Anticoagulant Rodenticide Ingestion

The EPA has banned public use of brodifacoum, bromadiolone, difenacoum, and difethialone. These products were manufactured for home use until December 31, 2014, and shipped until March 2015. The new products contain diphacinone, and 4 weeks of vitamin K1 therapy is currently recommended to treat this anticoagulant rodenticide (ACR). These changes may decrease ACR toxicities and increase cases of other rodenticide toxicities, particularly bromethalin, which can cause neurotoxicity.

**ACUTE INGESTION**

**INVESTIGATION**
- Confirm ACR ingested (ie, not bromethalin, cholecalciferol, zinc phosphide)
- If ≥1/10th LD 50 or unknown
- <1/10th LD 50
- >4-6 hours since ingestion?
- PT normal?

**TREATMENT**
- No treatment needed
- Close observation
- PT at 48 hours post-ingestion
- Do not give vitamin K1 before checking PT.
- If PT prolonged, treat with vitamin K1 at 2.5 mg/kg PO q12h for 4 weeks
- Induce emesis if no contraindications:
  - Dogs: Apomorphine 0.03 mg/kg IV or 0.04 mg/kg IM
  - Cats: Xylazine 0.44 mg/kg IM or SC, then reverse with yohimbine 0.25-0.5 mg/kg IM or SC; or dexametomidine 0.002-0.015 mg/kg IV, IM, or SC, then reverse with equal volume of atimepazole.
  - IV administration is preferred, but if no IV access is available, IM or SC are options.
- Activated charcoal (1-4 g/kg PO) and cathartic (sodium sulfate 250 mg/kg or 70% sorbitol solution 1-2 mL/kg PO)
- Repeat as needed

**Common Anticoagulant Rodenticides**

<table>
<thead>
<tr>
<th>Agent</th>
<th>LD50 (mg/kg) in Dogs</th>
<th>LD50 (mg/kg) in Cats</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brodifacoum</td>
<td>0.2-4</td>
<td>25</td>
</tr>
<tr>
<td>Bromadiolone</td>
<td>11-15</td>
<td>&gt;25</td>
</tr>
<tr>
<td>Chlorophacinone</td>
<td>3-20</td>
<td>15</td>
</tr>
<tr>
<td>Diphacinone</td>
<td>0.9-8</td>
<td>15</td>
</tr>
</tbody>
</table>
**CLINICALLY AFFECTED (actively bleeding)**

TREATMENT

Stabilize with IV fluids ± supplemental oxygen

INVESTIGATION

Determine PCV/TS, PT, PTT, platelet count

INVESTIGATION

Confirm ACR exposure by one or more of the following:
- Present in environment
- Coagulopathy consistent with ACR (PT more prolonged than PTT or both out of range)
- ACR toxicology screening can be submitted to most veterinary school diagnostic laboratories and even some commercial veterinary diagnostic labs

DIAGNOSTICS

Consider other differential diagnoses if ACR cannot be confirmed:
- Liver failure
- DIC
- Hemophilia
- ITP
- Neoplasia

**TREATMENT**

Vitamin K1 (5 mg/kg SC) once as soon as diagnosis is suspected and coagulation panel has been drawn

INVESTIGATION

Is patient anemic?

**TREATMENT**

- Fresh frozen plasma 10-20 mL/kg IV given over 1-2 hours to provide active clotting factors immediately and pRBCs if needed
- If only fresh whole blood is available, fresh whole blood 20-40 mL/kg to give equivalent dose of clotting factors (watch for volume overload)

**TREATMENT**

- Continue vitamin K1 at 2.5 mg/kg SC (until able to take PO) or PO q12h for 4 weeks
- Convert to oral vitamin K1 as soon as patient is able to take oral meds (better bioavailability)

**TREATMENT**

- Monitor PT at 48 hours after last dose of vitamin K1
- Treat for 2 more weeks if prolonged

**TREATMENT**

Repeat as needed

**INVESTIGATION**

Common signs include:
- Lethargy
- Anorexia
- Increased RR/RE
- Hemoptysis
- Lameness

**INVESTIGATION**

Examination findings:
- Abnormalities consistent with location of bleed
- Dull lung or heart sounds
- Abdominal distension
- Episcleral hemorrhage
- SC hematoma

ACR = anticoagulant rodenticide, LD = lethal dose, PCV = packed cell volume, pRBCs = packed red blood cells, PT = prothrombin time, PTT = partial thromboplastin time, RE = respiratory effort, RR = respiratory rate, TS = total solids

References