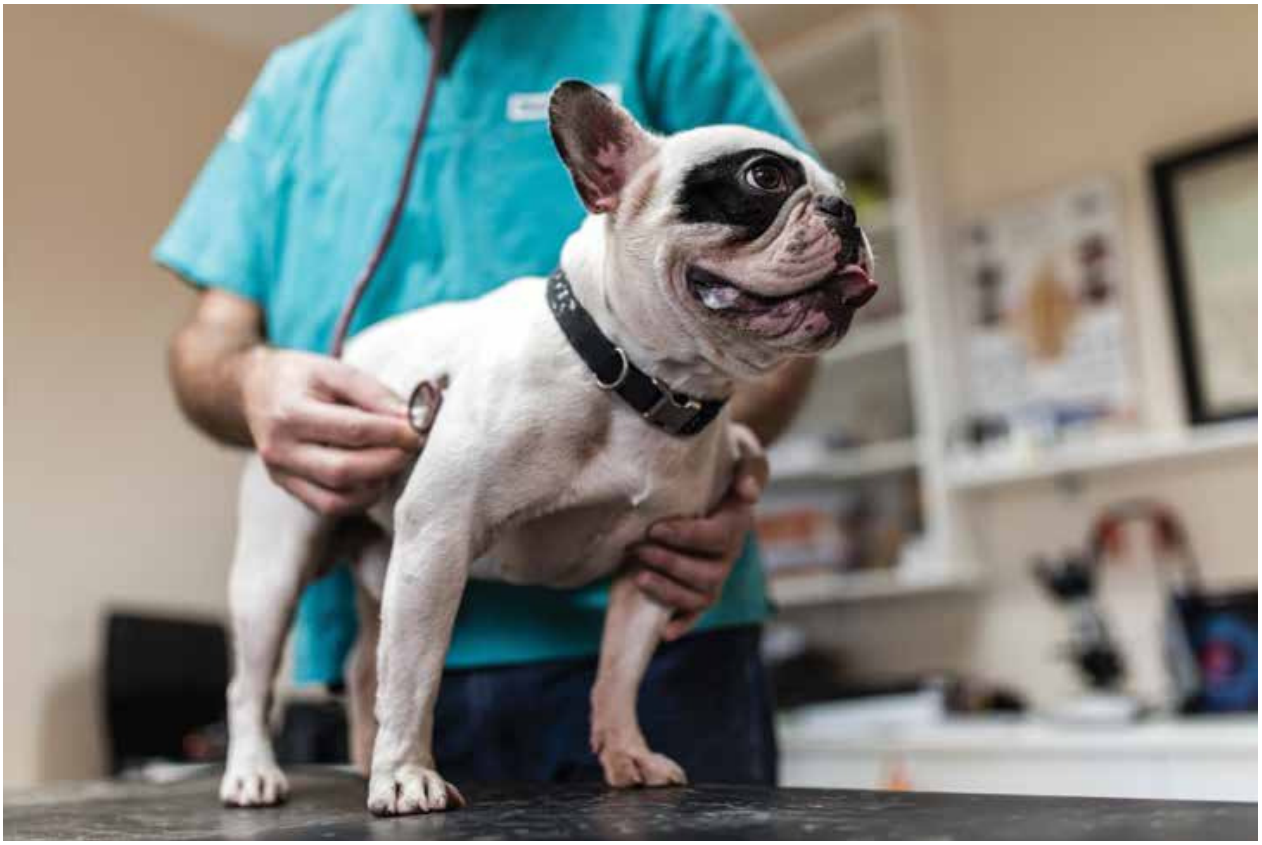
The Veterinarian's Guide

Bromethalin Addendum

LIPHATECH®

The Soft Bait Innovators™

Liphatech, Inc. • 3600 W. Elm Street • Milwaukee, WI 53209 • 1-888-331-7900 • www.liphatech.com



NOTE: The information in this guide does not represent labeling and does not replace information on rodenticide labels relating to exposure of non-target species. Please read and follow all label directions on all rodenticide products you are using.

Mentions of trade names in this publication does not imply endorsement of these products.

At the time of this printing all information was deemed accurate and reliable.

LIPHATECH®

Liphatech, Inc.
3600 W. Elm Street
Milwaukee, WI 53209
1-888-331-7900
www.liphatech.com

October, 2016

The Veterinarian's Guide - Bromethalin Addendum

The Veterinarian's Guide to Accidental Rodenticide Ingestion by Dogs and Cats focuses on anticoagulants. This addendum is intended to help veterinarians recognize and treat the symptoms of bromethalin toxicity in domestic animals. It describes bromethalin's mode of action and how it is used as a rodenticide. In addition to reviewing the symptoms of bromethalin poisoning in domestic animals and the acute toxicity levels for dogs and cats (Table 5), we have also included the American Society for Prevention of Cruelty to Animals' Animal Poison Control Center (ASPCA APCC) recommendations for decontamination (Tables 6 and 7).

