
 SAVING PETS' LIVES, 24 HOURS A DAY, 7 DAYS A WEEK  
**PET POISON HELPLINE**

  
Nationwide®

## **Hot Topics in Toxicology: Marijuana, Xylitol, & Laundry Pods**

February 9, 2016

<b>Ahna Brutlag, DVM, MS, DABT, DABVT</b> Associate Director of Veterinary Services Pet Poison Helpline <a href="mailto:abrutlag@petpoisonhelpline.com">abrutlag@petpoisonhelpline.com</a> & Adjunct Assistant Professor Dept. Veterinary Biomedical Sciences College of Vet. Med., University of Minnesota	<b>Heather Handley, DVM</b> Senior Consulting Veterinarian, Clinical Toxicology Pet Poison Helpline <a href="mailto:hhandley@petpoisonhelpline.com">hhandley@petpoisonhelpline.com</a>	<b>Renee Schmid, DVM</b> Associate Veterinarian, Clinical Toxicology Pet Poison Helpline <a href="mailto:rschmid@petpoisonhelpline.com">rschmid@petpoisonhelpline.com</a>
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www.petpoisonhelpline.com | 3600 American Blvd. W., #725 Bloomington, MN 55431 | Pet Poison Helpline ©2015

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Nationwide®  
Be on your side.

### **Whole Pet from Nationwide**

Carol McConnell, DVM, MBA  
Chief Veterinary Officer  
February 2016





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### **The best pet insurance plan ever!**

 **whole pet™**  
with wellness  
90% back on all veterinary bills

Two great options!

- 90% reimbursement with \$100 annual deductible
- 90% reimbursement with \$250 annual deductible

It's a new day for pet insurance. Whole Pet withWellness is a true industry game-changer. If you examine it, prescribe it, treat it or administer it, we'll cover it.

Clients get back 90% on **everything** from Bordetella to bilateral ACL surgeries; from dental cleanings to dysplasias. It's serious coverage—which means serious business for you.

Quite frankly, it's the best pet insurance plan ever made. And it's **only** from Nationwide.

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**Introducing Whole Pet with Wellness!**



**Coverage Highlights:**

- One annual deductible—not per incident
- 90% reimbursement on veterinary expenses
- All veterinary exams including specialty and emergency visits
- All hospitalization and surgeries including preventive and elective procedures
- All injuries, illnesses, and cancer including hereditary and congenital conditions
- All diagnostic testing including xrays, MRIs, CAT scans and ultrasounds
- All prescribed medications, nutritional supplements and therapeutic diets
- All preventive care including vaccinations, teeth cleaning and spay/neuter

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**Introducing Whole Pet with Wellness!**



**It's easier to tell you what we don't cover:**

- Pre-existing conditions
- Boarding
- Grooming
- Tax
- Waste

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**Speaker Introduction**



**Ahna G. Brutlag, DVM,  
MS, DABT, DABVT**

*Associate Director of  
Veterinary Services*

**Pet Poison Helpline  
Minneapolis, Minnesota**




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**Pet Poison Helpline**  
 800.212.6689  
 www.petpoisonhelpline.com

## What is Pet Poison Helpline?

- **24/7 animal poison control center**
  - Affiliated with University of Minnesota
- **Veterinary & human expertise**
  - 19 DVMs, 35 CVTs
    - DABVT, DABT
    - DACVECC
    - DACVIM
  - 7 PharmDs
- **Case fee of \$49 includes**
  - Unlimited consultation
  - Fax or email of case report
- **Educational center**
  - Free webinars (archived)
  - Tox tools
    - Wheel of Vomit
    - Pot of Poisons (toxic plants)
  - Textbook
  - iPhone app
  - Newsletters for vet professionals
  - Free resources for clinics
    - Videos
    - Electronic material
    - Clings

**Email us for info!**

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## Marijuana Trends at PPH

- 330% increase in cases over 5 yrs
- Sources
  - Food (“medibles”) = 66%
    - Of food, 71% contain chocolate
  - Dried plant = 19%
  - Medical = 9%\*
    - Likely under-represented
  - Unknown = 5%
- Increase in severity?



