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UNIVERSITY OF NEW ZEALAND

Small Animal Toxicology

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THE ENGINE OF THE NEW NEW ZEALAND

Outline

- Case of “Shake and Bake”
- GI decontamination in SA toxicities

- Case of “no clots”
- Diagnostic tests in SA Toxicities
- Antidotes in SA Toxicities

- Common SA Toxicities

Case of “Shake and Bake”

7 year old, MC husky, Sam

Presenting Complaint and History

- PC: acute onset tremors and inability to walk
- Hx: Owners left for work in AM and dog fine; returned at noon and found dog with CS so rushed him in
  - Access to property/lifestyle block
  - Queried hx of neurological dz or other metabolic dz; access to toxins

- PE: T: 40.7, HR: 150, MM injected, CRT 1sec, pulses fair and synchronous; full body tremors, lying in lateral recumbency; panting, hypersalivating

Possible Causes

- Tremors and hyperthermia
  - Primary neurological disease (fever vs hyperthermia): infectious, inflammatory, neoplastic (less likely)
  - Primary metabolic diseases (less likely with hyperthermia): hepatopathy, renal disease, hypoglycemia, electrolyte imbalances (hypocalcemia, acute hypernatremia)
  - Toxicity: metaldehyde, strychnine, bromethalin, xylitol, alpha-chloralose

- Historical information important
  - Communication with owners
  - PE findings

Gastrointestinal Decontamination

- Emesis
- Gastric lavage
- Adsorbants

Emesis

- Advantages
  - Most effective: 20-60% yield (up to 70%)
  - Effective emetics: apomorphine, sodium carbonate, xylazine

- Disadvantages
  - Excluded if clinical signs present
  - Time limitations
  - Complications

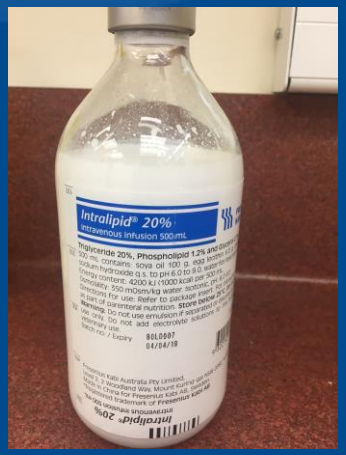
Gastric lavage

- Advantages
  - Not excluded if clinical signs present
  - Reduce systemic absorption by 30-50%

- Disadvantages
  - General anaesthesia required
  - Complications: aspiration pneumonia, others

Adsorbants

- Activated charcoal
  - Carbon particulates with high SA to bind organic compounds
  - Reduce systemic absorption 30-50% +/- enterohepatic circulation of toxins
  - +/- cathartic, multidose AC



- Intravenous lipid emulsion
  - “Lipid sink” for lipophilic compounds +/- other factors
  - Macrocyclic lactones, permethrins, local anaesthetics, mycotoxins, phenobarb, amphetamines, marijuana
  - Pancreatitis and hyperlipidemia, hypersensitivity reactions, effects on therapeutic drugs

