The winter holiday season holds an abundance of dangers for domestic pets that could result in toxicosis. This article will focus on exposures to chocolate, grapes and raisins, and homemade playdough in dogs. Plants that dogs and cats are commonly exposed to during the winter months will also be discussed.
**CHOCOLATE**

The APCC received more calls about chocolate than any other agent in 2016, averaging over 41 cases per day. An influx of chocolate exposures is observed by APCC during the winter season because the agents are readily available to pets in the home. Examples of common forms of chocolate the APCC receives calls about are candy bars, snack mixes, chocolate desserts (brownies, cakes, and cookies), and baking goods such as chocolate chips and cocoa powder.

Chocolate contains 2 methylxanthines of toxicologic significance: theobromine and caffeine.¹ The concentration of these methylxanthines differs between products (TABLE 1). White chocolate has a very low concentration of methylxanthines and has low toxicologic significance. Milk chocolate, dark chocolate (semi-sweet chocolate), baking chocolate (unsweetened chocolate), and cocoa powder have much higher concentrations of methylxanthines, and exposures to these more commonly result in toxicosis.

Methylxanthine toxicosis causes stimulation of the cardiovascular and central nervous systems. The degree of toxicity is dose dependent. With low doses of chocolate, only mild gastrointestinal (GI) upset is observed. At cardiotoxic doses, more severe signs such as tachycardia, tachypnea, hyperthermia, cardiac arrhythmias, tremors, and seizures can develop. If exposure to chocolate is suspected or observed, an estimated dose of methylxanthines should be calculated. In an asymptomatic patient, this dose will determine whether decontamination or treatment is necessary (BOX 1).

**Decontamination and Treatment**

Decontamination through emesis is recommended in patients that have ingested >35 mg/kg of methylxanthines. Doses lower than this are not expected to cause serious clinical signs. With large exposures to chocolate that do not yield a toxic dose, emesis is recommended to prevent severe GI upset and to decrease the risk of pancreatitis. Emesis should be considered if the exposure occurred within the past 2 to 6 hours.²

Activated charcoal can help in preventing absorption of methylxanthines from the GI tract. However, charcoal can cause electrolyte changes and therefore is only recommended when a risk of severe toxicosis exists.

**TABLE 1 Concentration of Methylxanthines in Different Types of Chocolate**

<table>
<thead>
<tr>
<th>TYPE OF CHOCOLATE</th>
<th>CONCENTRATION OF METHYLXANTHINES a</th>
</tr>
</thead>
<tbody>
<tr>
<td>White chocolate</td>
<td>1 mg/oz</td>
</tr>
<tr>
<td>Milk chocolate</td>
<td>65 mg/oz</td>
</tr>
<tr>
<td>Dark chocolate</td>
<td>165 mg/oz</td>
</tr>
<tr>
<td>Baking chocolate</td>
<td>400 mg/oz</td>
</tr>
<tr>
<td>Unsweetened cocoa powder</td>
<td>800 mg/oz</td>
</tr>
</tbody>
</table>

aAmounts used by the APCC in calculating chocolate dose.

There is no antidote for chocolate toxicosis; therefore, treatment consists largely of supportive and symptomatic care.² Propranolol is recommended in treating moderate to severe tachycardia,² whereas muscle tremors can be managed with methocarbamol or diazepam.² Diazepam is also recommended for the management of seizure activity.² IV fluids are recommended to help increase excretion of methylxanthines,² and the bladder should be emptied regularly to prevent reabsorption of methylxanthines through the bladder wall.²

The prognosis for chocolate toxicosis is generally considered good with successful decontamination and veterinary intervention.¹ However, pets that present with seizures or tachyarrhythmias have a more guarded prognosis.²

**GRAPES AND RAISINS**

Exposures to grapes and raisins are especially common during the winter season because these items are used in many holiday recipes and meals.

Grapes, raisins, and zante currants belong to the genus *Vitis*, and ingestion can result in acute renal injury in
dogs. The mechanism of action is unknown at this time. Although studies have evaluated these fruits for mycotoxins, pesticides, heavy metals, and vitamin D₃, there have been no positive results for these nephrotoxins.

Not all dogs that ingest grapes or raisins develop acute renal injury. A dose-response relationship, common to other toxic agents, has not been observed with Vitis exposures. Therefore, the severity of toxicosis does not depend on the amount of grapes or raisins ingested.

Also, grape seed extract, grape juice, grape jelly, and wine have not been shown to cause Vitis toxicosis. Clinical signs may be delayed by several hours after the ingestion of Vitis species. Vomiting is common within the first 24 hours, followed by diarrhea, anorexia, lethargy, and abdominal pain. Oliguria or anuria may be observed days to weeks after the exposure as renal injury progresses. Elevated creatinine, blood urea nitrogen, calcium, and phosphorus can be observed 24 hours after ingestion.