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## “Medibles”

- #1 source of PPH marijuana cases
- Common sources
  - Brownies & cookies
  - Chocolate bars/choc covered fruit
  - Gummi bears
  - Butter/coconut oil
- Risk
  - High concentration THC
  - Better bioavailability (butter/oil)
  - Co-ingestants



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**Peru**  
**HELP LINE**  
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[www.ppp.org/pe](http://www.ppp.org/pe)

## Dried plants

- #2 source at PPH
- Not your parent's plants...
  - Up to 20% THC
  - Joint = 15-30 mg THC
- Tend to see more vomiting



Mature plant courtesy of Dr. Laura Bultman, Minnesota Medical Solutions (cannabis manufacturer)




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## THC Concentrates

- 50-90% THC
- Smoked or “vaped”
- High risk


Hash Oil




Shatter



Wax



<http://honestmarijuana.com/trichomes/>




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## Medical Cannabis

<p><b>THC</b></p> <ul style="list-style-type: none"> <li>• Psychoactive</li> <li>• Binds CB1 &amp; CB2</li> <li>• Indications (people)           <ul style="list-style-type: none"> <li>– Weight loss/wasting</li> <li>– Decreased appetite</li> <li>– Nausea</li> <li>– Anxiety</li> <li>– Insomnia</li> <li>– Pain</li> </ul> </li> </ul>	<p><b>Cannabidiol(CBD)</b></p> <ul style="list-style-type: none"> <li>• Not psychoactive</li> <li>• Augments endogenous cannabinoids</li> <li>• Indications (people)           <ul style="list-style-type: none"> <li>– Seizures</li> <li>– Pain</li> <li>– Inflammation</li> <li>– Immune mediated disease</li> </ul> </li> </ul>
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**Endocannabinoids**

- Naturally-occurring substances that act within the same signaling system as exogenous cannabinoids
- Two main "endocannabinoids"
  - Anandamide = *N*-arachidonoylethanolamine = AEA
  - 2-arachidonoylglycerol = 2-AG

CCCCCCCCCCCCCCCC(=O)O  
Anandamide

CCCCCCCCCCCCCCCC(O)CO  
2-Arachidonoylglycerol (2-AG)




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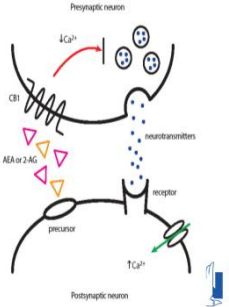

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**Endocannabinoids**

- Produced on-demand in response to stress
- Largely inhibit neurotransmitter release


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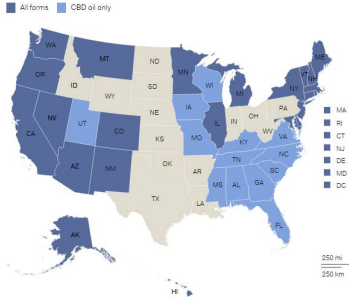

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**Medical Cannabis**


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### The MinnMed Formulary Spectrum (available in MN only)

THC Dominant      Balanced THC:CBD      CBD Dominant

<b>Red</b> THC Dominant Cannabis Product	<b>Orange</b> THC:CBD (70:30) Cannabis Product	<b>Yellow</b> THC:CBD (40:60) Cannabis Product	<b>Green</b> THC:CBD (20:80) Cannabis Product	<b>Blue</b> THC:CBD (10:90) Cannabis Product	<b>Indigo</b> CBD Dominant Cannabis Product	<b>Violet</b> CBD Only Cannabis Product
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THC Level      CBD Level

Graphic courtesy of Minnesota Medical Solutions

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### Risk to Pets?

© hushourger.com

- Concerning
  - Large doses
  - High THC concentrates (butter-based, medical)
  - Co-ingestants (i.e. chocolate)
- Less concerning
  - CBD alone
- Other risks
  - Concomitant disease
  - Bowel obstruction (packaging, pill bottle)
  - Additives in liquid formulations (alcohol, etc.)

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### Xylitol:

### There's much more to it than gum!

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## Speaker Introduction

**Renee Schmid, DVM**

*Associate Veterinarian,  
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Pet Poison Helpline  
Minneapolis, Minnesota

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## What is Xylitol

- Naturally occurring sugar alcohol found in hardwoods such as birch.
  - Xylan from bark is hydrolyzed and processed to produce xylitol
- Produced using corncob remnants from ethanol plants
- Discovered in 1891
- Approved by the FDA in 1986 as a food additive and has unlimited restrictions regarding its safety
- Used in over 35 countries

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## Characteristics of Xylitol

- Sweetener
- Anticariogenic
- Antimicrobial for oral bacteria
- Low glycemic index, ideal for diabetics
- Cooling effect in oral and nasal cavities
- Humectant
- Prevents fermentation and molding