More on the case

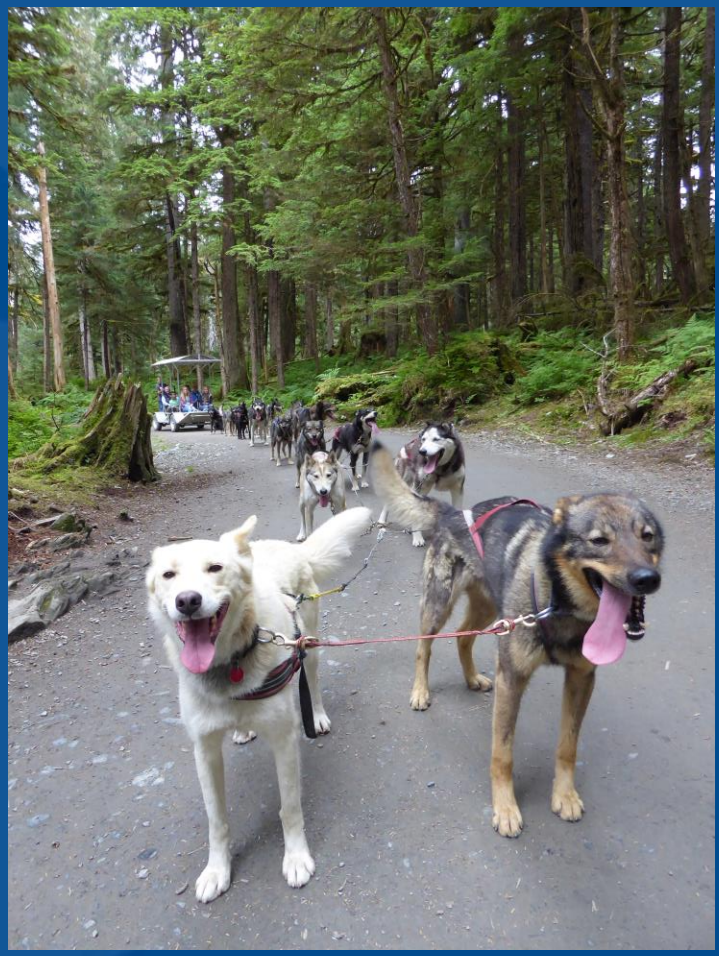
- Supportive and symptomatic care
  - MOA: ↓ inhibitory NT (GABA), ↓ noradrenaline, ↓ serotonin
  - Benzodiazepine CRI,+/- Propofol CRI; multiple drug therapy
  - Monitoring of BP, CO_2, Temperature, other CV and Resp parameters

- After decontamination efforts…

Outcome of the case

- Prognosis with Metaldehyde
  - CS 24-48hrs; LOH 24-72hrs
  - Guarded to Good; mortality ~9-17%

- Concerns and potential complications
  - Hyperthermia (heatstroke) consequences: cell necrosis
  - Respiratory depression
    - Monitoring of effective ventilation
    - IPPV



Another Case: "No Clots"

- Bo, 2y/o MC Laborador Ret.

- Presented for profound and rapid neurological deterioration
- No prior history of illness
- rDVM
  - Stumbling and ataxia, mild obtundation
  - Worsened throughout the day
  - Suspect inflammatory brain disease (phone consultation with neurologist)→referred
  - Administered SC penicillin

Presentation for Referral

- Stuporous to comatose mentation, non-ambulatory

The importance of paying attention…..

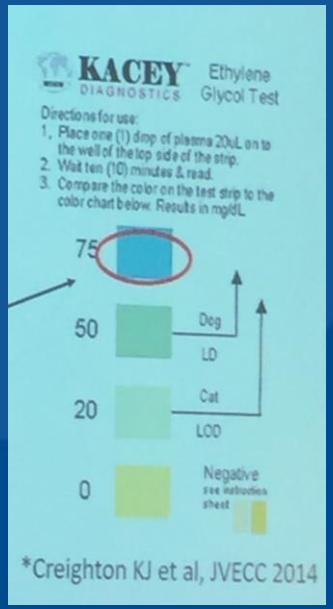
- Upon placement of IV catheter noted excessive bleeding and swelling noted under skin at site of SC injection

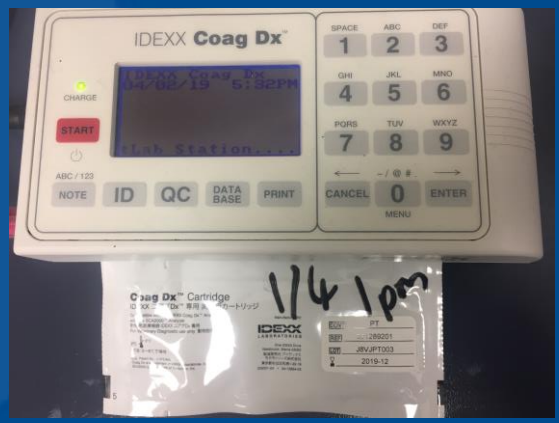
- Bloodwork submitted
  - CBC, Chem, Coag profile