To calculate a dose of chocolate, 3 pieces of information are needed:

- The weight of the pet in kg
- The amount of the agent ingested in grams or ounces
- The estimated concentration of methylxanthines

**Milk Chocolate**

For example, consider a 15-kg dog that has ingested a 3.5-oz solid milk chocolate bar (solid meaning there are no nuts or fillings). Milk chocolate contains an estimated methylxanthine concentration of 65 mg/oz. To get the mg/kg dose of chocolate, the weight of the chocolate bar is multiplied by the concentration of methylxanthines, which is then divided by the pet’s weight in kg.

\[
3.5 \text{ oz} \times 65 \text{ mg/oz} = 227.5 \text{ mg} / 15 \text{ kg} = 15.166 \text{ mg/kg}
\]

A 15-mg/kg dose of chocolate would be expected to cause only mild GI upset with a low risk of pancreatitis. No veterinary treatment would be required for this exposure.

**Dark Chocolate**

However, if this chocolate bar were made of dark chocolate, then the concentration of methylxanthines would be 165 mg/oz.

\[
3.5 \text{ oz} \times 165 \text{ mg/oz} = 577.5 \text{ mg} / 15 \text{ kg} = 38.5 \text{ mg/kg}
\]

A 38.5-mg/kg dose of chocolate is not cardiotoxic, but could cause moderate GI upset, polydipsia, pancreatitis, and mild agitation or hyperactivity. In an asymptomatic patient, emesis would be recommended. With successful emesis, further veterinary care would not be required.

**Baking Chocolate**

Some milk and dark chocolate bars show a percentage of cacao on the label, which is generally seen on the front of the bar and not in the ingredient list. Cacao is unsweetened (baking) chocolate. If this percentage is observed, then an extra calculation must be done to obtain the bar’s estimated concentration of methylxanthines. A range of estimated concentrations exists, but the APCC uses those listed in TABLE 1. For example, if the label shows a 65% concentration of cacao, the APCC multiplies the percentage by 400 mg/oz.

\[
0.65 \times 400 \text{ mg/oz} = 260 \text{ mg/oz}
\]

When substituted into the previous equation, the 15-kg dog that ingested a 3.5-oz dark chocolate bar containing 65% cacao has an estimated chocolate dose of 60.67 mg/kg.

\[
3.5 \text{ oz} \times 260 \text{ mg/oz} = 910 \text{ mg} / 15 \text{ kg} = 60.67 \text{ mg/kg}
\]

This dose is at a cardiotoxic level and can be expected to significantly stimulate the cardiovascular and central nervous systems. Hospitalization would be recommended.

Calculating a dose of chocolate can be challenging, especially if the agent involved is a baked good such as a chocolate cake or brownie. Looking at the ingredients in the agent will help determine what concentration of methylxanthines should be used in the dosage calculation. With purchased baked goods or box mixes, the ingredients are commonly printed on the label. If the baked good was made from scratch, ask the owner what ingredients were used in the recipe, the amounts of each ingredient, and the amount of the baked good yielded.
after ingestion, whereas pathologic changes observed on blood chemistries may be delayed by several days.

**Decontamination and Treatment**

Any exposure to grapes or raisins should be considered significant, and decontamination via emesis and activated charcoal is recommended. Grapes and raisins have a tendency to sit in the stomach for prolonged periods of time; therefore, emesis can be induced in asymptomatic patients up to 6 hours after the exposure.

Protection of the kidneys is critical with exposures to *Vitis* species. IV fluid diuresis is recommended for 48 to 72 hours. A baseline blood chemistry should be obtained and rechecked every 12 hours for 72 hours to monitor renal function, and electrolytes should be monitored along with urinalysis. Furosemide, dopamine, or mannitol can be used to treat oliguria, while hemodialysis or peritoneal dialysis may be helpful in treating uremia. The prognosis is considered poor for pets that develop weakness, ataxia, oliguria, or anuria.

**HOMEMADE PLAYDOUGH**

Exposures to homemade playdough are not as common as exposures to chocolate or grapes and raisins. The ingestion of playdough, however, can result in rapid onset of a life-threatening toxicosis called hypernatremia, an excessive amount of sodium in the blood.

**Onset of Hypernatremia**

Homemade playdough, used to make salt ornaments and other holiday crafts, is made from dough consisting of flour, table salt (sodium chloride), and water. Other ingredients such as vegetable oil, cornstarch, and cream of tartar are also used in some recipes. Homemade playdough contains a high concentration of salt. Some dough formulations contain 8 g of salt per tablespoon of dough. When the dough is ingested, an increase in sodium in the vasculature results in a fluid shift in the body, causing cellular dehydration and vascular expansion.