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## Recent studies

- Ear infections
- Wound bandaging
- Return of post-operative intestinal motility
- Study in rats to ameliorate type-2 diabetes




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## Where is Xylitol Found

- Low levels in fruits and vegetables
  - strawberries, raspberries, plums, lettuce and many others
- Available in granular form
- Sugar-Free food products
  - Gum
  - Candies
  - Peanut butter
  - Pudding
  - Specialty ice creams
  - Many others
- Weight loss foods/Energy bars/Protein Powder




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## Newer products containing xylitol

- Prescription medications
  - Liquid and chewable formulations
  - Compounded drugs
- OTC products
  - Toothpaste/Mouth rinse
  - Nasal sprays
  - Chewable and liquid products
    - Dietary supplements
    - Vitamins
    - Children's supplements and medications
  - Weight loss products
- Deodorants
- Make-up remover
- Skin gel/Lotions
- More....




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### Xylitol in Dogs

- Rapidly absorbed in the stomach
- Metabolism occurs primarily in the liver
  - Most is rapidly converted to glucose
- Causes stimulation of pancreatic islet cells
  - Results in insulin release
  - Dose dependent increase in plasma insulin concentration
- Contrast from humans as it is metabolized independently of insulin




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### Xylitol Toxicity

- Very species dependent
- Species showing toxicity:
  - Dogs
  - Rabbits
  - Cows
  - Baboons
  - Goats
  - Horses (slight)
- No toxicity reported to date
  - Cats
  - Ferrets




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### Xylitol Toxicity in dogs

0.1g/kg: Hypoglycemia  
0.5g/kg: Acute hepatic necrosis

- Hypoglycemia may be seen within 30 minutes
  - Due to insulin release
- +/- Hypokalemia
- Acute hepatic necrosis may be seen in less than 24 hours for large ingestions
  - Two theories for MOA
  - ALT rises within 12 hours, peaks within 1-2 days




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## Xylitol Toxicity Calculations

- Common standard xylitol amount calculations
  - Use CAUTIOUSLY
  - 0.3g/piece if xylitol is not the first sugar alcohol
  - 1g/piece if xylitol is the first sugar alcohol
- Why doesn't a standard calculation for gum work?
- Xylitol amounts can range from approx. 2mg-1.15gm or more per piece!




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## Xylitol Toxicity Calculations

- Example: 20kg dog ingesting 14 pieces of gum with xylitol NOT listed as first sugar alcohol
  - 14 pcs x 0.3g = 4.2g/20kg = 0.21g/kg  
**TOXIC/Hypoglycemia**
  - 14 pcs x 75mg = 1.05g/20kg = 0.052g/kg  
**SUB-TOXIC**




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## Xylitol Calculation Misconceptions

Nutrition Facts	Amount/Serving	% DV*
Serving Size 1 piece (1.5g)	Total Fat 1g	2%
	Sodium 20g	0%
	Total Carb 1g	1%
	Sugar 0g	0%
	Sugar Alcohol 1g	0%
	Phenol 0g	0%

\*Percent Daily Values (DV) are based on a 2,000 calorie diet. Not a significant source of other nutrients.

Neither of these gums Contain 0.3g xylitol per piece!

Xylitol not first sugar alcohol

**INGREDIENTS: SORBITOL, GUM BASE, XYLITOL, GLYCERIN, NATURAL AND ARTIFICIAL FLAVORING, MANNITOL; LESS THAN 2% OF: ACESULFAME POTASSIUM, ASPARTAME, BHT (TO MAINTAIN FRESHNESS), BLUE 1 LAKE, SOY LECITHIN, SUCRALOSE AND YELLOW 5 LAKE.**

**PHENYLKETONURICS: CONTAINS PHENYLALANINE**




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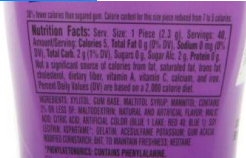
## Xylitol Calculation Misconceptions

Xylitol first sugar alcohol

**INGREDIENTS:** EDULCORANTS (XYLITOL, SORBITOL, MANNITOL, SIROP DE MALTITOL, MALTITOL, ASPARTAME, ACESULFAME K, SUCRALOSE), GOÛME BASE, STABILISANT (GLYCEROL), AGENTS ÉPAISSISSANTS (GOMME ARABIQUE, GOMME XANTHANE), AROMES, COLORANTS (DIOXYDE DE TITANE, BLEU BRILLANT FCF), ÉMULSIFIANT (LECITHINE DE SOJA), EXTRAIT NATUREL DE THE VERT, AGENT D'ENROBAGE (CIRE DE CARNAUBA), ANTI-OXYDANT (E320). UNE CONSOMMATION EXCESSIVE PEUT AVOIR DES EFFETS LAXATIFS. CONTIENT UNE SOURCE DE PHENYLALANINE.

