



Dr. Janet is a native of Puerto Rico and received her B.S. (1982), D.V.M. (1984) and M.S. in Pathology (1984) from Kansas State University (KSU). Upon graduation she worked as a small animal intern at KSU's College of Veterinary Medicine Teaching Hospital until she and her family relocated to Raleigh, NC. She worked as a dermatology intern at NCSU-CVM, was a full time associate at Six Forks Animal Hospital in Raleigh until relocating to Greensboro. She worked as a full time associate veterinarian at Cobb Animal Clinic until opening Adams Farm Animal Hospital, P.A. on November 6, 1989. During her 34 years of clinical practice, Dr. Janet has continuously dedicated herself to serving the local veterinary community, serving as a board member of the NCVMA (2001-2010) and as an officer for the Guilford County VMA (2001-2016), and as a clinical investigator for pharmaceutical trials. While she enjoys all aspects of veterinary medicine, her main interests are dermatology, internal medicine, preventative medicine, and surgery for both canine and feline patients.

Chocolate Toxicity in Dogs

by Janet J. Raczowski, D.V.M., M.S.

Chocolate toxicity in dogs is one of the most common toxicities (top 20) treated in Veterinary Medicine. Not surprisingly, incidence rates are higher around certain holidays, such as St. Valentine's Day, Easter and Halloween, when we tend to buy and give chocolate. Chocolate is a mixture of cocoa beans and butter. It contains theobromines and caffeine, which are chemicals classified as methylxanthines. Unfortunately, dogs are very sensitive to methylxanthines - even a small dose can be potentially fatal. As a species, dogs are more sensitive due to metabolic differences. The formation of unique active metabolites in the system upon ingestion and decreased detoxification enzymes result in a longer half-life (the time it takes for a drug or a compound's blood level to drop by 50%) in dogs compared to other species. Most of the toxic effects are due to the theobromine compound and not due to the caffeine.

Other factors can also predispose them to this common toxicity:

1. Most dogs do not have an "off" switch when it comes to eating. The average person (unless you are a "chocoholic" like me) will eat two-three pieces of chocolate or brownies and stop when satisfied. Dogs will likely eat the entire bag or the whole pan of freshly baked brownies we left on the counter to cool down.
 2. Dogs are generally smaller than people so they ingest a higher dose on a milligram per pound of body weight basis. This means "small amounts" can actually be a toxic dose.
 3. Most dogs will even eat very concentrated forms of chocolate (like baking chocolate or unsweetened cocoa) which people find bitter to the taste.
- The amount of methylxanthines in chocolate depends and varies by type and manufacturing process. Susceptibility to chocolate toxicoses varies according to a dog's individual sensitivity and pre-existing health issues. As a general rule, the darker and more bitter the chocolate, the higher the concentration of methylxanthines and the more toxic it could be. In fact, unsweetened baking chocolate contains seven times the concentration of theobromine than milk chocolate. White chocolate is a combination of cocoa butter, sugar, butterfat, milk solids and flavorings without cocoa beans so it contains negligible amounts of methylxanthines.

Clinical signs usually occur within 6 to 12 hours of ingestion. Initially, symptoms can include polydipsia (excessive thirst), vomiting, diarrhea, bloating and restlessness. Signs can progress to hyperactivity, hyperthermia (elevated body temperature), coma and death (due to cardiac and/or respiratory failure).

The mechanism of action of methylxanthines is to competitively inhibit cellular receptors of adenosine (a chemical that is present in cells) which results in CNS (central nervous system) stimulation and tachycardia (elevated cardiac rate). Although theobromine and caffeine have an LD50 (dose of metabolite at which first deaths would be expected) of 100- 200 mg per kilogram of body weight, clinical signs can be seen at doses well below this dose.

Table 1. Symptoms and Toxicity

Mild symptoms (like vomiting and diarrhea) can be seen at 20 mg/kg. Mild to moderate toxicity can result in tachycardia at 20 to 40 mg/kg. Moderate to severe toxicity symptoms are seen at 40 to 60 mg/kg. Severe signs (like coma and death) can be seen at doses over 60 mg/kg.

Early treatment includes decontamination procedures such as emesis (induce vomiting) and possibly administration of activated charcoal (to prevent further absorption). Cardiovascular function monitoring (blood pressure, EKG) and beta-blockers (medication to treat tachycardia) may be warranted. Supportive care (intravenous fluids) is also instituted to help improve clearance of the toxic metabolites in the event of moderate to severe toxicity. An interesting fact is that methylxanthines (in particular caffeine) can be resorbed through the urinary bladder wall (once excreted by the kidneys) which can contribute to prolongation of the clinical signs. For this reason, veterinary staff will take extra steps to keep the patient's urinary bladder empty by frequent walks and/or urinary catheterization.

One ounce of baking chocolate can be toxic in a 50 lb dog! If you suspect or know your beloved dog ate your chocolate please seek medical help and contact your veterinarian immediately! It's very helpful to us to know the type of chocolate and the amount the dog has ingested if possible. The earlier the intervention the better chance your dog will have of a full recovery. Of course the best way to "treat" this toxicity is prevention: if you have a "counter surfer" in your home, make sure to leave your freshly baked chocolate brownies inside the cabinet and ensure to leave the semisweet chocolate chips or the big box of Valentine chocolates out of their reach and in a secure location.

Table 2.

Based on Animal Poison Control Center Data the following is the average concentration of methylxanthines (mg per ounce):

Chocolate type	Theobromine	Caffeine
White chocolate	.25	85
Milk chocolate	.58	6
Dark sweet chocolate	130	20
Semisweet chocolate chip	.38	22
Baker's (unsweetened)	393	47
Dry cocoa powder	737	70
Instant cocoa powder	136	15
Cocoa beans	600	0
Coffee beans	0	600
Cocoa beans hulls	255	N/A

If you suspect your pet has ingested anything toxic you can contact The Animal Poison Control Center at 1-888-426-4435* (There may be a fee depending on the call).



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