

Halley Hemmert

- Took an ROP veterinary assistant class Hired after the externship
- I grew up in Bloomington, CA Started working in veterinary medicine in 2007
- and more
- A french bulldog and a yorkie mix
- I have a passion for critical care, training, and education • Became an RVT in 2021 I have 2 dogs

- For fun I enjoy; traveling, concerts, and trying new restaurants or coffee shops with my wife

• 17 years of experience in general practice, specialty, emergency,



Unveiling the Antidote: A Technician's Guide to Common Toxicities

By Halley Hemmert, RVT

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Common Toxins

- 1. Over-the-counter medications
 - Acetaminophen, NSAIDs, vitamins/supplements
- 2. Human food products
 - Grapes/raisins, xylitol, onions/garlic
- 3. Human prescriptions
 - ADHD, anti-depressants, cardiac
- 4. Chocolate
- 5. Veterinary products
 - Flavored chewable tablets, topical flea/tick products
- 6. Plants and fungi
 - Lilies in cats, poisonous mushrooms, sago palm
- 7. Household products
 - Deoxidizers, batteries, antifreeze (ethylene glycol)
- 8. Rodenticides

9. Insecticides

10. Recreational drugs

• THC and magic (psilocybin/muscarine) mushrooms



Triaging a Toxic Emergency

What do I ask?

- What is the toxin?
- How were they exposed?
 - Ingested, topical, etc.
- When did this happen?
- How much?
- Any medical history or current medications?
- Are there any symptoms yet?
 - Has the patient vomited or has the owner tried to induce vomiting?







PET POISON HELPLINE 800.213.6680 www.petpoisonhelpline.com



Detoxification



Emesis

- Used if toxin was ingested within 2 4 hours
 - For canines: Apomorphine, Clevor
 - Maropitant or metroclopramide for post emesis nausea • For felines: Dexmedetomidine, hydromorphome, or xylazine • Reversal agents: atipamizole, naloxone, and yohimbine Only used when patients are mentally appropriate and have a gag Not recommended if toxin is corrosive or if the patient swallowed anything
- - sharp
 - Hydrogen peroxide should be avoided if possible
 - Not always successful
 - Can cause GI ulcerations
 - Never to be used in cats



- Good option if patient is too obtunded to perform emesis ightarrow
- Patient needs to be anesthetized and intubated ullet
- Measure tube to the last rib
- 60mL/kg of warm H2O at a time to flush GI •
- Once stomach tube is in place can be utilized to give activated ulletcharcoal once flushing is finished
- Be sure to kink tube before removing to help avoid aspiration







Activated Charcoal

- A porous adsorbent that binds to the toxin
- Reduces toxin absorption into the bloodstream
- Available with sorbitol or without sorbitol
 - Sorbitol is a cathartic; laxative to speed up the process of removing the toxin from the body
 - Doses of activated charcoal with sorbitol are not generally repeated to avoid electrolyte imbalances



- For patients that have ingested a large amount of a toxin
- Patients that are experiencing a delayed onset of clinical signs ightarrow
- Helps to stop toxins that entrohepatically recirculate \bullet
 - Toxin will be processed by the liver, excreted into bile and than reabsorbed via the GI tract "recycled"
- Warm water, DSS enemas, or lactulose can be used depending on the toxin
- Enemas should not be used on patients with diarrhea \bullet

Enemas





Intralipids

- A soybean oil emulsion
- Used for fat soluble toxins ightarrow
- Can be administered through a peripheral catheter ightarrow
 - Aseptic technique needs to be used when administering
 - Needs a filter ullet
 - Dispose after 24 hours •
- Log P >1.0 respond to intralipid therapy ightarrow
 - Best results when Log P > 5.0 •
- Monitor serum for lipemia ullet
 - These patients are at risk for developing pancreatitis



Terrin/data	Machanian of action
1 oxin/drug	Mechanism of action
(number of	
reports)	
Permethrin (7)	Voltage-gated sodium
	channel blocker
Ivermectin (9)	Glutamate-gated
	chloride channel
	blocker
Moxidectin (4)	GABA and glutamate-
	gated chloride channel
	blocker
Monensin (1)	Ionophore
Minodoxil (1)	ATP-sensitive
	potassium channel
	opener
Baclofen (5)	Substance P inhibitor,
	GABA agonist
Naproxen (1)	Non-selective COX
	inhibitor
Ibuprofen (1)	Non-selective COX
	inhibitor
Lidocaine (1)	Fast voltage-gated
	sodium channel
	blocker
Diltiazem (1)	Calcium channel
	blocker
Marijuana (1)	Cannabinoid receptor
	agonst