Diagnostic use in toxicities

- Challenging
  - Specific toxicological tests expensive and specific
  - Unknown: suspected toxicity

- Specific use diagnostics beneficial
  - EG tests
  - Coagulation panels (Prothrombin time)
  - Organ dysfunction
  - Glucose



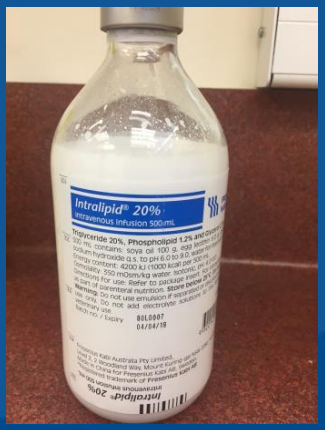


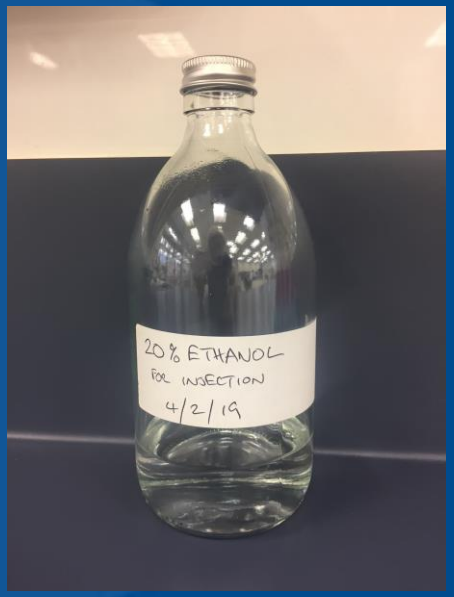
Small Clues….Significant Findings

- CBC: moderate anemia, mild thrombocytopenia, normal WBC
- Chem: mildly elevated liver values
- Coags: very elevated PT, mildly elevated PTT
- Questioned owners about possible rodenticide ingestion
- Suspect intracranial hemorrhage

Antidotes in toxicities

- Uncommon
- Cost prohibitive
- Chemical
  - Lead
  - Iron
- Pharmacological
  - Anticoagulant rodenticides
  - EG or organophosphates





Treatment

- Fresh frozen plasma (FFP) at 10-20mL/kg

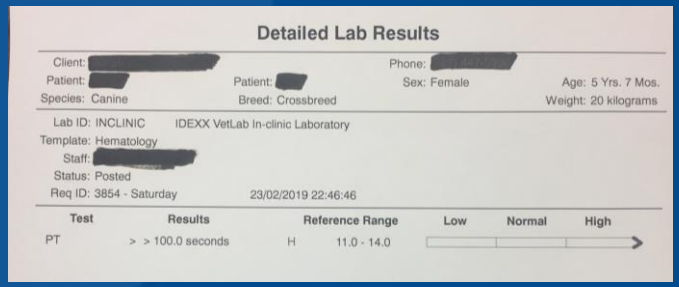
- pRBCs at 10mL/kg
- Vitamin K injection

Anticoagulant Rodenticides

- Types
  - First generation – warfarin
  - Second generation – most common
- Clinical signs and MOA
  - Haemorrhage into body cavities: Chest, abdomen, joints most common
    - Occurs 3-5 days after ingestion
  - Inhibit enzyme converts clotting factors (II, VII, IX, X) into active forms

Anticoagulant Rodenticides

- Diagnosis
  - PT: FVII shortest half-life; PTT: if haemorrhaging; +/- anemia and thrombocytopenia
- Treatment
  - If bleeding, replace coag factors → FFP or FP
  - Vitamin K → needed for 4+weeks due to long half-life
  - Recheck PT 48-72hrs post-tx
- Prognosis
  - Fair to good if no haemorrhage
  - Guarded or worse if haemorrhage