**This gum contains <1g/piece xylitol**

**This gum contains >1g/piece xylitol**



Nutrition Facts: Serv. Size: 1 Piece (7.2 g), Servings: 48  
Amount/Calories: Calories 5, Total Fat 0g (0% DV), Sodium 0mg (0% DV), Total Carb. 2g (4% DV), Sugars 0g, Sugar Alc. 2g, Protein 0g  
\*Not a significant source of calories from fat, potassium, fat, iron and phosphorus. Dietary fiber, vitamins A, vitamins C, calcium, and zinc present only in trace amounts (20% or less based on a 2,000 calorie diet).  
INGREDIENTS: GUM BASE, MANNITOL, STREPT. MONOCHE, CALORINE. 10% LECES OF MANNITOL, NATURAL AND ARTIFICIAL FLAVOR ONLY. MAY CONTAIN ALCOHOL. COLORED WITH 1 LAYER. KEEP AWAY FROM HEAT. CONTAINS SODIUM. SALT. INGREDIENTS: POLYETHYLENE TEREPHTHALATE, POLYETHYLENE TEREPHTHALATE, POLYETHYLENE TEREPHTHALATE, POLYETHYLENE TEREPHTHALATE.  
©2015 NATIONWIDE. LAXATIVES FROM XYLITOL.

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## Xylitol Toxicity Treatment

- Call Pet Poison Helpline First!!
  - A more accurate ingested dose can be calculated to avoid over/under treating patient
- Toxic Ingestions
  - >0.1g/kg-<0.5g/kg
    - Induce emesis if blood glucose normal
    - Activated charcoal? NO!
    - Monitor blood glucose for 12 hours
    - Dextrose supplementation, if hypoglycemia develops, for 12-48 hours
    - Patient should maintain euglycemia for 6 hours without supplementation before discharge

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## Xylitol Toxicity Treatment

- Toxic Ingestions
  - >0.5g/kg
    - Same initial therapy as for lower ingestions
    - +/- Pre-emptive dextrose supplementation for hepatic support
    - Electrolytes (Hypokalemia)
    - Liver values
      - Baseline and recheck q 12 hours for 48 hours and again at 72 hours
    - Hepatoprotectant
      - Sam-E x 2 weeks

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## Xylitol Toxicity Treatment

- Toxic Ingestions
  - >0.5g/kg WITH Liver elevations
    - IV fluids with 2.5-5% dextrose supplementation
    - Monitor blood glucose
    - NAC x 17 doses
    - Sam-E x 4 weeks
    - Monitor for development of secondary coagulopathy
    - FFP and vitamin K1 if coagulopathy occurs
    - Continue to monitor for stabilization and improvement in liver values

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## Xylitol Toxicity Treatment

- Long-term monitoring
  - Recheck liver values at 1, 2 and 4 weeks to ensure values are returning to normal
  - Hepatoprotectants and monitoring liver enzymes past 4 weeks not generally necessary
    - Exception for patients with underlying liver disease prior to toxicity
  - No reports to date of chronic hepatic dysfunction

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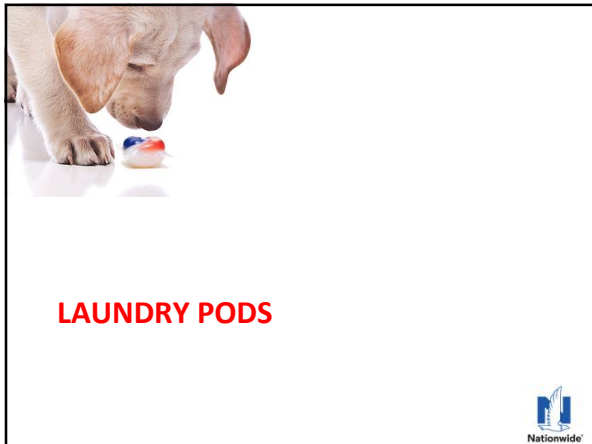
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**Speaker Introduction**



