



Awareness of xylitol toxicity in dogs still lacking

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For The VIN News Service

After Sophie binged on approximately 60 pieces of sugarless gum, what stands out in the minds of her owners Andi Dennison and Peter Johnson isn't the six days of intensive treatment for the yellow Labrador retriever, nor the \$7,000 medical bill.

What stuns the Gaithersburg, Md., couple, is that they had no idea the artificial sweetener xylitol, commonly found in sugarless gum and other candies, is toxic to dogs.

They had never heard that xylitol (pronounced ZI-luh-tohl) can wreak havoc on a canine's blood sugar levels, resulting — in severe cases — in liver failure.

"The only people who I knew that knew xylitol was toxic were the vets and vet techs," Dennison said.

Like Sophie's owners, many pet owners are just discovering the [dangers of xylitol](#). The veterinary community itself has been aware of xylitol toxicity to dogs for only a few years, and many practitioners have questions about appropriate treatment.

Members of the Veterinary Information Network (VIN), an online profession for the community and parent of the VIN News Service, regularly raise questions such as: [How much xylitol is in one piece?](#) [How much xylitol remains in chewed gum?](#) [How long should a dog that's eaten xylitol be treated?](#) [Does ingestion cause long-term health effects?](#)

The number of products containing xylitol seems to be growing, as is the number of poisoning cases, judging from records kept by the American Society for Protection of Animals' Animal Poison Control Center ([ASPCA APPC](#)) in Urbana, Ill.

According to ASPCA APPC Medical Director Dr. Tina Wismer, the center began in 2007 to tally cases involving xylitol. That year, the center fielded 1,764 calls. In 2011, the call volume reached 3,045, an increase of 73 percent.

Certain foods are well-known to dog owners to be toxic to their pets. Who hasn't heard that dogs shouldn't eat chocolate, grapes and raisins? But most, it seems, don't realize that products containing xylitol may cause more harm.

"I'll get calls from people saying 'My Great Dane just ate two M&Ms,' but xylitol is far worse than chocolate," said Dr. Tony Johnson, a clinical assistant professor at Purdue University College of Veterinary Medicine and an emergency-



Photo by Phyllis DeGioia

A variety of sugarless gums, including some in this rack at a grocery store in Wisconsin, contain the artificial sweetener xylitol, which is toxic to dogs.

medicine consultant at VIN.

"I think people don't know more about (xylitol) because whenever there is something that presents harm to animals, companies aren't necessarily shouting from the rooftops about it," Johnson said.

Moreover, he noted, it hasn't been that long that the veterinary medical community has known about the hazards of xylitol to dogs.

"I can remember seeing cases where we didn't know what the dog got into and now we realize what it was," Johnson recalled. "Back then, if I heard a dog got into chewing gum, my reaction would have been 'Let him chew it.'"

"I wonder what else we're going to find out is toxic in five years?" Johnson mused.

The [first paper](#) in a veterinary journal about xylitol appeared in 2004. The author of that study, published in *Veterinary & Human Toxicology*, predicted, "With the increased appearance of xylitol-sweetened products in the U.S., xylitol toxicosis in dogs may become more common."

By comparison, the first study to appear in a veterinary journal about [problems with chocolate](#) in dogs was published in 1981, according to results of a search on PubMed, a database-access service maintained by the U.S. Library of Medicine.

Xylitol is a natural substance derived from the bark of birch trees. It is referred to as an artificial sweetener because it is a sugar alcohol. In people, xylitol generally has no effect on plasma insulin or glucose levels, making it a popular sweetener among diabetics. The substance seems to be tolerated by most people, although it can cause diarrhea in some. Research suggests the use of xylitol instead of sugar [may benefit dental health](#).

Dogs metabolize xylitol differently from people. In dogs, xylitol triggers a large release of insulin that causes a sudden drop in blood sugar, a condition called hypoglycemia. According to Johnson, signs of hypoglycemia include unsteadiness, depression, dilated pupils and, in severe cases, seizures. If ingested in quantity, xylitol may lead to liver failure. Signs are subtle and include lethargy, vomiting, loss of appetite and diarrhea.

According to Wismer, the toxic dose of xylitol for dogs is 75-100 mg/kg. It's easy enough to determine the weight of an affected dog, but knowing how much xylitol the dog ate is another matter. Wismer said some manufacturers consider the level of xylitol in their products to be proprietary information and refuse to disclose it. The amount may differ not only from manufacturer to manufacturer, but from flavor to flavor.