Detailed Lab Results

Client: [redacted] Phone: [redacted]
Patient: [redacted] Patient: [redacted] Sex: Female Age: 5 Yrs. 7 Mos.
Species: Canine Breed: Crossbreed Weight: 20 kilograms

Lab ID: INCLINIC IDEXX VetLab In-clinic Laboratory
Template: Hematology
Staff: [redacted]
Status: Posted
Req ID: 3854 - Saturday 23/02/2019 22:46:46

Test	Results		Reference Range	Low	Normal	High
PT	> > 100.0 seconds	H	11.0 - 14.0			

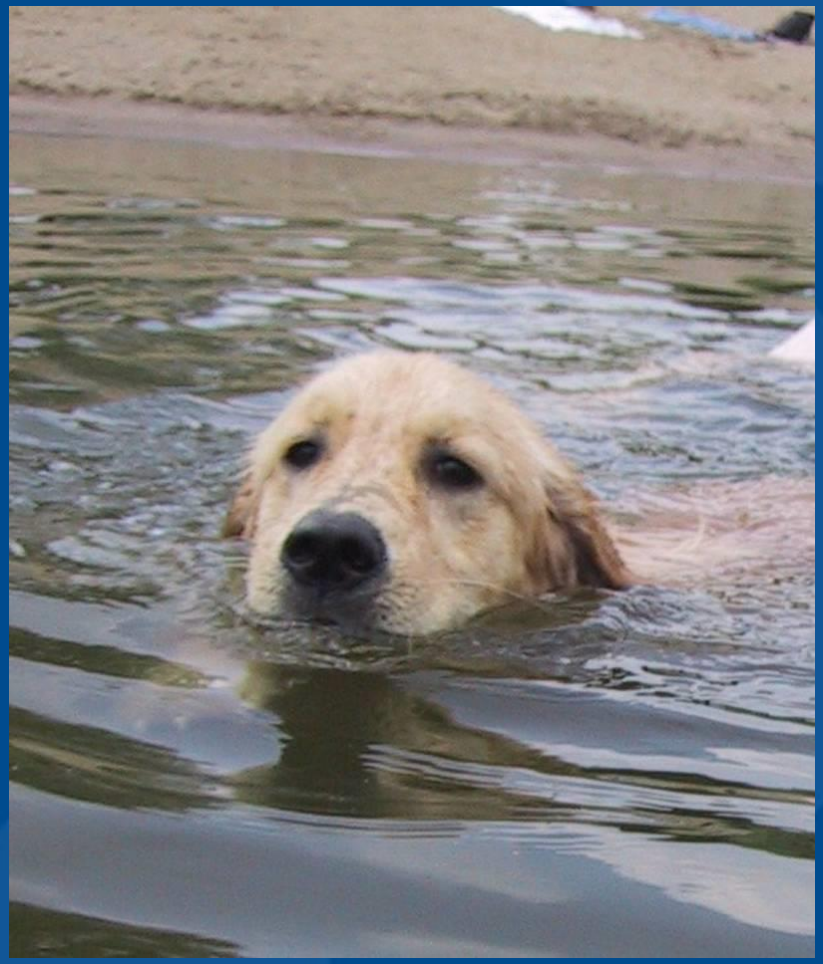
Monitoring and Care

- Recumbent care and PT/ROM q4hrs
- Oral and eye care q4hrs
  - Lube eyes
  - Wipe mouth with oral rinse solution
- Nutrition
  - Enteral: NG tube, PEG tube (not recommended)
  - Parenteral: PPN, TPN
- UOP
  - Urinary catheter and closed collection system
  - Ins and outs
- Recheck BW: PCV/TP, CBC, Chem, Coags

Outcome

- Improved gradually in neurologic function: moderately to severely ataxic
- Able to eat on own and transitioned to oral Vit K
- Discharged 7 days after presentation due to financial constraints
- Returned 1 month later…

3 Months after Event



Most Common SA Toxicities in NZ

- Anticoagulant rodenticides
- Snail/Slug bait
- Tremorgenic mycotoxins
- Chocolate
- NSAID OD
- Illicit drugs