Overview of Bromethalin Rodenticide

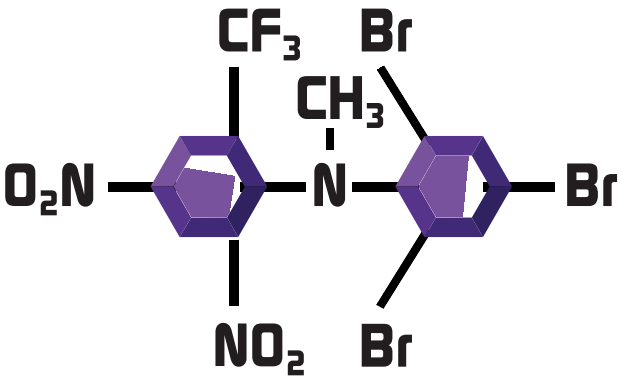
Rodenticides containing 0.01% bromethalin, a potent neurotoxin, have been marketed almost continuously since 1985 under a variety of trade names, including Vengeance, Assault®, Gladiator, Gunslinger®, Fastrac®, Top Gun™, Tomcat® with bromethalin, Rampage®, Trounce®, and most recently in soft bait form as TakeDown™ and Cannon™. Because it works as a neurotoxin, it is often used to address anticoagulant-resistant rodent populations or to quickly knock down large infestations to levels manageable with slower-acting anticoagulant rodenticides.

Properly handled by pest management professionals, bromethalin should present very little threat to non-target animals. However, there is no antidote for bromethalin poisoning; treatment with Vitamin K_1 will have no effect. If an accidental ingestion does occur, emesis or gastric lavage to reduce the ingested dose may be the most useful treatment. Vomiting should not be induced in symptomatic animals. Multiple doses with activated charcoal can aid decontamination for dogs; multiple doses of activated charcoal may not be as effective for cats.[1] Therefore, it is especially critical to determine the type and quantity of the rodenticide consumed, the time of consumption and the health of the animal prior to ingestion.

Understanding Bromethalin's Mode of Action

Bromethalin rodenticides act relatively quickly in rodents, with effects visible as soon as two to three days from bait placement. Because it is also highly toxic to non-target species, bittering agents or emetics are often added to bromethalin baits in order to repel or induce vomiting in other animals (rodents cannot vomit).

Anticoagulant rodenticides containing brodifacoum, bromadiolone and difethialone act by preventing blood clotting. Acute rodenticides, such as bromethalin, work by attacking the nervous system, specifically by disrupting energy production and causing a build-up of fluid in the spinal cord and brain, leading to neurological dysfunction. Although tests found that the swelling from sub-lethal doses of bromethalin could be lessened in rats with diuretics and corticosteroids, a similar effect was not seen in tests on dogs and cats.



Clinical Symptoms of Bromethalin Ingestion

Animals that have ingested bromethalin at toxic levels typically develop symptoms within 4 to 36 hours. Acute symptoms for both cats and dogs include tremors, seizures and paralysis. Less toxic doses typically produce a slower onset of symptoms, with signs including lethargy, hind-leg weakness and loss of muscle tone. At sub-lethal doses, these effects are reversible if exposure is discontinued. Although symptoms can be managed, there is no antidote.

Table 5 gives veterinarians an idea of the acute oral toxicity levels for dogs and cats. It is important to note, however, that toxicity is a continuum. Depending on the animal's weight and metabolism, a much smaller dose than the LD_{50} can constitute a lethal dose. For example, the ASPCA APCC has documented reports of cats showing signs of toxicity after ingesting as little as 0.24 mg, although lab testing reported a minimum lethal dose of 0.45 mg/kg for cats. ASPCA APCC case records also document deaths in dogs that have ingested as little as 0.95 to 1.05 mg/kg, despite lab testing reporting lethal doses starting at 2.38 mg/kg.[2]

Bromethalin poisoning mimics several other conditions, including spinal cord injuries, cerebral trauma, rabies or other infectious diseases that affect the central nervous system. Symptoms are similar to poisonings from other convulsion-causing toxins such as lead, strychnine and zinc phosphide. Diagnosis of bromethalin poisoning is dependent on possible exposure, the exclusion of other causes for symptoms, clinical signs and by confirming the presence of bromethalin in tissues.

