Remember fighting to stay awake when mycotoxins were being discussed in toxicology class? You thought only large animal veterinarians needed to know about mycotoxins. In this session, you will have a chance to review common mycotoxins which should be of concern to small animal practitioners.

You are on the frontlines to detect toxic and infectious diseases which can have devastating effects on pets, livestock, and humans!!! There is nothing quite so unsettling to humans as doubts about the safety of their food OR the safety of food for their pets!!!

**What are mycotoxins?**

- Toxic fungal secondary metabolites
- Produced sporadically under specific conditions
- International problem of major significance
- Field versus storage fungi
- Plant/fungal interactions
- Potential Pet Food contaminants
- Acute toxicoses: Disease and/or death; “high” doses
- Chronic toxicoses: Inefficient production; “low” doses

**Just the tip of the “iceberg”**

- Only 6,000 secondary fungal metabolites identified
- 200,000 to 3,000,000 possible
- Approximately 10% of secondary fungal metabolites can be classified as mycotoxins.
- <500 mycotoxins identified thus far
- **DO THE MATH!!!**

**Factors influencing fungal growth and mycotoxin production**

- Substrate
- Moisture
- Temperature
- pH
- Stressors
- Drought
- Insect Damage
- Other Fungi

**The most common mycotoxin-producing fungal genera**

- Aspergillus
- Storage traditionally
- Field more frequently in U.S.A.
- Fusarium
- Field
- Penicillium
- Storage
- Claviceps
- Seed heads replaced by fungal sclerotia

**Mycotoxins of potential clinical importance to small animals**

- Aflatoxins
- Action Levels
- Trichotheccenes
DON (Deoxynivalenol or Vomitoxin)
Advisory Levels
Fumonisins
Advisory Levels
Tremorgens
Advisory Levels
Ochratoxin A
Advisory Levels
Zearalenone
Advisory Levels
Ergot Alkaloids
Advisory Levels

Management of mycotoxicoses
DEPENDS ON THE MYCOTOXIN
ESSENTIALLY follows the same Rx/Dx APPROACH as MALICIOUS POISONING
Rather than a neighbor, it’s the pet food company trying to kill our pets!!!
Would expect multiple animals and multiple households to be affected!!!
Some mycotoxins, like those in mushrooms, are better discussed under toxic plants

Potentially useful sources of information on mycotoxin contamination in pet food
http://www.fda.gov/AnimalVeterinary/default.htm
https://www.avma.org/News/Issues/recalls-alerts/Pages/default.aspx
Remember fighting to stay awake when toxic plants were being discussed in toxicology class? You thought only large animal veterinarians treating herbivores needed to know about plant toxins. In this session, you will have a chance to review some common and, perhaps, not so common phytotoxins which may be of concern to small animal practitioners.

What impacts plant toxicity?
Plant toxicity depends on many factors:
- Plant ID/[Toxins]/Toxin types in plant
- Animal species which is exposed
- Stage of plant growth/Plant parts eaten
- Animal health status
- Availability of nutrients/Water for plants
- Effects of weather/Season/time of year
- Environmental conditions
- Geographical location

What impacts plant consumption?
Many factors influence toxic plant consumption:
- Palatability
- Abundance relative to “nontoxic” plants
- Boredom
- Hunger
- Because they are “there”
- Curiosity
- Stupidity
- Possible Darwinian Phenomena

“Dose makes the poison!!!”
Expressions of toxic plant/fungi dose
- Less commonly in terms of toxic principle:
  - Specific dosage of toxic principle (mg/kg of body weight)
  - Concentration in diet (ppm)-COMMON WITH MYCOTOXINS
- More commonly in terms of amount of plant eaten:
  - Percent of body weight
  - Percent of diet
  - Incorporation of duration of exposure
  - Consumed once or twice; days, months or years of exposure
  - Descriptive terms
    - “Pinch”
    - “Tad”;
    - “Boatload”;
    - “Enough to choke a horse”

The basic clinical management of suspected plant intoxications
Basic work up of a suspected plant intoxication/look familiar???
Usually an EMERGENCY!!!
Simultaneously incorporates aspects of treatment and diagnosis
FIRST THINGS FIRST!!!
Possible rationale for having yourself or technicians cloned!!!
Signalment + Clinical Signs/Clinical Circumstances

Who?
What Plant?
When?
Where?
Problem List
What’s wrong?
Physical examination and STAT laboratory testing, IF proximate to patient
“Big Picture” Problems

SUMMARY OF CRITICAL ISSUES AND TARGET SYSTEMS/ORGANS
TREAT THE PATIENT NOT PLANT, UNLESS EXPOSURE TO TOXIC PLANT OBSERVED!!!
STABILIZATION OF THE PATIENT IS NUMBER ONE PRIORITY!!!