References

- Peterson, Veterinary Toxicology
- Plumlee, Clinical Veterinary Toxicology
- Gwaltney-brant, Intravenous lipid emulsions in veterinary clinical medicine, Vet Clin Small Animal 48 (2018): 933-942
- Rosendale, Decontamination strategies, Vet clin Small Animal 32 (2002):311-321
- Yam, Comparison of the Use of Sodium Carbonate and apomorphine for inducing emesis in dogs, Australian veterinary journal, 94 (12); Dec 2016
- Koenigshof, Effect of sorbitol, single and multidose activated charcoal administration on carprofen absorption in dogs, JVECC, 25(5) 2015: 606-610
- Bates, Metaldehyde slug bait poisoning in dogs, Vet Record, Sept 2012

TABLE 2: Onset and duration of signs in dogs with suspected metaldehyde poisoning reported to the Veterinary Poisons Information Service

Signs	Onset (hours)	Range (number of dogs)	Duration (hours)	Range (number of dogs)
Gastrointestinal signs	2.5	30 minutes to 48 hours (134)	16.7	15 minutes to 4 days (22)
Increased muscle activity	3.2	2 minutes to 48 hours (199)	15.2	5 minutes to 72 hours (110)
Cardiac effects	3.3	30 minutes to 24 hours (15)	10.4	45 minutes to 24 hours (12)
Respiratory effects	4.8	1 minute to 48 hours (35)	4	Information only available for one dog
Hepatic effects	54.4	48 hours to 72 hours (5)	48	Information only available for one dog

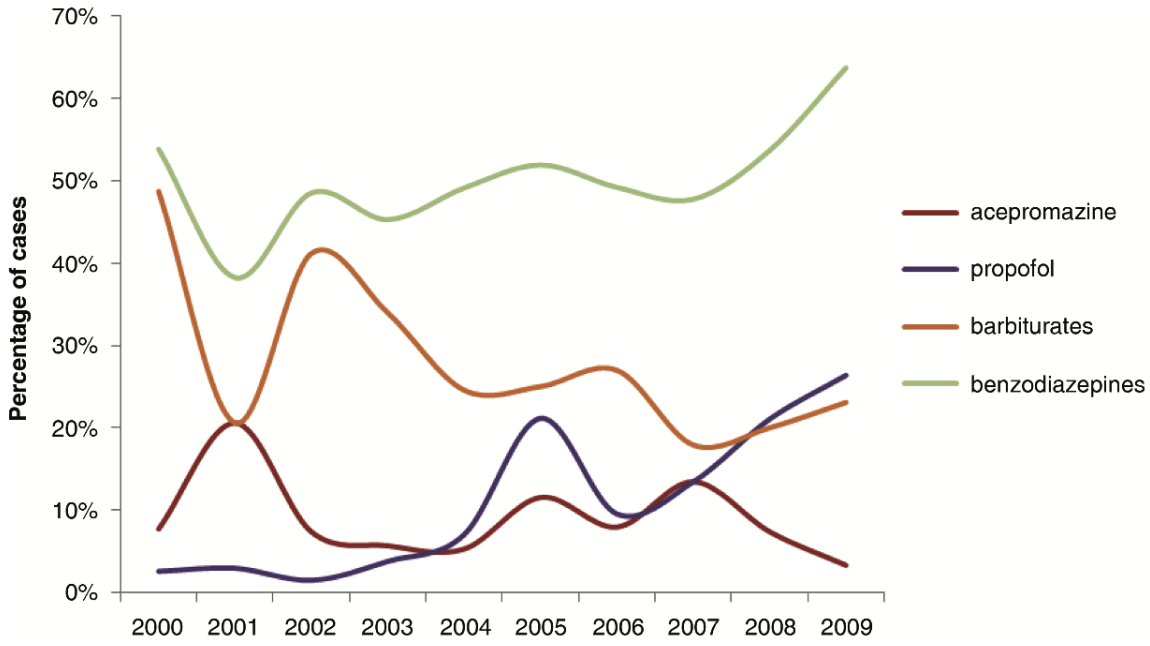


FIG 3: The pattern of anaesthetic and sedative drug usage in dogs with metaldehyde poisoning in Veterinary Poisons Information Service cases 2000–2009. The data for 2010 are omitted due to poor follow up return rate (see text), and in earlier years the numbers were too small to permit analysis

