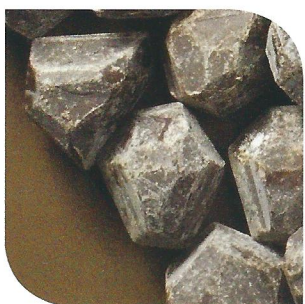
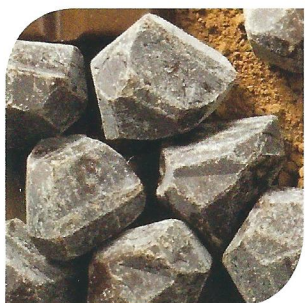


Chocolate Toxicosis in Dogs

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As Valentine's Day approaches, it's no surprise that dogs are getting into chocolate. In fact, ASPCA Animal Poison Control Center (APCC) received almost 10,000 calls about chocolate toxicosis in 2013. As an emergency critical care specialist and toxicologist, chocolate toxicosis is one of my favorite emergencies, as emesis induction finally smells oh-so-sweet.

Chocolate, a naturally occurring alkaloid found primarily in the *Theobroma cacao* plant, contains methylated xanthine derivatives (e.g., theobromine, methylxanthine). As chocolate is prevalent in pet owners' households, this is a very common toxicosis that veterinary professionals must feel comfortable treating. Sources of chocolate include:

- Valentine's candy
- Chocolate-containing calcium chews (e.g., Viactiv)
- Cocoa
- Chocolate liquor
- Chocolate-covered espresso beans
- Baked goods

When it comes to chocolate poisoning, *it's the dose that makes the poison*. A few chocolate chips aren't going to cause a problem, but keep in mind that when it comes to chocolate, the *darker and the more bitter the chocolate, the bigger the*

poisoning problem. Keep in mind that there are variable amounts of theobromine in products (See **Table 1**). Baked goods contain very little theobromine. Likewise, white chocolate has very little "real" chocolate in it, and rarely poses a threat. For a 50-pound dog, it would take over 100 pounds of white chocolate to result in true chocolate toxicosis. (That said, they'd get sick from all that fat and sugar, which can result in gastroenteritis and pancreatitis.) Milk chocolate has more theobromine, and approximately 8 ounces (half a pound) can result in toxicosis in a 50-pound dog. As for more concentrated, bitter types of chocolate? Baker's chocolate and dark chocolate pose the biggest problem. Only 1 ounce of Baker's chocolate could result in toxicosis in that same 50-pound dog. Check out Table 2 to figure out if your patient ingested a toxic amount of milk chocolate.

Thankfully, most pet owners are aware that chocolate is poisonous. Depending on the type and amount of chocolate ingested, clinical signs may include:

- Hyperactivity
- Agitation
- Vomiting
- Diarrhea
- Lethargy
- Panting

- Polyuria
- Tachyarrhythmias
- Hypertension
- Tremors
- Hyperthermia (secondary to hyperactivity, tremoring, anxiety, etc.)
- Tachypnea (secondary to aspiration pneumonia)
- Dyspnea (rare)
- Seizures (rare)
- Death (rare)

With chocolate toxicosis, clinical signs can be seen when the amount of theobromine ingested is > 20 mg/kg (e.g., vomiting, diarrhea). With toxic ingestions > 40 mg/kg, cardiotoxicity (e.g., ventricular premature contractions, tachyarrhythmias, hypertension, etc.) may be seen. With toxic ingestions > 60 mg/kg, neurotoxicity can be seen (e.g., tremors, seizures, etc.).

TREATMENT

Treatment for chocolate toxicosis will depend on the amount ingested - and how much comes up with emesis! Ideally, the first step is calculating whether a toxic dose has been ingested.* Non-toxic doses (e.g., a few chocolate chip cookies) do not necessarily warrant the need for decontamination unless the risk of gastrointestinal upset or pancreatitis exists. If a toxic dose is ingested, decontamination is warranted. As chocolate often stays in the gastrointestinal tract for a

prolonged period of time, emesis induction up to 4-6 hours post-ingestion may be of benefit, provided the patient remains asymptomatic. Further decontamination includes administration of multiple doses of activated charcoal (1-2 g/kg, PO, q 6 hours X 24 hours), as chocolate undergoes enterohepatic recirculation.