D.A.M.N.I.T.
D = Degenerative
A = Anomaly
M = Metabolic
N = Nutritional/Neoplastic
I = Infectious/Inflammatory
T = Traumatic/Toxic

PLANT POISONING SHOULD BE SUSPECTED WHEN
OBSERVATION OF PLANT INGESTION/DESTRUCTION/PLANT PARTS IN VOMITUS
Sudden death/Similar clinical signs in MULTIPLE animals
Rapid onset of afebrile syndrome or sudden death of a previously healthy animal.”
IF “OBVIOUSLY” AN INTOXICATION, GO IMMEDIATELY TO INTOXICATION TREATMENT!!!
List plausible toxic plants/Some not so toxic plants and other differentials
Most likely FINAL “Toxic Plant” diagnosis and WHY?
Not always possible
Helpful to know toxic mechanism of action of toxic plants
Correlation with observed problems
Incorporated into Rx/Dx
Plant toxicosis treated/Diagnosis confirmed
Sometimes not possible to do both!!!

Emergency treatment of suspected plant intoxications (SHOULD LOOK FAMILIAR!!!)
REMOVE THE ANIMAL(S) FROM THE SOURCE!!!
MIGHT ACTUALLY BE REMOVAL OF THE SUSPECTED SOURCE FROM THE ANIMAL!!!
House/Yard management

The basic clinical management of suspected plant intoxications (CONTINUED)
Emergency treatment of suspected plant intoxications (continued)

IMMEDIATE VETERINARY CARE!!!
TREAT THE PATIENT NOT THE PLANT, UNLESS PLANT EXPOSURE IS OBSERVED!!!
STABILIZATION ABCs
Airway/Breathing/Circulation/Depression/Excitation/Fever/Hypothermia
Supportive care
Decontamination/Antidotal therapy
Decontamination is way to remove source from animal!!!
Induction of emesis/Activated charcoal
Depends on the stage of the intoxication
The availability of antidotes is limited.

Diagnosis of suspected plant intoxications
↑PLANT TOXICITY + ↑TOXIC PLANT CONSUMPTION = PLANT INTOXICATION
OBSERVATION OF PLANT PARTS IN VOMITUS OR GASTROINTESTINAL TRACT!!!
TOXIC PLANT ID!!!
IF THE ABOVE DOESN’T HAPPEN: Collect detailed and accurate history
Usually 1st stage of assessing signalment + clinical signs/clinical circumstances
NEXT STEP: Physical examination of the alive and/or dead animal
Usually 2nd stage of signalment + clinical signs/clinical circumstances assessment
Updated Problem List/D.A.M.N.I.T./List of differentials
Tentative diagnosis/Most likely differentials
Correlation mechanism(s) of action to Problem List
Evaluate the efficacy of any treatment in progress.
Clinical pathology IF ALIVE
Necropsy exam/Histopathology IF DEAD
Collect appropriate samples for toxicologic analyses
GARBAGE IN/GARBAGE OUT

Examples of “COMMON” plant intoxications

Plants Affecting the GI tract
Just about every ingested “toxic” plant
Plants containing steroidal glycoalkaloids
Plants containing insoluble oxalates
Plants containing saponins
Plants containing toxalbumins
Euphorbia species and others
Plants affecting the Heart
Plants containing cardiac glycosides
Plants containing polyditerpene alkaloids
Plants containing grayanotoxins
Plants containing taxine alkaloids
Plants affecting the Nervous System
Plants causing neuroexcitation
Plants causing receptor-mediated CNS depression
Plants affecting the parasympathetic nervous system
Miscellaneous plants affecting the CNS

Examples of “COMMON” plant intoxications (CONTINUED)

Plants affecting the Liver
Hepatotoxic blue-green algae
Hepatotoxic mushrooms
Plants containing pyrrolizidine alkaloids
Miscellaneous plants affecting the CNS
Plants affecting the Kidney
Plants containing soluble oxalates
True lilies and cats
Grapes and raisins and dogs

Useful toxic plant electronic resources
List of toxic and “nontoxic” plants
http://www.library.uiuc.edu/vex/toxic/comlist.htm
http://www.vth.colostate.edu/poisonous_plants/report/search.cfm
Is it Toxic?  How Toxic?  
Electronic Toxicology Resources Available to Practitioners

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Columbia, MO

There are a variety of online/electronic resources which small animal practitioners can use to access critical information about potential toxicants. In this lecture, these resources will be discussed and demonstrated for specific uses.

General veterinary toxicology electronic resources
- Lists of potential toxicants/Helpful publications/Links to podcasts and webinars
  - [www.petpoisonhelpline.com](http://www.petpoisonhelpline.com) separate tabs for pet owners and veterinarians
  - [https://www.aspca.org/pet-care/animal-poison-control](https://www.aspca.org/pet-care/animal-poison-control) for pet owners
  - [http://aspcapro.org/poison](http://aspcapro.org/poison) for pet professionals
  - Phone apps available and phone consultations available on a fee for service basis