Table 1
Food and Drug Administration–approved lipid emulsions for intravenous use

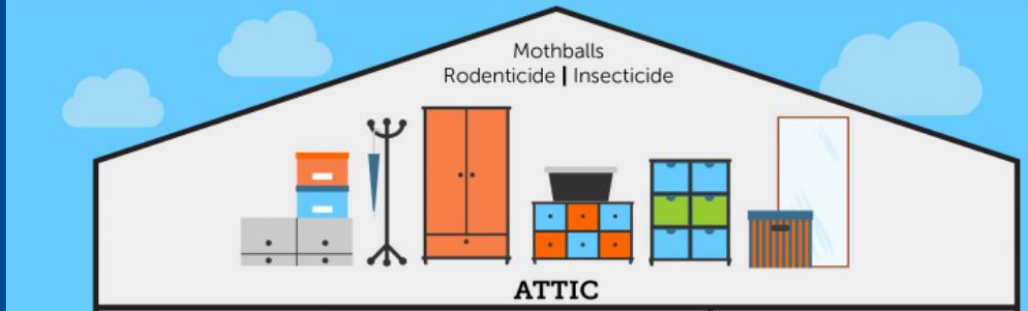
Trade Name	Composition	Total Lipid Content	Manufacturer
Clinolipid	16% olive oil, 4% soybean oil	20%	Baxter Healthcare
Intralipid	30% soybean oil, 1.2% egg yolk phospholipids, 1.7% glycerin	30%	Baxter Healthcare
	20% soybean oil, 1.2% egg yolk phospholipids, 2.25% glycerin	20%	
	10% soybean oil, 1.2% egg yolk phospholipids, 2.25% glycerin	10%	
Nutrilipid	20% soybean oil, 1.2% egg yolk phospholipids, 2.5% glycerin	20%	B. Braun Medical
Smoflipid	6% soybean oil, 6% medium-chain triglycerides, 5% olive oil, 3% fish oil, 1.2% egg phospholipids, 2.5% glycerin, 0.3% sodium oleate, 0.016%–0.023% all-*rac*-α-tocopherol	20%	Fresenius Kabi USA

Monitoring and Care

- Intravenous access
  - Multiple peripheral IV catheters
  - Triple lumen central IV catheter (long lateral saphenous or jugular)
- Critical monitoring
  - ECG, NIBP, HR, RR, SpO_2 continuous to q1hr
  - Vitals, PLRs, mentation q1-4hrs
  - PE and neurological exams q4-6hrs

ASPCA ANIMAL POISON CONTROL CENTER

Household Dangers: Room by Room



ATTIC

Medications | Vitamins | Garbage | Cleaning Products | Personal Care Products | Cosmetics

BEDROOM

BATHROOM

Garbage | Toxic Food
Alcohol | Medications
Cleaning Products

KITCHEN

Batteries | Plants
Fragrance Products

LIVING ROOM

Detergent/Detergent Pods
Bleach | Dryer Sheets
Fabric Softener

LAUNDRY ROOM

Rodenticide | Insecticide | Cigarettes
Automobile Chemicals | Carbon Monoxide
Cleaning Products | Garden Chemicals
Torch Fuel | Paint

GARAGE

Plants | Mushrooms | Pesticides | Compost
Stinging Insects | Charcoal Briquettes
Cigarettes

YARD

For more information about these and other potentially toxic substances, please visit our website: **ASPCA.org/Poison**.
If your pet gets into something potentially toxic, please call the ASPCA Animal Poison Control Center at **(888) 426-4435**.