**Heather Handley, DVM**  
*Senior Consulting Veterinarian,  
Clinical Toxicology*

Pet Poison Helpline  
Minneapolis, Minnesota



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**Laundry Detergent Pods**

- Individual packet filled with the concentrated liquid detergent for one load of laundry.
- Use in Europe since 2001.
- First marketed in the United States in 2012.
- Contain ionic and non-ionic surfactants



<http://veterinarian.dvm360.com/laundrydetergentpodsconcern-kids-can-harm-pets-too>



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## Surfactants

– Non-Ionic & Anionic

Anionic	+	-	
Cationic	-	+	
Nonionic		0	
Zwitterionic (amphoteric)	+	-	

<http://petpoison.org/>

### How Surfactants Work

Surfactant Molecule

HYDROPHILIC    LIPOPHILIC

<http://www.petpoisonhelpline.com/>

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## Why are these pods so dangerous?

- Thin, dissolvable membrane under pressure from concentrated liquid soap
- After being punctured, pressure on the pack causes a fountain of soap to come out

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## Non-ionic & Anionic Surfactant Symptoms

Reported effects

- Most common effects: **skin, mucosal, and eye irritation.**
- **Vomiting and diarrhea** may occur, usually self-limiting.
- **Aspiration** can cause upper **airway irritation** and **respiratory distress**, most often in young children.
- Rarely, ingestion can cause **caustic injury to the GI tract.**
- Significant **corneal injury** is rare, but has been reported after ocular exposure.

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## Pediatric Pod Exposures

- Vomiting
- Coughing
- Loss of consciousness
- Airway compromise (rare)
- Esophageal perforation (rare)



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## PPH Data on Laundry Detergent Pods

- 319 PPH cases from March 1, 2012– March 1, 2015
- 244 patients (76.5%) developed symptoms
- Vomiting = 197 (80.7%)
- Cough = 63 (25.8%)
- Lethargy = 43 (17.6%)
- Nasal discharge = 35 (14.3%)
- Dyspnea, wheezing, or other respiratory irritation = 39 (16%)
- **Vomiting preceded respiratory signs in the majority of cases**



akronarea.com




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SYMPTOM	POD	NON-POD
Vomiting	197 (80.7%)	73 (19.68%)
Cough	63 (25.8%)	26 (7%)
Lethargy	43 (17.6%)	28 (7.55%)
Nasal discharge	35 (14.3%)	4 (1.08%)
Dyspnea, wheezing, or other respiratory irritation	39 (16%)	46 (12.38%)
Any	244 (76.5%)	147 (62.8%)




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## What's the Prognosis?

- Three deaths reported (1%).
- No necropsies performed.
- One puppy was euthanized after presenting with shock and hypoglycemia 16h after exposure to 2 PODS.
- One cat died after developing a T = 108 F° (42.2C°) ; clinician notes that the cat was suspected to have been in the dryer.
- No surgeries or endoscopies were reported to have been performed, but follow-up is limited
- Although significant symptoms are commonly seen, our information is that they **typically do well with supportive care**. This is similar to the human data.
- Published statistics are scarce.




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## Treatment Do's & Don'ts

- **Do not induce emesis.**
- **Do not give charcoal.**
- Encourage dilution
  - Be careful not to increase aspiration risk
  - Dilution may be controversial in humans
- If the animal is vomiting, give an anti-emetic and monitor for signs of aspiration pneumonia
  - Radiographic evidence may be delayed





Figure 3.  
Lateral thoracic radiograph from a dog with aspiration pneumonia showing the characteristic streak pattern commonly seen in this disease process.




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## Symptomatic and Supportive Care

- Maintain hydration with balanced crystalloid
- Provide humidified oxygen
- Antibiotics for respiratory signs
- Steroid is indicated if there is severe oropharyngeal inflammation
- Analgesia
- GI protectants (?)




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**When in doubt, call**  
**800-213-6680**



- Something you're not familiar or comfortable with
- Odd clinical signs
- Animals with preexisting disease

SAVING PET'S LIVE 24 HOURS A DAY, 7 DAYS A WEEK  
**PET POISON HELPLINE**




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**Introducing...**

**No Lilies for Kitties!**

Please help us spread the word. Visit [www.noliliesforkitties.com](http://www.noliliesforkitties.com) for more information!