U.S. government websites providing helpful information for suspected intoxications
  - Information from MSDS for household products
  - Information on product ingredients
- [http://www.fda.gov/AnimalVeterinary/default.htm](http://www.fda.gov/AnimalVeterinary/default.htm)
  - Website for Food and Drug Administration
  - Go to Animal & Veterinary tab for veterinary drug-specific information
  - Useful regulatory information on pet food contaminants/recalls
  - Mechanism for reporting adverse drug reactions/pet food-related incidents
  - Other helpful information on veterinary medications
  - PubMed literature search
  - Website for National Institute of Environmental Sciences
  - Information pertaining to environmental health
- [https://www3.epa.gov/](https://www3.epa.gov/)
  - Website for U.S. Environmental Protection
  - Environmental contamination
  - Superfund sites
  - Pesticides
  - Heavy metals
  - Organic pollutants
  - Website for Agency for toxic Substances and Disease Registry
  - Operated by Center for Disease Control
  - Information on many toxicants of human and veterinary importance
  - Toxicological Profiles
  - Tox FAQs™

Useful toxic plant electronic resources
- List of toxic and “nontoxic” plants
- [http://research.vet.upenn.edu/poisonousplants/Plants/tabid/5259/Default.aspx](http://research.vet.upenn.edu/poisonousplants/Plants/tabid/5259/Default.aspx)
- [http://www.library.uiuc.edu/vex/toxic/comlist.htm](http://www.library.uiuc.edu/vex/toxic/comlist.htm)
http://www.vth.colostate.edu/poisonous_plants/report/search.cfm
https://www.erowid.org/
Psychoactive plants/drugs
http://www.amazon.com/Toxic-Plants-America-George-Burrows/dp/0813820340

Can purchase E-book version
Extremely thorough source of accurate information
If a plant is potentially “toxic”, the information is probably in this book!!!

Miscellaneous helpful websites
http://www.msd.com/
Website for free access to material safety data sheets (MSDS)
http://www.snopes.com/
Useful for urban legends/e-mails forwarded by your mother
http://www.merckvetmanual.com/mvm/index.jsp
Generic animal disease information
http://www.ahc.umn.edu/rar/umnuser/formulary.html
Free veterinary drug formulary
https://www.avma.org/News/Issues/recalls-alerts/Pages/default.aspx
American Veterinary Medical Association website on pet food recalls
Prescribed OTC, and Recreational Drugs Associated with Small Animal Intoxication

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We live in a “medicated world.” IF, you doubt that statement, simply sit down and watch the cavalcade of pharmaceutical advertisements which takes place 24/7 on network television. Taking into account all of the prescription, over-the-counter (OTC) traditional AND herbal, and recreational drugs surrounding our pets, it should be no surprise that there is an increasing rate of dog and cat intoxications involving “drugs.” In fact, according to National Animal Poison Control Center, prescription medications and veterinary medications of top toxicants in 2014 http://www.aspcapro.org/resource/shelter-health-poison-control/top-10-pet-toxins-2014. ALWAYS KEEP MEDICATIONS OUT OF REACH OF CHILDREN AND PETS. FOR VETERINARY MEDICATIONS, ALWAYS READ LABELS AND FOLLOW LABEL INSTRUCTIONS.

Acknowledging that, to ALMOST ALL of our clients, pet survival takes precedence over successful diagnosis, it is important to remember the mantra “TREAT THE PATIENT, NOT THE POISON” (UNLESS THERE ARE WITNESSES). THEREFORE, before going on to specific “DRUGS”, the “BASICS” of managing any suspected intoxication, which apply directly to “DRUGS”, are reviewed here and will be quickly summarized during oral presentation.

Overview of basic clinical management of suspected “drug” intoxications

REVIEW of Basic Work Up of a Suspected Drug Intoxication/Look Familiar???:

Usually an EMERGENCY!!!

Simultaneously incorporates aspects of treatment and diagnosis
FIRST THINGS FIRST!!! PATIENT SURVIVAL OFTEN HIGHER PRIORITY THAN Dx
Determine what is actually in suspected “DRUGS”/Jump right to treatment???
Possible rationale for having yourself or technicians cloned!!!

Signalment + clinical signs/clinical circumstances
Which Pet or Pets (be sure all present and accounted for)?
What “Drug” or “Drugs” (how certain/labeled or unlabeled/multiple drugs/legality)?
When (approximate time or day/might be clueless)?
Where (IF known/how certain of location/other possibilities)?

Problem list
WHAT’S WRONG? SOME CLINICAL SIGNS “TOXICANT X” SPECIFIC/SOME GENERIC
Physical examination and STAT laboratory testing, IF proximate to patient

“Big picture” problems
SUMMARY OF CRITICAL ISSUES AND TARGET SYSTEMS/ORGANS
TREAT THE PATIENT NOT DRUG, UNLESS EXPOSURE TO TOXIC “DRUG” OBSERVED!!!
STABILIZATION OF THE PATIENT IS NUMBER ONE PRIORITY!!!