Diuresis

- Flushes out the toxin with crystalloid intravenous fluids
- Protects kidneys and prevents kidney damage
- Corrects dehydration ullet
- 1.5x to 4x maintenance fluid rate
 - Maintenance is 40 60mL/kg/day
- Monitor RR/RE for patient's on high rates of fluids
- Monitor your patients ins and outs closely





Over-the-counter Medications









NSAIDS

- Species affected: Dogs and cats
- Toxin: Ibuprofen, Naproxen, Meloxicam, Asprin
- Common names: Advil, Motrin, Aleve, Metacam
- Usage: Commonly used in humans for shortterm management of pain and fever. Comes in various strengths and formulations and can be found combined with other medications.
- Exposure: Mistakenly dosed by pet owner or ingested by a mischievous pet
- How it works: Inhibits prostaglandins involved in the blood supply to the stomach and kidner

- Early symptoms: Inappetence, vomiting (with or ulletwithout blood), diarrhea, nausea, lethargy, abdominal pain, dark stools, PU/PD
- Progressive signs: Hypothermia, anuria, GI rupture, kidney failure, bleeding/bruising, mentation changes, ataxia, seizures























NSAID Toxicity

Treatment, Monitoring, and Diagnosis

- Emesis (time permitting)
- Activated charcoal administration
- Intravenous fluids
- +/- Intralipid therapy
- Gastrointestinal protectants
 - Misoprostol
 - Omeprazole/pantoprazole
 - Famotadine
 - Cerenia/ondansetron
 - Sucrulfate
- Recheck kidney function on lab work
- Due to enterohepatic recirculation some doctors will also treat with oral cholestyramine
- Diagnosis: specialized testing can be sent to a university





Acetaminophen

- Species affected: Cats and dogs, much lower dose needed for toxic effect in cats
- Toxin: Acetaminophen
- Common names: Tylenol, Excedrin
- Toxic dosages: Cats 10mg/kg, Dogs 75-100mg/kg
- Usage: Used to treat minor aches and pains, and reduces fever. It is available worldwide in a wide variety of strengths and formulas including mixed with other medications.
- Exposure: Mistakenly dosed by pet owner or ingested by a mischievous pet
- How it works: Causes hepatic cell death and necrosis, Heinz body formation, and methemoglobinemia
- Symptoms: Lethargy, vomiting, icterus, bruising/bleeding, tachycardia, respiratory distress, weakness, muddy/cyanotic mucous membranes







Acetaminophen Toxicity

Treatment, Monitoring, and Diagnosis

- Emesis
- Activated charcoal
- Intravenous fluid diuresis
- Hepatoprotectants
 - N-acetylcysteine
 - Denamarin
 - SAMe
- +/- Fresh frozen plasma
- +/- pRBC's
- Vitamin K if indicated
- Serial monitoring of liver values and clotting times
- Severe methemoglobinemia may require treatment with methalyne blue
- Diagnosis: confirmation with testing to university laboratory, co-oximeter or blood spot test to confirm methemoglobinemia





















Human Food Products









Grapes and Raisins & Zante Currents

- Species affected: Dogs and cats
- Toxin: Unknown dose is not a factor
- Exposure: Off the vine, as a treat (mistakenly), mixed in with other food items
- How it works: Exact mechanism is unknown, causes decreased blood flow
 - to the kidneys
- Symptoms: None (initially)
- Advanced symptoms: Vomiting, lethargy, inappetence; usually within 24 hours





Grape and Raisin Toxicity

Treatment, Monitoring, and Diagnosis

- Emesis
- Activated charcoal
- Intravenous fluids for 48 to 72 hours
- Monitoring urine output closely
- If oliguria arises:
 - Mannitol
 - Furosemide
- Recheck kidney values
- Dialysis for progressive azotemia/anuria
- No confirmatory test can be done



Xylitol

- Other common names: Birch sugar, wood sugar, birch bark extract
- Species affected: Dogs
- Exposure: sugar free gum, candies, peanut butters, baked goods, oral hygiene products
- Toxic dosages:
 - 30 mg/kg hypoglycemia (.03g/kg)
 - 500mg/kg liver failure (.5g/kg)
- How it works:
 - Causes a large release of insulin, resulting in severe hypoglycemia.
 - When being broken down in the liver causes hepatic necrosis and failure
- Early symptoms: Lethargy, vomiting
- Progressive symptoms:
 - Hypoglycemia: Ataxia, tremors, seizures
 - Liver failure: Icterus, bruising, melena, abnormal mentation