In a small clinical study, symptoms emerged in dogs given a lethal dose of bromethalin (6.25 mg/kg) within 6.5 to 8 hours and death occurred in roughly 30 hours. Symptoms included hyperactivity, severe muscle tremors, seizures, overresponsive hind limb reflexes and a reduced ability to function.[3] A similar study found that symptoms were slower to appear in cats. Cats given a lethal dose (1.5 mg/kg) began developing symptoms within 1 to 2 days and lethal symptoms within 2 to 3 days. Common clinical symptoms included uncoordinated limbs and decreased bodily awareness, inability to urinate, seizures, decerebrate posture (legs rigid, toes pointed downward, head and neck arched backward) and a reduced ability to function.[4,5]

Notably, clinical tests found that Guinea pigs appear to be immune to the effects of bromethalin.[6]

Table 5 - Oral Toxicities for Bromethalin Rodenticides

(mg bromethalin per kg of animal weight)

	DOG 10 kg (22 lb.)	CAT 2 kg (4.4 lb.)
Approximate range of lethal dosage of bromethalin	0.95-5.6 mg/kg	0.45-0.75 mg/kg
Approximate range of lethal dosage of 0.01% bromethalin bait*	95 g-560 g (0.21-1.23 lb.)	9.0 g-15.0 g (0.02-0.03 lb.)

*0.01% bromethalin is the most common bait formulation. Check packaging; products containing 0.05% bromethalin will have different dose ranges.

Safety

Direct exposure to bromethalin causes moderate eye irritation, and it can be absorbed through the skin. However, when used according to the label directions, including use of the specified personal protective equipment, the risk of exposure to the applicator from applying the bait is minimal.

It is not known whether target animals that have ingested a lethal dose of bromethalin can be a secondary hazard. Only limited information exists about the risk to domestic animals. In one secondary toxicity study, dogs that fed for two weeks on meat from rats that had been fed lethal doses of 0.05% bromethalin bait did not ingest enough to produce any signs of poisoning.[7]

Availability

Although commonly used in professional pest control markets, bromethalin rodenticide products aren't as popular as second-generation anticoagulant rodenticides. They are used more often in agricultural settings in rotation with other types of rodenticides as part of a resistance prevention program. Since EPA regulations have prohibited the use of second-generation anticoagulant rodenticides by consumers and existing first-generation anticoagulant rodenticides are not as fast-acting as bromethalin, more consumers may start using bromethalin for do-it-yourself home rodent control.[8] This may lead to veterinarians seeing an increase in bromethalin poisoning in pets.

Recommendations for Treatment

Treatment of bromethalin poisoning is summarized in Tables 6 and 7. There are no antidotes, but symptoms can be treated with early, aggressive decontamination and supportive treatment. Treatment with Vitamin K_1 will have no effect and therefore is not recommended.

Since there is no antidote to bromethalin poisoning, treatment is limited to removing any toxicant remaining in the stomach. Decontamination may limit the symptoms and provide relief, but will not reverse the effects of the poison. Unless the animal is already showing symptoms, the most useful treatment may be to induce vomiting or pump the stomach in order to reduce the ingested dose.

Although not as effective for cats as for dogs, activated charcoal can also be administered to absorb any bromethalin left in the stomach. Multiple doses are suggested, since bromethalin is able to be circulated through the liver and back into the gastrointestinal tract.[9] If you are not sure how much was ingested, treat at the most aggressive level. Table 8 offers a list of available bromethalin baits and their formulations, which may be helpful in calculating the amount consumed if detailed packaging information is not available. Be sure to monitor hydration and sodium levels, since the signs of a high concentration of sodium in the blood from charcoal and the signs of bromethalin toxicosis look very similar, but have very different treatments.[10]

Although the cerebrospinal swelling produced by sub-lethal doses of bromethalin was lessened by treatment with osmotic diuretics and corticosteroids in test rats, these agents appear to be ineffective in cats and dogs. Mild symptoms such as hind limb weakness may resolve with time. Animals with paralysis or seizures generally have a poor to grave prognosis for survival.[11]

The ASPCA APCC's Decontamination Treatment Recommendations [12]

Table 6 - Dogs

Dose Ingested	Time Since Exposure	
	Less than 4 hours	More than 4 hours
0.1-0.49 mg/kg	Induce vomiting or administer one dose of activated charcoal	Administer one dose of activated charcoal
0.5-0.75 mg/kg	Induce vomiting and administer three doses of activated charcoal over 24 hours	Administer three doses of activated charcoal over 24 hours
0.75 mg/kg or more	Induce vomiting and administer three doses of activated charcoal a day for two days	Administer three doses of activated charcoal a day for two days