D.A.M.N.I.T.
D = Degenerative
A = Anomaly
M = Metabolic
N = Nutritional/Neoplastic
I = Infectious/Inflammatory
T = Traumatic/Toxic

Overview of basic clinical management of suspected drug intoxications (continued)

REVIEW of Basic Work Up of a Suspected Drug Intoxication/Look Familiar??? (continued)

DRUG POISONING SHOULD BE SUSPECTED WHEN
OBSERVED “DRUG” INGESTION/“DRUG”/PACKAGING IN VOMITUS OR GI TRACT
Sudden death/Similar clinical signs in MULTIPLE animals
Rapid onset of afebrile syndrome or sudden death of a previously healthy animal.”
IF “OBVIOUS” INTOXICATION BY “DRUGS”, GO IMMEDIATELY TO EMERGENCY Rx!!!
ONCE ANIMAL STABLE/DIAGNOSIS STILL UNCERTAIN: CONTINUE STEPWISE WORK UP
List Drugs/Other toxic and nontoxic differentials
Most likely FINAL “Drug” diagnosis and WHY?
Not always possible
Helpful to know toxic mechanism of action (MOA) of “Drugs”
Might need to consult a formulary or “expert”
Good correlation of “Drug” MOA with Problem List supports Dx of “Drug” toxicosis
Can incorporate knowledge of “Drug” MOA into successful treatment plan
“Drug” toxicosis treated/”Drug” diagnosis confirmed by laboratory testing
Sometimes not possible to do both!!!

Detailed clinical management of suspected “drug” intoxications, including Rx/Dx
EMERGENCY Rx/TREATMENT of Suspected “Drug” Intoxications (SHOULD LOOK FAMILIAR!!!)
Remove the animal(s) from the source
MIGHT ACTUALLY BE REMOVAL OF THE SUSPECTED SOURCE FROM THE ANIMAL!!!
House/Yard management
Immediate veterinary care
TREAT THE PATIENT NOT THE DRUG, UNLESS DRUG EXPOSURE IS OBSERVED!!!
STABILIZATION ABCs
Airway/Breathing/Circulation/Depression/Excitation/Fever/Hypothermia
Supportive care
Decontamination/antidotal therapy AND/OR lipid infusion for specific “drugs”
Decontamination is ANOTHER way to separate the source from the animal!!! Depends on the route of exposure and stage of the intoxication
Bathing if plant material on paws (think cats)
Emesis/GI lavage/Activated charcoal (repeated?) ± Cathartics if ingested “Drugs”
MAKE SURE INDUCTION OF EMESIS+ NOT CONTRAINDICATED
Some specific antidotes for “Drugs”/Lipid infusion limited to a few “Drugs”

Confirming diagnosis of suspected “drug” intoxications (not always possible)
OBSERVED “DRUG” EXPOSURE/“DRUGS”/PACKAGING IN VOMITUS OR GI TRACT
MIGHT NOT NEED TO GO MUCH FURTHER FOR IDENTIFIABLE “DRUG”!!!
POSSIBLE EXCEPTION FOR “LEGAL” CASES WHERE “DRUG” CONFIRMATION NEEDED
IF THE ABOVE DOESN’T HAPPEN OR “LEGAL”: Make sure detailed and accurate history!!!
Usually 1st stage of assessing signalment + clinical signs/clinical circumstances
NEXT STEP: Physical examination of the stabilized alive and/or very dead animal
Usually 2nd stage of signalment + clinical signs/clinical circumstances assessment
Tentative “Drug” diagnosis/Most likely differential is “Drug”
Correlation of “Drug” MOA to Problem List helps support FINAL “Drug” Dx.
Evaluate the efficacy of treatment in progress, especially antidotes for specific “Drugs”

Detailed clinical management of suspected “drug” intoxications (continued)
CONFIRMING Diagnosis of Suspected “Drug” Intoxications (NOT ALWAYS POSSIBLE/continued):
Clinical pathology IF ALIVE/Possible laboratory analyses for “Drugs”
Necropsy Exam/Histopathology ± Toxicology Testing IF DEAD
Collect appropriate samples for histopathology IN FORMALIN
Collect appropriate samples for possible toxicologic analyses NOT IN FORMALIN!!!
CAREFULLY labeled and separated samples/COC/?/Refrigerated or frozen (best)
“Drugs”/Vomitus/Gastric Contents/Liver/Kidney/Brain (if CNS)/Urine??/Fat???
Knowledge of “Drug” MOA and pharmacokinetics/toxicokinetics can be helpful.
Often determines analyses for what and when.
IDEALLY, histopath/analytical results are consistent with one another and “Drug” Dx.
HOWEVER, GARBAGE IN = GARBAGE OUT!!!
“Rotten” tissues tell no tales!!!/Pathognomonic lesions might be MIA!!!
BUT, can’t analyze for “Drugs”, IF ideal tissue samples/source not collected.
Challenges to diagnosing “Drug” intoxications.

For “Drug” known to have been given therapeutically, what does detection mean?

Analyses not available for all “Drugs”.

Ingredients in proprietary “Drugs” or illegal “Drugs” might not be known

Differences in analytical results between diagnostic laboratories?

Differences in interpretation?

Certainty of identification?

“Legal” issues

Illegal drugs detected?

