxicosis. However, certain formulations of this medication can contain which compound that is toxic to dogs?
 - a. Sucrose
 - b. Xylitol**
 - c. Maltose
 - d. Alcohol

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1. Choose the drug that is ineffective for inducing emesis in cats.

- a. Dexmedetomidine
- b. Xylazine
- c. Apomorphine**
- d. Medetomidine

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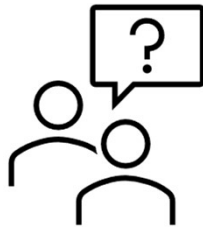
1. Which drug can be used with intralipid emulsion overdose to clear excessive lipids from circulation?

- a. Hetastarch
- b. Unfractionated heparin**
- c. Naloxone
- d. Acepromazine

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Questions?

Amanda.Cavanagh
@colostate.edu



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