Table 7 - Cats

Dose Ingested	Time Since Exposure	
	Less than 4 hours	More than 4 hours
0.05-0.1 mg/kg	Induce vomiting or administer one dose of activated charcoal	Administer one dose of activated charcoal
0.1-0.3 mg/kg	Induce vomiting and administer three doses of activated charcoal over 24 hours	Administer three doses of activated charcoal over 24 hours
0.3 mg/kg or more	Induce vomiting and administer three doses of activated charcoal a day for two days	Administer three doses of activated charcoal a day for two days

Table 8 – Common Bromethalin Rodenticides

Brand Name	Formulation	Weight
TakeDown™	soft bait	8 g
Cannon™	soft bait	8 g
Fastrac®	block	15 g
Fastrac®	place packs	15 g
Fastrac®	pellet	bulk
Top Gun™	block	0.5 oz
Top Gun™	place packs	0.5 oz
Tomcat® with bromethalin	blocks	1 oz
Tomcat® with bromethalin	place pack	3 oz
Tomcat® with bromethalin	pellet	bulk
Rampage®	block	15 g
Rampage®	place packs	15 g
Rampage®	pellet	bulk
Trounce®	pellet	bulk
Gladiator	block	0.5 oz
Gladiator	place pack	0.5 oz

ENDNOTES

1. DUNAYER, ERIC. 2003. Bromethalin: The other rodenticide. Veterinary Medicine, September 2003:732-736. Retrieved July 15, 2016 from http://www.aspcapro.org/sites/pro/files/0903toxbrief.pdf.
2. DUNAYER 2003
3. DORMAN, D.C., JOSEPH SIMON, KAREN A. HARLIN, WILLIAM S. BUCK. 1990. Diagnosis of bromethalin toxicosis in dogs. Journal of Veterinary Diagnostic Investigation, 2:123-128.
4. DORMAN, D.C., J.F. ZACHARY, W.B.BUCK. 1992. Neuropathologic findings of bromethalin toxicosis in the cat. Veterinary Pathology, 29:139-144.
5. DUNAYER 2003
6. VAN LIER, ROBERT B. L., LINDA D. CHERRY. 1988. The toxicity and mechanism of action of bromethalin: a new single-feeding rodenticide. Fundamental and Applied Toxicology, 11:664-672.
7. JACKSON, WILLIAM B., S.R SPAULDING, R.B.L. VAN LIER, B.A.DREIKORN. 1982. Bromethalin—A promising new rodenticide. Proceedings of the Tenth Vertebrate Pest Conference (1982). Paper 24. Retrieved July 15, 2016 from http://digitalcommons.unl.edu/vpc10/24.
8. EPA. Restrictions on rodenticide products. United States Environmental Protection Agency. Retrieved July 15, 2016 from https://www.epa.gov/rodenticides/restrictions-rodenticide-products.
9. DUNAYER 2003
10. American Society for the Prevention of Cruelty to Animals. Treating bromethalin toxicosis. ASPCA Professional. Retrieved July 15, 2016 from http://aspcapro.org/resource/shelter-health-poison-control/treating-bromethalin-toxicosis.
11. DUNAYER 2003
12. DUNAYER 2003

Liphatech Professional Bromethalin Rodenticide

TakeDown™

TakeDown is the first soft bait formulated with bromethalin for the professional pest management (PMP) market. Since rodents ingesting a lethal dose of bromethalin bait often do not feed again, significantly less bait is needed than when using anticoagulants.

- Active ingredient: bromethalin
- 0.01% (100 PPM)
- Combines speed of AI with the palatability of soft bait
- Product label allows paper pouch to be removed and bait placed directly onto feeding device.

Our Pest Management Mission

Liphatech, Inc. creates successful partnerships with pest management professionals by offering superior and innovative rodent control products. We strive to consistently provide outstanding and fast customer service to assist PMPs in improving the quality of human life.

Industry-Leading Rodent Control Solutions

Finding the most effective and efficient solutions for the world's rodent control problems — and helping its customers succeed — has made Liphatech the industry leader.

No matter how complex or challenging a rodent control problem may be, pest management professionals have come to rely on the quality, innovation and expertise of Liphatech.

Throughout its history, Liphatech has focused exclusively on the development and production of rodenticides and related rodent control products. The result? The industry's most advanced technology, along with a powerful commitment to deliver the highest levels of customer service and technical support. Bolstered by ongoing research, our innovations have consistently set the standard for the rodent control industry.

LIPHATECH
GROUPE DE SANGOSSE

Liphatech, Inc. • 3600 W. Elm Street • Milwaukee, WI 53209 • 1-888-331-7900 • www.liphatech.com

10/2016
2022-6