Useful “drug” electronic resources

MIGHT NEED TO JUST KNOW INGREDIENTS OF DRUGS/POTENTIAL ADVERSE EFFECTS

http://www.ahc.umn.edu/rar/umnuser/formulary.html

Free veterinary drug formulary

http://www.msd.com/

Website for free access to material safety data sheets (MSDS)

http://householdproducts.nlm.nih.gov/

Information from MSDS for OTC household products/Lists of ingredients

https://www.erowid.org/

Psychoactive plants/drugs

http://www.fda.gov/AnimalVeterinary/default.htm

Website for Food and Drug Administration

Go to Animal & Veterinary tab for veterinary drug-specific information

Mechanism for reporting adverse drug reactions

Other helpful information on veterinary and human medications


PubMed literature search

Veterinary Poison Control Centers


http://aspcapro.org/human-animal-medication for pet professionals

Examples of “common” intoxications associated with various classes of “drugs”

Prescription human medications

NSAIDs

Zorvolex (Diclofenac)→Gastric ulcers at very low dosages in cats and dogs.

Antidepressants

Effexor (Venlafaxine) and Prozac (Fluoxetine)→SSRIs→ Heart rate + blood pressure + hyperthermia + sedation, ataxia, tremors, and/or seizures

Benzodiazepines and Sleep Aids

Xanax (Alprazolam) and Ambien (Zolpidem)→GABA agonism→CNS depression

ADD/ADHD Medications

Adderall (Dextroamphetamine/Amphetamine) and Ritalin (Methylphenidate)→Stimulants→ Heart rate + blood pressure + tremors, seizures, hyperthermia

β-Blockers→Much more severe toxic effects than seen with ACE-inhibitors

Tenormin (Atenolol) + Coreg (Carvedilol)→Bradycardia + hypotension

Cholesterol Lowering Agents

Statins→Lipitor (Atorvastatin) and Crestor (Rosuvastatin)→Vomiting + diarrhea

OTC human medications

NSAIDs

Advil (Ibuprofen), Aspirin, and Aleve (Naproxen)→GI + kidney + CNS (Ibuprofen)

Pain Medications

Tylenol (Acetaminophen/Paracetamol)→Methemoglobinemia + hepatic necrosis
Cold/Flu/Sinus/Sore Throat/Cough/Allergy/and “Red Eye” Medications

- Pseudoephedrine → Sympathomimetic thermogenic stimulant
- Caffeine → Neuroexcitation + PVCs + other cardiac arrhythmias
- NSAIDs → Primarily GI + kidney + occasional liver involvement
- Acetaminophen → Methemoglobinemia + hepatocellular necrosis
- Dextromethorphan (for coughing) → Serotonin agonism → Tremors + seizures
- Imidazoline Decongestant → $\alpha_2$ Adrenergic agonism → Bradycardia + hypotension
- Antihistamines → Agitation + sedation + abnormal heart rate and blood pressure
- Benzocaine (local anesthetic) → Possible methemoglobinemia
- Xylitol → Hypoglycemia + hepatocellular necrosis in dogs

Veterinary medications

- NSAIDS
  - Rimadyl (Carprofen) and Phenylbutazone → GI + kidney + liver (Carprofen in dogs)
  - “Dewormers”
    - Ivermectins → GABA agonism → CNS depression (especially with mutated \textit{MDRI})

Herbal preparations

- Guarana (Methylxanthines) and Ephedra/Ma Huang (Ephedrine/Pseudoephedrine)
- Ephedrine and pseudoephedrine are sympathomimetic thermogenic stimulants.

Recreational drugs and drugs of abuse

- Marijuana → Cannabinoids → THC → ”Depression” + ataxia + incontinence
- K2 → Synthetic cannabinoids → Variety of effects + concerns about adulteration
- Miscellaneous others, such as prescription painkillers various mild-altering “Drugs”
Based on reports in the popular media and information on the Internet, one would be led to believe that pet food manufacturers are actually out to eradicate our pets. Frankly, that doesn’t sound like a particularly financially rewarding business plan. Admittedly, there is a high correlation between animals which eat commercially manufactured pet food and those who get sick. Similarly, most dogs which get hit by cars are also eating many of these same pet foods. Furthermore, ALL animals eating commercially prepared pet foods will die.

The simple truth is that MOST pet food manufacturers in the U.S. are extremely conscientious. However, human and machine errors do occur; pet food ingredients do come from all over the world, with food quality and consumer protection regulations not being globally uniform; pet food manufacturers cannot control what happens to their products during storage by a distributor or, even, by a pet owner; pets may have chronic, life-threatening diseases without ever exhibiting any overt clinical signs, and then the pet all of sudden drops over dead; and YES, there are those would try to profit at the expense of the health and welfare of our pets.