Depending on the severity of clinical signs and timing of decontamination, further treatment may include:

Fluid therapy: Depending on whether the patient is treated on an outpatient or inpatient basis, either subcutaneous or intravenous (IV) fluids is warranted. This is important to help prevent rare side effects from multiple doses of activated charcoal (e.g., hypernatremia). For patients on IV fluids, the goal of hydration should be a PCV/TS of 35% and 5 g/dL.

Gastrointestinal support: The use of a potent anti-emetic such as maropitant, dolasetron or ondasetron is warranted to prevent vomiting of activated charcoal. This will also aid in patient comfort and help prevent secondary complications (e.g., nausea, aspiration pneumonia, etc.). The use of a pro-kinetic (e.g., metoclopramide) can also be considered to help expedite fecal expulsion of the chocolate-charcoal mixture.

Cardiovascular support: If a cardiotoxic dose (> 40 mg/kg) has been ingested, the patient's heart rate and blood pressure should be carefully monitored (q. 1-4 hours). If the patient is

agitated, tachycardiac (> 180 bpm), and hypertensive (systolic > 180 mm Hg), the use of sedatives (such as acepromazine) is warranted. If continued tachycardia is still observed despite anxiolytics, the use of parenteral beta-blocker therapy (e.g., propranolol) is necessary.

Neurologic support: If a neurotoxic dose (> 60 mg/kg) has been ingested, the patient should be treated with muscle relaxants (e.g., methocarbamol, 50-220 mg/kg, IV PRN) for tremors or anti-convulsants (e.g., diazepam, 0.25-0.5 mg/kg, IV PRN; phenobarbital, 4-20 mg/kg, IV PRN; etc.) for seizures as needed.

Symptomatic supportive care: As chocolate has a long half-life (approximately 17 hours), clinical signs can be seen for up to 72 hours, and treatment should be continued until clinical signs resolve. Note: Patients should be walked frequently (q. 4 hours) to prevent reabsorption of methylxanthines from the bladder.

Overall, the prognosis for chocolate toxicosis is excellent with supportive care. Some patients may develop secondary pancreatitis or other signs of toxicosis, particularly if other ingredients were involved (e.g., macadamia nuts).

When in doubt, help educate your pet owners on how to avoid chocolate poisoning in the first place by keeping it safely out of reach... particularly during the holidays! When in doubt, you can always calculate if the dose is toxic or call ASPCA APCC for life-saving care.

Table 1. Amount of theobromine per ounce of food item

PRODUCT	THEOBROMINE
White chocolate	0.25 mg/oz
Milk chocolate	44-60 mg/oz
Dark chocolate	135 mg/oz
Unsweetened baker's chocolate	390-450 mg/oz
Dry cocoa powder	400-737 mg/oz
Cocoa beans	300-1500 mg/oz
Cocoa bean mulch	56-900 mg/oz

Table 2. Toxic dose of milk chocolate (60 mg/oz) for dogs

WEIGHT (in kgs)	MILD REACTION (20 mg/kg)	MODERATE TO SEVERE REACTION (> 40 mg/kg)
2.5	0.8 oz	1.7 oz
5	1.7 oz	3.3 oz
7.5	2.5 oz	5 oz
10	3.3 oz	6.7 oz
15	5 oz	10 oz
20	6.7 oz	13.3 oz
25	8.3 oz	16.7 oz
30	10 oz	20 oz
35	11.7 oz	23.3 oz
40	13.3 oz	27 oz
45	15 oz	30 oz
50	16.7 oz	33 oz

* Order your free ASPCA APCC "Dogs & Chocolate" wheel from <http://aspcapro.org/freebies>