**NO LILIES FOR KITTIES!**

Cats and lilies don't mix! Liliaceae species (True lilies) such as Easter, Tiger, Asiatic, Oriental, etc., and daylilies (Hemerocallis) are highly toxic to cats (not dogs or people). Ingesting petals, leaves, pollen, or even water in the vase can result in kidney failure and death. If your cat eats any part of a lily, call Pet Poison Helpline, your local emergency clinic or your veterinarian immediately. Early treatment is important!

SEE BELOW FOR SAFER FLOWER CHOICES FOR CATS

Other lily varieties shown have such as peace (Eucharis), Peruvian (Alstroemeria) and calla (Zantedaeschia) are much less dangerous and cause only minor symptoms when eaten.

**SAFER** cat flower choices include: Roses, Sulphur, Lilies, Mums, Carnations, Pinks, Baby's Breath, Spiders and Gerberas.

\*These flowers may cause vomiting and diarrhea but are not considered life threatening.





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**Grab What's New at WVC!**

Stop by **Booth #1327** to pick up...



**10 MOST COMMON TOXINS**






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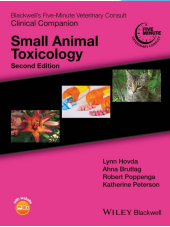
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**Blackwell's Five-Minute Veterinary Consult Clinical Companion: Small Animal Toxicology 2<sup>nd</sup> Edition**

Drs. Lynn Hovda, Ahna Brutlag, Robert Poppenga, Katherine Peterson

- Provides concise, bulleted information focused on the most important facts needed when treating a poisoned cat or dog
- Carefully organized for ease of use in an emergency, with important toxicants arranged alphabetically with categories
- Details clinically relevant information on the most common toxicants encountered by small animals
- Presents a wealth of color photographs to aid in plant identification
- Includes 14 new topics to this edition covering cyclosporine A, sleep aids, tacrolimus, bath salts, synthetic marijuana, poisonous lizards, imidacloprid, spring bulbs, and sodium monofluoroacetate



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**PET POISON HELPLINE**  
 800.213.6680  
[www.petpoisonhelpline.com](http://www.petpoisonhelpline.com)

**2016 FREE CE WEBINARS**  
 RACE-Approved CE for Veterinary Professionals  
 Register at: [www.petpoisonhelpline.com/veterinarians/webinars](http://www.petpoisonhelpline.com/veterinarians/webinars)

All webinars are from:  
**12:00-1:00 PM Central Time**

**FEBRUARY 9, 2016** - Ahna Brutlag, DVM, MS, DABT, DABVT  
*Hot Topics in Toxicology: Marijuana, Xylitol, and Laundry Pods*

**APRIL 12, 2016** - Ahna Brutlag, DVM, MS, DABT, DABVT  
*Let's Chew the Fat: Updates on the Use of Intravenous Lipid Emulsion*

**JUNE 7, 2016** - Sarah Gray, DVM, DACVECC  
*A Year in Review: What's New in the Veterinary Toxicology Literature*

**SEPTEMBER 20, 2016** - Colleen Almgren, DVM, PhD, DABT, DABVT  
*Vitamins, Minerals, and Herbal Supplements: The Good, the Bad and the Very, Very Bad*

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**NYS ED**  
 Approved by a New York State committee of continuing education for veterinarians and veterinary technicians

**Nationwide**

Course meets the requirements for 1 hour of continuing education credit per lecture in jurisdictions which recognize AAOSB RACE approval; however, participants should be aware that some boards have limitations on the number of hours accepted in certain categories and/or restrictions on certain methods of delivery of continuing education.

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SAVING PETS' LIVES, 24 HOURS A DAY, 7 DAYS A WEEK

**PET POISON HELPLINE**

**Nationwide**

**Thank you for attending!**

CE credit FAQs

1. **When will I get my CE certificate?** We'll email it to you within 24 hrs.
2. **I attended the webinar but wasn't the person who logged in. Can I still get interactive CE credit?** Yes. Send your name and email address to [info@petpoisonhelpline.com](mailto:info@petpoisonhelpline.com) by **1 pm central time on Feb 10, 2016** (strict deadline).
3. **Can I watch the recorded webinar online for CE credit?** Yes. You can receive non-interactive CE credit. Go to the "For Vets" page on our website, [www.petpoisonhelpline.com](http://www.petpoisonhelpline.com) for more info.

Comments? Questions? Email us! [info@petpoisonhelpline.com](mailto:info@petpoisonhelpline.com)

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