Causes of pet food recalls
- Bacterial contamination
  - Contamination by *Salmonella* species appears to be the most common
- Mycotoxin contamination
  - Aflatoxins and DON appear to be the most common clinically relevant contaminants.
- Formulation errors involving vitamins and minerals
- Can be intoxications or deficiencies
- Various medications
- Previous concerns about medications used for animal euthanasia
- Rendering of euthanized animals thought to be most likely source.
- Miscellaneous
  - Melamine/Cyanuric acid and other potential “zebras”

How does a veterinary professional recognize that contaminated pet food is causing disease?
- Animals from different households, with similar signs after consuming same pet food
  - Magnified by the same pet food being marketed under several different names
- More widespread if contaminated ingredient is used in multiple products and brands
- More likely when single manufacturing plant is sole source for a specific diet type
- Drought-stressed corn-based diets are more likely to be contaminated by aflatoxins.
  - “Suspicious” when animals get sick after eating “cheaper” unheard of brand
- Also “suspicious” when animals get “sick” immediately after eating new pet food?
- More questionable circumstances for suspecting contamination of pet food
  - Rumors of diets contaminated with known toxicants without appropriate signs???
  - Conspiracy theories originating from unreliable sources???
  - Single animal eating manufactured pet food, which subsequently gets sick/dies???
  - Any animal experiencing GI, cardiac, hepatic, or renal disease???
  - Any animal eating commercial pet food???
  - Enemy of owner works for pet food manufacturer?????????

What should veterinary professionals do when pet food contamination is suspected?
- Make sure there is a detailed/accurate history, along with a thorough physical exam
- Consult previous health records to rule out pre-existing disease
- Consult with FDA and AVMA pet food recall websites to see if pet food already recalled.
- Perform appropriate diagnostic tests to eliminate other causes of observed disease
- If case involves pet death, postmortem exam with appropriate sampling is needed.
- Carefully record all information/Maintain detailed medical records
- Get a sufficient amount of suspect pet food and store/label sample appropriately
Retain original container and labeling
Need enough sample so some can retained and multiple analyses performed
For legal purposes, often best if sample from unopened bag of the same brand/lot #
Ideal for veterinarian to collect pet food sample and retain custody/ship sample
Determine the most appropriate method for long-term storage
Room temperature/Refrigerated/Frozen
Might need to consult with label/manufacturer/regulatory personnel

**It is critical to record the following product information**

- Exact name of the product and product description, as stated on the product label
- Type of container
- Product intended to be refrigerated, frozen, or stored at room temperature
- Lot #
- Can sometimes be challenging to locate
- Best by, best before or expiration date
- UPC code
- Also known as the bar code
- Net weight
- Purchase date and exact location where purchased.
- How the food was stored, prepared, and handled

**Appropriate testing of pet food generally involves mycotoxin analyses/bacterial culture**

Not all of the sample should be sent off for analyses or sent back to manufacturer.
A portion of the sample should be retained until the situation is completely resolved

**Pet food manufacturer can/"should???” be informed of potential problem with product**

Might be most appropriate after testing pet food, so analytical results can be shared.
However, if there has been pet death, it might be best to contact manufacturer first.
If pet food contamination is likely, manufacturer contact should involve veterinarian.
Not all of the sample should be sent off for analyses or sent back to manufacturer.
A portion of the sample should be retained until the situation is resolved!!!

**There is mechanism in place for reporting pet food complaints to the FDA**

http://www.fda.gov/AnimalVeterinary/SafetyHealth/ReportaProblem/ucm182403.htm
If pet food contamination likely, veterinarian should be involved in reporting to FDA.
Not all of the sample should ever be sent off for analyses or sent to manufacturer.
A portion of the sample should be retained until the situation is resolved.

**Potentially useful sources of information on mycotoxin contamination in pet food**

http://www.fda.gov/AnimalVeterinary/default.htm
https://www.avma.org/News/Issues/recalls-alerts/Pages/default.aspx
The Neighbor Did it!
Common Malicious Poisonings and How to Prove it
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The goal of this lecture is to outline a practical approach to small animal intoxications, with real examples of malicious poisonings, attempted “peticides” which were actually canine suicides, and various tasty and yucky poisons pets get into!!!

In this presentation we will review the following
Some fundamental principles of toxicology
The basics of the clinical management of suspected intoxications
A few examples of malicious intoxication attempts/successes
Some tasty/yucky things pets will eat

Fundamental principles of veterinary toxicology
All veterinarians should know by their second day of practice that EVERYONE has someone who dislikes them enough to harm their pets!!! Furthermore, according to Paracelsus, “Solely the dose determines that a thing is not a poison.” This statement essentially means that ANYTHING is potentially toxic, depending on the level of exposure!!! It also means that, with regards to potential toxicants/intoxications:

There is a dose-response relationship for potential toxicants.
The greater the dose/dosage of a given toxicant, the more severe the clinical signs.
Exposure to toxicants and/or their metabolites must be sufficient to cause intoxication.

However, there can be what appear to be possible exceptions to these “principles” (e.g., endocrine-disrupting chemicals), so it is critical to carefully define the toxicant being discussed, the different toxic endpoints being evaluated for that toxicant, and to take into consideration possible species differences in the effects of different toxicants.