Signs of salt toxicosis can be observed at a dose of 2 g of NaCl per kilogram of body weight, with the lethal dose at 4 g/kg. A dog is considered to be hypernatremic when the serum sodium concentration is >156 mEq/L. Clinical signs are commonly observed when the serum sodium concentration is >170 mEq/L. Vomiting develops within the first 2 hours of ingestion, followed by neurologic signs, including tremors and seizures. Signs most commonly observed by the APCC include vomiting, anorexia, diarrhea, ataxia, polydipsia, trembling, weakness, tremors, and seizures.

**Decontamination and Treatment**

The treatment for acute salt toxicosis includes decontamination, management of clinical signs, and lowering serum sodium levels. With recent exposures (<2 hours) and in patients that are asymptomatic, emesis is recommended. Baseline electrolytes should be obtained and frequently monitored. Asymptomatic patients with a normal serum sodium concentration should be allowed free access to water after emesis has been managed and monitored closely for clinical signs.

Patients that have clinical signs or elevations in serum sodium concentration should be started on IV fluids using a low-sodium fluid (D5W, 0.4% NaCl). Warm-water enemas at a dose of 5 to 10 mL/kg can be used in addition to IV fluids. A loop diuretic, such as furosemide, can be administered to aid in sodium excretion and to help prevent pulmonary edema caused by fluid overload. Patients exhibiting mild to moderate clinical effects that receive timely and aggressive treatment generally have a favorable prognosis. The prognosis is guarded in patients that have developed severe neurologic signs.

**PLANTS**

There are several popular holiday plants that dogs and cats may have the opportunity to ingest during the winter season that may remain in the home several months.

They include:

- Christmas cactus
- Evergreen trees
- Holly
- Mistletoe
- Poinsettias
- Amaryllis
- Christmas kalanchoe

Exposures to Christmas cactus, evergreen trees, holly, mistletoe, and poinsettias commonly result in GI upset, but are unlikely to cause serious toxicosis. Amaryllis and Christmas kalanchoe can cause more serious signs, depending on the part of the plant...
the pet is exposed to and the amount of the plant ingested. **TABLE 2** lists the clinical signs that can be expected after ingestion of these plants. TVN

**TABLE 2 Plant Quick Reference**

<table>
<thead>
<tr>
<th>COMMON NAME</th>
<th>LATIN NAME</th>
<th>CLINICAL SIGNS</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amaryllis</td>
<td>Hippeastrum spp.</td>
<td>Vomiting, diarrhea, anorexia, hypersalivation, hypotension, sedation, and seizures</td>
<td>Mild to moderate GI upset with small exposures to the leaves, flowers, and bulb. Large exposures to the bulb increase the risk for more severe GI signs, as well as hypotension, sedation, and seizures.</td>
</tr>
<tr>
<td>Christmas cactus</td>
<td>Schlumbergera truncata</td>
<td>Vomiting, diarrhea, anorexia, and depression</td>
<td>Signs are expected to be mild and self-limiting. Minimal treatment is required.</td>
</tr>
<tr>
<td>Christmas kalanchoe</td>
<td>Kalanchoe blossfeldiana</td>
<td>Vomiting, depression, lethargy, diarrhea, weakness, dyspnea, anorexia, tachycardia, and vocalization</td>
<td>Flowers are the most toxic. Most exposures only cause GI signs.</td>
</tr>
<tr>
<td>Evergreen trees (firs, pines, and spruces)</td>
<td>Abies, Pinus, Picea</td>
<td>Vomiting, anorexia, abdominal pain, and depression</td>
<td>Exposure to tree water containing tree preservatives is not expected to cause serious toxicosis, but mild GI upset is possible. Water that is not frequently changed could grow bacteria or fungi over time, possibly resulting in gastroenteritis if ingested.</td>
</tr>
<tr>
<td>Holly</td>
<td>Ilex aquifolium</td>
<td>Hypersalivation, vomiting, anorexia, diarrhea, head shaking, and lip smacking</td>
<td>GI irritation is due to the saponins in the leaves and berries.</td>
</tr>
<tr>
<td>Mistletoe</td>
<td>Phoradendron spp</td>
<td>Vomiting, diarrhea, depression, hypotension</td>
<td>Hypotension is uncommon.</td>
</tr>
<tr>
<td>Poinsettia</td>
<td>Euphorbia pulcherrima</td>
<td>Vomiting, hypersalivation, diarrhea, and dermal irritation</td>
<td>Historically, toxicity has been greatly exaggerated.</td>
</tr>
</tbody>
</table>

**References**

In allergic skin disease,

Avoid the cycle of itch—start with fast, safe relief.1-4

- Fast and effective
  - Itch relief begins within 4 hours; effectively controls itch within 24 hours.1,5
- Safe
  - Without many of the side effects associated with steroids5
  - Can be used with many other drugs, including anti-infectives, parasiticides, antifungals, NSAIDs and allergen immunotherapy.2
- Allows diagnostic testing, so you can give dogs relief and restore the quality of life while you determine the cause of the itch.2,6

To learn more, please visit www.APOQUEL.com

Indications
Control of pruritus associated with allergic dermatitis and control of atopic dermatitis in dogs at least 12 months of age.