Based on information provided by some manufacturers, Wismer has deduced that the quantity of xylitol in one piece of gum ranges from 0.9 mg to 1,000 mg. "It's a big difference," she said.

Products that list xylitol as the first ingredient tend to be the most toxic to dogs, she added.

As with most toxicants, the dose makes the poison. That explains why xylitol in doggy dental products, such as Virbac's [AquaDent](#), doesn't sicken its users. Wismer said the amount of xylitol is so low that ingestion by dogs is equivalent to people eating apple seeds, which contain traces of cyanide.

The form of xylitol used in a product affects its toxicity, as well. Wismer said some xylitol used in candies and mints is in a powder that is absorbed quickly in the system, causing signs of illness in 30 minutes.

Gum is different. "You have to chew to release xylitol," Wismer said, noting that dogs tend to swallow gum whole without chewing. "It still leaches out into the stomach but it takes longer. ... If we haven't seen any signs after eight to 12 hours of (a dog) ingesting gum, toxicity won't be an issue. That means we have a lot of time to make these dogs vomit and decrease the amount absorbed."

As for the dangers posed to dogs of eating already-chewed gum, Wismer said the more thoroughly a piece of gum has been chewed, the less sweetener it will contain.

Johnson, one of three veterinary criticalists at Purdue, said assessing the severity of a case of xylitol ingestion is tricky. "There is no assay or test to run to determine how much they got into," he said. "I've only seen a couple of cases, and they were mildly clinical. I think people need to be aware but they don't need to freak out. It's not up there

with antifreeze and rat poison. It's fairly easy to treat if you know what you're dealing with."

According to Johnson, typical treatment for xylitol toxicity is supportive treatment of fluids with dextrose to reduce the hypoglycemia. In severe cases, some veterinarians also may give dexamethasone, a corticosteroid, and glucagon, a hormone used to raise very low blood sugar.

Johnson pointed out that not every significant ingestion results in liver failure. When it does, no "magic bullet" exists to treat it, he said. Supportive care is given while the patient's blood chemistry is tracked.

Length of treatment depends on severity of clinical signs. Johnson said a typical case without liver involvement generally requires one to three days of treatment. He said treatment should continue until glucose levels are normal or as directed by the APCC.

As far as long-term health effects, Wismer said she hasn't seen any lingering medical issues once liver problems are successfully resolved.

Other household pet species may be affected by xylitol, as well, but the evidence is unclear.

The U.S. Food and Drug Administration Center for Veterinary Medicine has [posted a caution](#) about the dangers of xylitol ingestion in dogs and ferrets. However, Wismer said the APCC has received no reports of xylitol poisoning in ferrets.

On the contrary, "We've had several cases with ferrets who ate gum and had no problems," Wismer said.

How about cats? Wismer said cats appear to be able to eat xylitol with no ill effect. "Some toxicity studies found that it was not a problem orally but when given by IV can cause liver failure. It depends on the quantity and method of administration," she said.

Lessons learned by experience

The kind of gum Sophie the yellow Lab ate was a Korean brand called Lotte. Her owners estimate that they'd eaten only three pieces from the 60-piece pack of "pink mint" flavored gum before Sophie helped herself to the rest.

Sophie is a trim 57 pounds, but even a giant breed would have trouble with that quantity.

Johnson came home to find the empty package and saw that Sophie had been vomiting and having diarrhea. "Xylitol" was the only word in English on the Korean [packaging](#). Fortunately, that's the only word Sophie's owners and veterinarian needed to know.

At first, though, Johnson and Dennison didn't know they should be concerned. They noticed Sophie was a bit lethargic and slightly unbalanced, but the 7-year-old Lab has had two hip surgeries (bilateral femoral head ostectomies) so her gait sometimes is wobbly.

The next morning, they realized she'd continued being sick throughout the night. As Johnson put it, "She vomited plenty." Dennison didn't give her breakfast but took Sophie for her usual morning walk. When Dennison got to work, she searched xylitol on the Internet. What she learned caused her to call her veterinarian immediately.

At the clinic, "Sophie was kind of dopey and low energy," Dennison remembered. "They took blood and said she was a little tachy (having a rapid heart rate) and a bit in shock, and gave her some fluids.