Overview of basic clinical management of suspected intoxications
REVIEW of Basic Work Up of a Suspected Intoxication (“Malicious” OR “Accidental”):

Often an EMERGENCY!!!
Simultaneously incorporates aspects of treatment and diagnosis
FIRST THINGS FIRST/MOST CLIENTS PREFER PET SURVIVAL OVER CONFIRMED Dx!!!
Determine what is in “Toxicant X” (NEED LABELS)/Jump right to treatment???
Possible rationale for having yourself or technicians cloned!!!
Signalment + Clinical Signs/Clinical Circumstances
WHICH PETS (names, breeds, ages+)?/WHAT ARE THE CLINICAL SIGNS?? (video?)
Exposure to “Toxicant X”→≈HOW MUCH?/WHEN?/WHERE? (How reliable is info?)
Problem List
WHAT’S WRONG? SOME CLINICAL SIGNS “TOXICANT X” SPECIFIC/SOME GENERIC
Physical examination and STAT laboratory testing, IF proximate to patient
“BIG PICTURE” PROBLEMS
SUMMARY OF CRITICAL LIFE-THREATENING ISSUES AND TARGET SYSTEMS/ORGANS
TREAT THE PATIENT NOT THE POISON, UNLESS TOXIC EXPOSURE OBSERVED!!!
STABILIZATION OF THE PATIENT IS NUMBER ONE PRIORITY!!!

Overview of basic clinical management of suspected intoxications (continued)
REVIEW of Basic Work Up of a Suspected Intoxication (“Malicious” OR “Accidental”/continued):

D.A.M.N.I.T.
D = Degenerative
A = Anomaly
M = Metabolic
N = Nutritional/Neoplastic
I = Infectious/Inflammatory
T = Traumatic/Toxic
POISONING SHOULD BE SUSPECTED WHEN:
DIRECTLY OBSERVED TOXIC" EXPOSURE/"TOXICANT X" IN VOMITUS OR GI TRACT
Sudden death/Similar clinical signs in MULTIPLE animals
Rapid onset of afebrile syndrome or sudden death of a previously healthy animal.
Signs of unknown etiology/Other causes ruled out
Recent change in diet or environment
Neighborhood feuds/Love gone bad/Pet owner often certain of “CULPRIT”
Very small, young, mean, noisy, annoying, and/or stupid animals!!!
Might be a “Darwinian phenomenon” OR “aliens”, “bikers”, “local meth labs”
IF “OBVIOUS” INTOXICATION, GO IMMEDIATELY TO EMERGENCY Rx!!!
ONCE ANIMAL STABLE/DIAGNOSIS STILL UNCERTAIN: CONTINUE STEPWISE WORK UP
List plausible toxic/Some not so toxic differentials
Most likely FINAL “Toxic” diagnosis and WHY IS IT “TOXICOSIS X”
Not always possible to CONFIRM Dx/Looking and acting like “Dx” might be sufficient.
Helpful to know toxic mechanism(s) of action (MOA) of “Toxicant X”
Good correlation of “Toxicant X”MOA with Problem List supports “Toxicosis X” Dx
Can incorporate knowledge of toxic MOA into successful treatment plan
“Toxicosis X” successfully treated/Diagnosis of “Toxicosis X” confirmed
Sometimes not possible to do both/“Toxicosis X” Dx confirmed by laboratory testing

Detailed clinical management of a suspected intoxication, including Rx/Dx
EMERGENCY Rx/TREATMENT of Suspected Intoxications:
REMOVE THE ANIMAL(S) FROM THE SOURCE OF “TOXICANT X”!!!
MIGHT BE REMOVAL OF THE SUSPECTED “TOXICANT X” SOURCE FROM ANIMAL!!!
Baths for cutaneous exposures to “Toxicant X” (especially the paws of cats)
IF “X” eaten, Emesis/GI lavage or containment/Activated charcoal ± Cathartics
House/Garage/Kennel/Yard/Junk management
IMMEDIATE VETERINARY CARE!!!
TREAT PATIENT NOT THE POISON, UNLESS “TOXICANT X” EXPOSURE OBSERVED!!!
STABILIZATION ABCs
Airway/Breathing/Circulation/Depression/Excitation/Fever/Hypothermia
Supportive care
Decontamination/Antidotal therapy AND/OR Lipid Infusion for specific Intoxications
Decontamination is ANOTHER way to separate the source from the animal!!!
Depends on route of exposure/Stage of intoxication/Specific antidote (IF available)
Bath for cutaneous exposures to “X”/Emesis+ IF NO contraindications (“X” eaten)

Detailed clinical management of a suspected intoxication, including Rx/Dx (continued)
Some “guidelines” for stabilization ABCs
Ensure that the Airway is patent
Awareness of obstructions/bronchoconstriction
Establish normal Breathing
Awareness of breathing problems/impaired gas exchange
Correct Circulation deficits
Fluid/Electrolyte/Acid-base imbalances + various anemias with different etiologies
Control Depression of CNS
Correct metabolic disturbances/neurotransmitter imbalances
Control Excitation of CNS
Do nothing if very mild
Correction of electrolyte imbalances and possible glucose deficits
Anticonvulsant medications
Bring down Fever
Avoid use of NSAIDs for toxicant-induced hyperthermia