Important Safety Information
Do not use APOQUEL in dogs less than 12 months of age or those with serious infections. APOQUEL may increase the chances of developing serious infections, and may cause existing parasitic skin infestations or pre-existing cancers to get worse. APOQUEL has not been tested in dogs receiving some medications including some commonly used to treat skin conditions such as corticosteroids and cyclosporines. Do not use in breeding, pregnant, or lactating dogs. Most common side effects are vomiting and diarrhea. APOQUEL has been used safely with many common medications including parasiticides, antibiotics and vaccines.


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For more information, please see Brief Summary of full Prescribing Information on reverse.
Brief Summary of Prescribing Information

Indications:
Control of pruritus associated with allergic dermatitis and control of atopic dermatitis in dogs at least 12 months of age.

Dosage and Administration: The dose of APOQUEL (oclacitinib maleate) tablets is 0.18 to 0.27 mg oclacitinib/lb (0.4 to 0.6 mg oclacitinib/kg) body weight, administered orally, twice daily for up to 14 days, and then administered once daily for maintenance therapy. APOQUEL may be administered with or without food.

Dosing Chart

<table>
<thead>
<tr>
<th>Weight Range (in lb)</th>
<th>Weight Range (in Kg)</th>
<th>Number of Tablets to be Administered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>High</td>
<td>Tablets</td>
</tr>
<tr>
<td>8.6</td>
<td>9.9</td>
<td>6.6 mg Tablets</td>
</tr>
<tr>
<td>10.0</td>
<td>14.9</td>
<td>5.4 mg Tablets</td>
</tr>
<tr>
<td>12.0</td>
<td>19.9</td>
<td>16 mg Tablets</td>
</tr>
<tr>
<td>20.0</td>
<td>29.0</td>
<td></td>
</tr>
<tr>
<td>30.0</td>
<td>44.9</td>
<td></td>
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<tr>
<td>40.0</td>
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<td>50.0</td>
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<tr>
<td>60.0</td>
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<tr>
<td>80.0</td>
<td>109.9</td>
<td></td>
</tr>
<tr>
<td>100.0</td>
<td>157.9</td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>High</td>
<td></td>
</tr>
<tr>
<td>6.6</td>
<td>9.9</td>
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</table>

Warnings:
APOQUEL is not for use in dogs less than 12 months of age (see Animal Safety).

APOQUEL may increase susceptibility to infection, including demodicosis, and exacerbate existing infections.

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APOQUEL is not for use in dogs with serious infections.

APOQUEL is not for use in dogs less than 12 months of age (see Warnings).

Precautions:
APOQUEL is not for use in breeding dogs, or pregnant or lactating bitches.

APOQUEL should be monitored for the development of infections, including demodicosis, and neoplasia.

Adverse Reactions:
Control of Atopic Dermatitis

In a masked field study to assess the effectiveness and safety of oclacitinib for the control of pruritus associated with allergic dermatitis in dogs, 216 dogs treated with APOQUEL and 220 dogs treated with placebo (vehicle control) were evaluated for safety. During the 30-day study, there were no fatalities and no adverse reactions requiring hospital care. Adverse reactions reported (and percent of dogs affected) during Days 0-7 included diarrhea (2.3% APOQUEL, 0.9% placebo), vomiting (2.3% APOQUEL, 1.6% placebo), lethargy (1.8% APOQUEL, 1.4% placebo), anemia (1.4% APOQUEL, 0% placebo), and polydipsia (1.4% APOQUEL, 0% placebo).

In most of these cases, signs spontaneously resolved with continued dosing. Five APOQUEL group dogs were withdrawn from study because of: darkening of skin and fur (1 dog), diarrhea (1 dog), fever, lethargy and cystitis (1 dog), an inflected footpad and vomiting (1 dog); and diarrhea, vomiting, and lethargy (1 dog). Dogs in the APOQUEL group had a slight decrease in mean white blood cell counts (neutrophil, eosinophil, and monocyte counts) that remained within the normal reference range. Mean lymphocyte counts for dogs in the APOQUEL group increased at Day 7, but returned to pretreatment levels by study end without a break in APOQUEL administration.

Four APOQUEL group dogs developed a Grade I mast cell lymphadopathy (1.1%, nausea (1.1%), increased appetite (1.1%), aggression (1.1%), and weight loss (0.7%).

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