Xylitol Toxicity

Treatment, Monitoring and Diagnosis

- Emesis
- +/- Activated charcoal (poor absorption)
- Intravenous fluids
 - As Treatment and Monitoring dextrose supplementation
- Liver protectants
 - N-acetylcysteine
 - Denamarin
- Blood glucose monitoring
- Liver enzyme monitoring
- +/- Fresh frozen plasma
- +/- pRBC's
- Vitamin K if indicated
- No confirmatory test







<u>Chocolate</u>



Chocolate

- Toxin: Theobromine, caffeine
- Species affected: Dogs and cats
- Types:
 - White: Minimal
 - Milk: 2mg/g
 - Dark: 5mg/g
 - Baking/Cacao Powder: 14mg/g (or more)
- How it works: increases the amount of circulating catecholamines and increase calcium in the cells in turn increasing muscle contractility
- Toxic dosages:
 - < 20mg/kg: None slight GI signs
 - 20 40mg/kg: GI signs, hyperactivity, possible cardiac
 - 40 60mg/kg: GI signs, agitation, cardiac arrhythmias
 - > 60mg/kg: Seizures



Chocolate Toxicity

Treatment, Monitoring, and Diagnosis

- Emesis
- Activated charcoal
 - Repeated doses to be used due to recirculation
- Intravenous fluids
- Gastrointestinal medications
 - Can develop subsequent pancreatitis
- ECG monitoring
 - Anti-arrhythmic drugs as needed
 - Propranolol
 - Metropolol
 - Atropine
 - Lidocaine

- Sedation as needed
 - Butorphanol
 - Acepromazine
- Anticonvulsants for patients that develop seizures









it develop









Veterinary Products





Pyrethroids

- Toxin: Permethrin \bullet
- Species affected: Cats, dogs only in very high doses
- Common names: Frontline, Advantix, Sergeants, Hartz
- Exposure: Topical (usually inaccurately dosed)
- How it works: Causes an interruption in the opening and closing of the sodium channels the body including the muscle cells resulting in tremors
- Symptoms: Hypersalivation, hyperthermia, tremors, ataxia, weakness, dyspnea, seizures



Pyrethroid Toxicity

Treatment, Monitoring, and Diagnosis

- If ingested:
 - Emesis
 - Activated charcoal
 - Oral irrigation
- If topical:
 - Shave the fur from affected area
 - Bathe multiple times with dish soap
- Active cooling if indicated (stop at 103.5)
- Intravenous fluids
- For tremors:
 - Methocarbamol
- For seizures:
 - Diazepam

- Midazolam
- Phenobarbital
- Intralipids very fat soluble toxin
- No test available





Plants and Fungi





Lilies

- Species affected: Primarily cats, dogs experience mostly GI upset
- Toxin: Unknown all parts of the plant are toxic
- Common types: Tiger lily, Easter lily, Stargazer lily, Japanese lily, Daylily
- "Non toxic" types: Peace lily, Water lily, Peruvian lily, Calla lily
- How it works: Causes acute renal failure
- Symptoms: Salivation, lethargy, vomiting, inappetence



Lily Toxicity

Treatment, Monitoring and Diagnosis

- Emesis
- Activated charcoal
- Bathe to remove any pollen
- Intravenous fluids
- Monitor renal values
 - Including 1-2 days post discharge
- Gastroprotectants if gastritis is present
- Monitor urine output
 - If oliguria arises:
 - Mannitol
 - Furosemide

- Dialysis for progressive
 - azotemia/anuria
- There is no blood or urine test to
 - confirm lily toxicity



Sago Palm

- Species affected: Dogs and cats
- Toxin: Cycasin the seeds of the plant are the most toxic however the whole plant is considered toxic
- Common types: Japanese cycad, coontie, cardboard palm, coontie • plant
- How it works: The body converts cycasin into a more harmful substance called methylazoxymethanol (MAM) which causes liver damage and necrosis
- Early symptoms: Hypersalivation, inappetence, vomiting, diarrhea abdominal distention, jaundice, melena, bruising, seizures, coma
- Progressive signs (Liver failure): Weakness, ataxia, abdominal pain,