Treat Hypothermia
No ice water baths

Supportive care
Maintenance of vital functions/fluid therapy
Might also be used in stabilization
Antibiotics/Analgesics/Diet modifications/Client communication/Client education

Patient stabilized/Dx uncertain—fine-tuned clinical signs/clinical circumstances reassessment
Might be onsite/animal side in clinic/remote by telephone, text, or ???
Access to both premises and animals is ideal!!!
A thorough and accurate history is often the key!!!
Prevents the chasing of many wild geese AND “innocent” parties!!!
Information might be relayed by phone or be secondhand.
The accuracy of such information might be questionable OR “slightly” exaggerated!!!
Asking the right questions is extremely important!!!
Might need to ask the same question several different ways!!!
Might need to seek out the individual really in the know OR the “CULPRIT”!!!
A good physical examination is of critical importance and may need to be repeated!!!
It is perfectly ok to use a stethoscope and a thermometer!!!
So is careful observation of clinical signs/circumstances!!!
Direct observation of patient might yield very different information!!!!
Information might be relayed by phone or be secondhand.
The accuracy of such information might be questionable OR “slightly” exaggerated!!!
Asking the right questions is extremely important!!!
Might need to ask the same question several different ways!!!
Might need to seek out the individual really in the know OR the “CULPRIT”!!!
A good physical examination is of critical importance and may need to be repeated!!!
It is perfectly ok to use a stethoscope and a thermometer!!!
So is careful observation of clinical signs/circumstances!!!
Direct observation of patient might yield very different information!!!!

Confirming diagnosis of suspected intoxications (not always possible)
DIRECT OBSERVATION OF “TOXIC” EXPOSURE/”TOXICANT X” IN VOMITUS OR GI TRACT
PRETTY MUCH TRUMPS EVERYTHING ELSE IF “TOXICANT X” IS IDENTIFIABLE
BRING IN CONTAINERS/LABELING/MSDS/ANY AVAILABLE DOCUMENTATION
MIGHT BE ALL DONE WITH Dx/EXCEPT “LEGAL” CASES REQUIRING Dx CONFIRMATION

Detailed clinical management of a suspected intoxication, including Rx/Dx (continued)
CONFRMING Diagnosis of Suspected Intoxications (NOT ALWAYS POSSIBLE/continued):
IF PRECEDING DOESN’T HAPPEN OR “LEGAL”: MUST have detailed and accurate history
Usually 1st stage of assessing/reassessing clinical signs/clinical circumstances
NEXT STEP: Physical examination of the stabilized alive and/or very dead animal
Usually 2nd stage of clinical signs/clinical circumstances assessment/reassessment
Updated Problem List/D.A.M.N.I.T./List of differentials
Tentative diagnosis of “Toxicosis X”/”Toxicosis X” is most likely differential/WHY???
Correlation of “Toxicant X”MOA to Problem List helps support Dx of “Toxicosis X”.
Evaluate efficacy of treatment in progress, especially specific antidotes for “Toxicant X”
Clinical pathology IF ALIVE/Might be able to do some chemical analyses for “Toxicant X”
Necropsy Exam/Histopathology ±Toxicology Testing IF DEAD
Collect appropriate samples for histopathology IN FORMALIN
Collect appropriate samples for toxicologic analyses NOT IN FORMALIN!!!
CAREFULLY labeled and separated samples/COC?/Refrigerated or frozen (best)
Bait/”Drug”/Plant/UFO/Vomitus/Gastric Contents/Liver/Kidney/Brain?/Urine?/Fat?
A variety of useful screening/confirmatory analyses for metals/organic toxicants
IDEALLY, histopath/analytical results agree with one another AND “Toxicosis X” Dx.
HOWEVER, GARBAGE IN = GARBAGE OUT
“Rotten” tissues tell no tales!!!/Pathognomonic lesions might be MIA!!!
Can’t analyze for “Toxicant X” IF appropriate tissue samples/source not collected

Examples of cases of malicious intoxication attempts/successes + work up
“The Yellow Pills in the Hotdog”
“The Stalker and the Suspicious Pan of Water”
“BEWARE of Strangers Bearing Meatballs”
“SHOW ME the Meth Lab”
“Stay Out of My Stash”
“ANY CIDE”
Criminals have a tendency to break the law
Emerging “Peticides”
“Oldies but Goodies”

Some tasty/yucky things our pets will eat voluntarily + example of work up
Most to also be discussed in other lectures
“The Grass is Always Greener”
“Attempted “Peticide at the Sale Barn”
“Makeover Gone Bad”
“Hit and Run or Otto accident”
“Death Without Cavities”
Play-Doh and Paint Balls
Bread Dough and Home Brewing Supplies
Anything Chocolate and Other Methylxanthines
NSAIDs/Acetaminophen/Other Medications
Compost Piles AND ANYTHING THAT SMELLS LIKE “POOP”