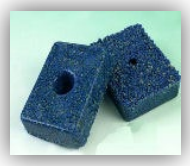
PET POISON HELPLINE®

Rodenticides (rat and mouse poisons)

Poisoning from rodenticides is one of the most common types of intoxications managed by Pet Poison Helpline. These poisons are easy for people to obtain and often used in residential or agricultural settings such as homes, garages, lake cottages or summer homes, barns, farms, and even parks or wildlife areas. Many different types of rodenticides are available in a wide variety of colors (i.e. green, blue, tan, red, beige) and formulations (i.e. pellets, bait blocks, grain-based baits, etc.). To add to the confusion, different rodenticides may look alike and have similar names, but contain very different types of poison. Thus, if a pet ingests rodenticide, accurate identification of the active ingredient is crucial as this will determine the risk of poisoning and the need for treatment. If the active ingredient is not clearly visible on the packaging, another important identifier is the EPA registration number (EPA Reg. No.) – this number will allow Pet Poison Helpline veterinarians to correctly identify the active ingredient.





Below are the four most common rodenticide active ingredients/ingredient classes, along with their mechanism of action, clinical signs of poisoning, and treatment options.

ANTICOAGULANTS: Anticoagulant rodenticides are divided into first- and second-generations. In general, first-generation baits are typically short-acting (i.e., warfarin) with second-generation baits being long-acting (i.e. brodifacoum, bromadiolone, etc.). For the past several decades, second-generation baits have been the most commonly used rodenticide in residential settings. As of 2011, the EPA restricted these from residential use.

- **Mechanism of action for both:** Inhibition of the enzyme Vitamin K1 epoxide reductase, which ultimately decreases the concentration of active clotting factors 2, 7, 9, and 10. This results in uncontrolled bleeding. When dogs or cats ingest anticoagulant rodenticides, 3-5 days pass before signs of poisoning are visible; however, if the pet has been chronically exposed to the product, the onset of clinical signs may be sooner.

- **Common signs of poisoning:** Initially, blood loss is typically internal, and signs include lethargy, exercise intolerance, coughing, difficulty breathing (due to bleeding into the lungs), weakness, and pale gums. Less common signs include vomiting, diarrhea (with or without blood), nosebleed, bruising, bloody urine, swollen joints/lameness, inappetence, and bleeding from the gums.

- **Antidote and treatment:** Vitamin K1 (phytonadione) is the antidote for both. Menadione (Vitamin K3), over-the-counter multi-vitamins containing K1, or food with a high vitamin K are not sufficient substitutes. If poisoning occurs, most pets need to be treated with oral Vitamin K1 for 5-10 days (short acting) or 21-30 days (long acting). Two days after the last dose of Vitamin K1 is administered, a prothrombin time (PT) should be checked to make sure the clotting is normal.

- **Threat:** Certain species, such as cats, are more resistant to the effects of these baits and rarely suffer poisoning. Dogs, on the other hand, can be quite sensitive and often require veterinary intervention. In

addition, the dose needed to cause poisoning from varies greatly between active ingredients making accurate product identification important to a successful treatment plan. With some baits (e.g., brodifacoum), it takes only a very small amount to cause poisoning in canines, while others have a wider margin of safety (e.g., bromadiolone) and larger amount is needed to cause poisoning. The age and health of the pet may be other factors determining whether the amount ingested will be poisonous. Animals with underlying liver or gastrointestinal disease, as well as the very young or very old, are more at risk.

CHOLECALCIFEROL (VITAMIN D3): For dogs and cats, this is one of the most dangerous rodenticides on the market and is gaining in popularity primarily due to EPA restrictions on second-generation anticoagulant rodenticides.

- **Mechanism of action**: This poison causes hypercalcemia and hyperphosphatemia, resulting in acute kidney failure and other tissue damage secondary to metastatic mineralization.

- **Common signs of poisoning:** PU/PD, weakness, lethargy, decreased appetite, and halitosis ("uremic" breath). Acute kidney failure develops 2-3 days after ingestion. Often by this point, significant and permanent damage has already occurred to the body.