Sago Palm Toxicity

Treatment, Monitoring, and Diagnosis

- Emesis
- Activated charcoal
 - Repeated doses to be used due to recirculation
- Intravenous fluids
- Gastroprotectants
 - Omeprazole/pantoprazole
 - Famotadine
 - Cerenia/ondansetron
 - Sucrulfate
- Hepatoprotectants
 - SAMe
 - N-acetylcysteine

- Denamarin
- Monitor liver enzymes



- Hypoglycemia and coaglopathy may
 - develop with liver necrosis
 - Monitor blood glucose
 - Monitor PT/aPTT
- +/- Fresh frozen plasma
- +/- PRBc's
- Vitamin K if indicated
- No diagnostic test for cycasin
 - ingestion

Ethylene Glycol



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Ethylene Glycol

- Sources: Antifreeze, windshield wiper fluid, brake and transmission fluid, wood stains, photograph developing solution
- Species effected: Dogs and cats
- Dose: very small amount can be considered lethal
 - 4.2mL/kg dogs
 - 1.5mL/kg cats
- How it works: liver turns it into oxalic acid, which binds to calcium and forms calcium oxalate crystals which get stuck in the kidneys and lead to acute renal failure
- Symptoms:
 - Stage 1: Mimics ethanol (alcohol) intoxication
 - ataxia
 - vomiting
 - PU/PD

Stage 2: A brief recovery approximately 12 hours after ingestion

 Stage 3: Cats; 12-24 hours post ingestion, Dogs; 36 -72 hours post ingestion

- Kidney failure
 - Oliguria progressing to anuria
- Painful abdomen, enlarged kidneys
- Tachycardia, tachypnea
- Anorexia, vomiting, diarrhea
- Oral ulcers, salivation
- Lethargy
- Seizures
- Coma, death



Ethylene Glycol Toxicity

Treatment, Monitoring, and Diagnosis

- Emesis
 - Gastric lavage, if patient is mentally inappropriate on presentation
- Activated charcoal is not effective
- Intravenous fluids
- Alcohol dehydrogenase
 - 4-methylpyrazole
 - 20% ethanol boluses
 - 30% ethanol CRI
 - Side effects of ethanol: sedation, hypothermia, hypoglycemia, risk for aspiration pneumonia



- Sodium bicarbonate to correct subsequent metabolic acidosis
- Gastrointestinal drugs to treat vomiting/nausea
- Blood glucose monitoring
 - +/- Dextrose supplementation
- Monitoring
 - Calcium levels (iCa)
 - Kidney values
 - Urine output
- Confirmed with serum test strips







Recreational Drugs





Cannabis

- Toxin: Tetrahydrocannabinol (THC)
- Species affected: Dogs and cats
- Exposure: usually ingested orally, available in many different forms.
- How it works: is highly fat-soluble, which means it quickly moves into the brain and other tissues in the body, where it interacts with special parts of cells called cannabinoid receptors causing psychoactive effects
- Symptoms: Lethargy, ataxia, tremors, hypersalivation, dribbling urine, hyperesthesia, bradycardia, hypothermia, vocalization, hypotension





Cannabis Toxicity

Treatment, Monitoring, and Diagnosis

- Emesis if mentally appropriate \bullet
- Activated charcoal
- Intravenous fluids
- Supportive care
 - Heat support
 - Antiemetics
 - Sedatives PRN
- Intralipid therapy THC is a very fat soluble toxin

• Sleeping it off!

• Diagnosis: OTC urine drug screens available but have questionable accuracy in dogs/cats





Prevention

Owner Education

- Unwitting owners often give their OTC medications to their injured or ill pets talk to pet owners about which"human" medications are okay and which ones are poisonous to their pets
 - Also ensure that owners understand how to appropriate dose their pet with these medications
- Some of our favorite snacks are safe to share with our pets and others could be deadly, have information available to help avoid a dangerous mix up
- proof locks.
 - Purchase trashcans with locking lids
 - Hang up purses, jackets, backpacks, and lunchboxes from curious noses
- then lick the chemicals from their paws. Fumes from cleaning products can also cause intoxication.
- Ensure that new plants added to the home or garden are not toxic to pets.
- Use caution and follow directions when using rodenticides, herbicides, or insecticides around pets.

• Remind pet owners to read the label carefully before filling up there pup's Kong with peanut butter as many brands are now using xylitol as a hidden sweetener in products that might otherwise be considered safe • Talk to pet parents about securing chemicals, medications, and hazardous foods out of reach using pet- or child-

Pets can drinks spilled liquids and become ill, but can also get sick if they walk across a freshly mopped floor and



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Thank you!