Photo by Peter Johnson

Sophie, a yellow Labrador retriever, was hospitalized for the better part of a week and nearly died after she devoured nearly 60 pieces of gum containing xylitol. She recovered.

Dennison went on: "They said, 'If she's more stable in an hour you can go to work,' so I went back. At the end of the day they said, 'She can come home tonight.' They said, 'If she vomits or seems like she's not OK, call immediately.' "

At home, Sophie wasn't interested in eating. She "threw up quite a lot," Dennison said, remembering it as "very yellow ... almost entirely water."

She phoned the veterinary hospital. "They said to bring her right back. They asked if the vomit was yellow, and they said that they asked because of her liver malfunction," she recounted. At the hospital, "They took more blood. The vet came back and was crying. She remained as professional as she could but tears were coming, and she said pieces of Sophie's liver were starting to die. The vet had already called poison control and the emergency hospital."

Sophie's measurement of alanine aminotransferase (ALT), a liver enzyme, was off the scale at 10,000 — the highest level the equipment could detect. The actual level may have been higher. In a healthy dog, the high end of the normal range is 150.

At that point, Dennison was given what she calls the "don't-get-your-hopes-up talk." But neither she nor the veterinarian was ready to give up. Sophie was put on an IV, given some medication and monitored for several days in the hospital. By the fifth day, they knew she would be all right.

The ER veterinarian told Dennison that the likely reason Sophie survived the episode was that she had vomited so much of the gum.

The harrowing episode happened a few days before Christmas. Her ALT now is normal.

Sophie's case was remarkable because of how much gum she swallowed, but even a few pieces can cause trouble.

Ralph Kamps of Madison, Wisc., always had gum in his pockets. One day a few years ago, a few pieces of mint-flavored Trident fell out. Kamps' golden retriever, Maddie, snarfed them up in front of him.

"I didn't think much of it at the time," Kamps said. He figured, "That will come out the other end tomorrow."

But in the middle of the night, it became apparent that something was wrong.

Kamps' daughter Danielle, a college student at the time, was home from school and slept that night on the couch in the family room with Maddie. Danielle awakened her dad in the middle of the night to say that Maddie was trying to walk but just kept leaning on the couch, Kamps recalled.

"I came down and at first I thought maybe she had hit her head on the coffee table and was a bit disoriented. But it kept up, and then she laid on the floor looking at us with those big, brown, dazed, glassy eyes, almost saying 'Help me, I don't know what is happening to me.' Well, after a few minutes of hugging and holding her and it didn't get better, we both thought this could be a seizure. She wasn't shaking or anything but just could not stand up, as hard as she tried, and (she) walked sideways, etc., and would fall over."

Kamps and his daughter headed out to the emergency veterinary hospital with Maddie, having great difficulty getting her into the car. Once at the ER, Maddie seemed momentarily to improve, but then urinated on the floor and her eyes became glazed again. The doctor said Maddie could be having another seizure; she wasn't sure why.



Photo by Danielle Kamps

After eating three pieces of gum sweetened with xylitol, Maddie had minor seizures and spent half a night at an emergency veterinary hospital a few years ago. She has had no more seizures — nor any xylitol — since.

Spread the word

Veterinarians can help educate the public about the dangers of xylitol poisoning in dogs by informing their clients, posting

At 6 a.m. when Maddie seemed stable, Kamps called his regular veterinarian and took the dog there straightaway. Blood analysis showed some enzymes suggestive of a seizure. Kamps said blood-work results at the emergency hospital had been similarly inconclusive. "Her enzymes were off but it was hard to tell. She had indications of a seizure," he said.

Before leaving the clinic, Kamps picked up a brochure about canine seizures. That's when he learned that xylitol may trigger seizures. "Checked my gum when I got home, and sure enough," Kamps said: "second ingredient was xylitol."

Maddie has not had another seizure since then, and Kamps is careful to keep anything with xylitol away from her.

These days, xylitol is used in far more products than gum, candy and dental rinses. It shows up in nasal spray, powdered protein, chewable vitamins, throat lozenges, sugar replacement for baking; the list goes on. Xylitol even is impregnated in fabric for a "cooling" effect. That fact has led veterinarians to [ask whether a dog could be harmed by eating xylitol-containing fabric](#). Not even veterinary toxicologists can answer that one.

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warnings in their clinics and linking to trusted sources on their websites or through social media.

They also may share the ASPCA Animal Poison Control Center's 24-hour hotline number: **(888) 426-4435**

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