- **Antidote and treatment:** This poisoning can be one of the most challenging to treat since hospitalization, frequent laboratory monitoring, and expensive therapy is often required for a positive outcome. There is no specific antidote but poisoning generally responds well to 2-3 days of aggressive IV fluids and specific drugs (e.g., cholestyramine, bisphosphonates and steroids) geared towards decreasing calcium concentration in the body. Frequent monitoring of blood work (calcium, phosphorus, and renal enzymes) is often needed for a period of 2-6 weeks after ingestion.

- **Threat**: Cholecalciferol has a very narrow margin of safety, and even small ingestions of this poison can result in severe clinical signs or death. Toxic ingestions must be treated quickly and appropriately to prevent kidney failure.

BROMETHALIN: This neurotoxic rodenticide causes cerebral edema. Because the ingredient name looks similar to many of the LAAC rodenticides (i.e. brodifacoum, bromadiolone, etc.), it may be easily mistaken for a LAAC.

- **Mechanism of action:** Bromethalin works by uncoupling oxidative phosphorylation in the brain and liver mitochondria and can result in cerebral edema.

- **Common signs of poisoning:** Incoordination (ataxia), tremors, seizures, paralysis, and eventually death. The larger the ingestion, the more severe and rapidly occurring the clinical signs may be. Signs can develop within 2 hours following ingestions above the LD50 but may be delayed as long as 3-4 days if the ingested toxic dose was less than the LD50. Thus, medical monitoring for at least 24 hours after ingestion of toxic amounts is often necessary.

- **Antidote and treatment:** In-hospital care for several days may be necessary because this poison has a long-half-life and long-lasting effects. Treatment may include multiple doses of activated charcoal, IV fluids, and specific drugs to decrease brain swelling.

- **Threat**: Cats are more sensitive to bromethalin than dogs are. As this type of rodenticide has a narrow margin of safety, prompt therapy is often needed in all species.

ZINC AND ALUMINUM PHOSPHIDES: These gas-producing poisons are more commonly found in mole or gopher baits but may appear in rat and mouse baits as well. Of particular concern is lung irritation and potential toxicity that may occur when veterinary staff inhale fumes from a pet's vomit.

- **Mechanism of action**: Once in the stomach, phosphine gas is released. Food in the stomach will increase the amount of gas produced and increase the toxicity of the poison. Therefore, feeding of pets after ingestion of this poison is never recommended.

- **Common signs of poisoning:** Phosphine gas produced by this poison can result in stomach bloating, vomiting, abdominal pain, shock, collapse, seizures, and liver damage.

- **Antidote and treatment:** This poison does not have an antidote and immediate therapy is needed. Administration of antacids soon after ingestion may help to decrease the amount of gas produced. Prompt decontamination of the stomach either by emesis induction or gastric lavage is necessary. During decontamination, care should be taken to prevent hospital personnel from being exposed to the phosphine gas by ensuring excellent ventilation. Given the potential risk this gas poses for people, vomiting is best induced by veterinary professionals (not pet owners) in a well-ventilated area or outdoors. Vomitus should be disposed of in an outdoor garbage canister.

- **Threat:** The toxic dose is very small and nearly all patients ingesting this poison need to be examined by a veterinarian. If the pet vomits in the car while en route to the veterinary clinic, the windows should be opened to prevent inhalation of phosphine gas.

As with all suspected poisonings the knowledgeable veterinary staff at Pet Poison Helpline is available to help you and your clients deal with these poisonings.

Pet Poison Helpline, an animal poison control center based out of Minneapolis, is available 24 hours a day, seven days a week for pet owners and veterinary professionals that require assistance treating a potentially poisoned pet. The staff provides treatment advice for poisoning cases of all species, including dogs, cats, birds, small mammals, large animals and exotic species. As the most cost-effective option for animal poison control care, Pet Poison Helpline's per incident fee includes follow-up consultations for the duration of the treatment time. Pet Poison Helpline is available in North America by calling **800-213-6680**. Additional information can be found online at www.petpoisonhelpline.com.