Pennsylvania Game Commission Wildlife Disease Reference Library

Rodenticide Toxicity

Cause

There are many different kinds of rodenticides (mouse and rat poisons) that can also poison wild birds and mammals. Common anticoagulant (prevent blood from clotting) rodenticides include brodifacoum, difenacoum, bromadiolone, diphacinone, warfarin, and chlorophacinone. Some common non-anticoagulant rodenticides include zinc phosphide, strychnine, bromethalin, and cholecalciferol.

Significance

Children, pets, and wildlife are all at risk of being unintentionally poisoned by rodenticides. When rat poisons are placed on the floor of houses, pets and small children may consume them and suffer potentially life threatening toxicity. The United States is currently in the process of creating stricter regulations for rodenticide use in order to protect children, pets, and wildlife (see **Management/Prevention** for more information).

Species Affected

Rodenticides are potentially toxic to any species of bird or mammal. Rodenticide poisoning has been reported in many wild mammals including white-tailed deer, raccoons, gray squirrels, chipmunks, red foxes, skunks, opossums, prairie dogs, and badgers. Wild birds reported with rodenticide toxicity include bald eagles, golden eagles, peregrine falcons, red-tailed hawks, great-horned owls, snowy owls, screech owls, turkey vultures, wild turkeys, and crows.

Distribution

Wildlife can suffer from rodenticide toxicity anywhere in the world where rodenticides are used.

Transmission

Animals can be exposed to rodenticides primarily or secondarily. Primary intoxication occurs when an animal directly consumes rodenticide. Secondary toxicity occurs when a scavenger or predator feeds on an animal that previously ingested rodenticide.

Clinical Signs

Clinical signs of anticoagulant rodenticide toxicity do not appear until 3-5 days following ingestion of a toxic dose. Anticoagulants interfere with blood's clotting ability, which is necessary to prevent fatal blood loss. Affected animals can experience extensive bleeding from any part of the body, internally and externally. Animals may have widespread bruising, blood in the stool or urine, and may bleed extensively from minor scrapes or cuts. Anemia is a typical finding following blood loss.

Clinical signs of non-anticoagulant rodenticide poisoning vary depending on which chemical is involved and how much is consumed. Zinc phosphide forms the poisonous phosphine gas when it reacts with stomach acids following consumption. The gas is absorbed into the blood stream and damages blood vessels and blood cells. Clinical signs are non-specific and include loss of appetite, vomiting, diarrhea, abdominal pain, lethargy, rapid breathing, loss of coordination, convulsions, paralysis, coma, and death. Animals suffering from strychnine poisoning exhibit restlessness, anxiety, muscle twitching, stiffened neck, dilated pupils, convulsions, hypersensitivity to stimuli, and death due to respiratory failure. Bromethalin, another highly toxic non-anticoagulant rodenticide, causes similar clinical signs to strychnine.

Diagnosis

Laboratory tests can be used to identify toxic levels of rodenticides in tissues (mainly liver) during post-mortem examination. Sometimes the poison can be found in the stomach contents. Zinc phosphide poisoning is diagnosed by detecting phosphine gas in the stomach.

Treatment

Except in rehabilitation facilities, wildlife is rarely treated for rodenticide poisoning, and when it is attempted treatment usually involves symptomatic, supportive care. Vitamin K can be administered in the event of anticoagulant rodenticide intoxication. If an animal is seen ingesting rodenticides, vomiting should be induced, and activated charcoal should be given to prevent absorption of the chemical.

Management/Prevention

The Environmental Protection Agency (EPA) has recently increased its rodenticide restrictions in hopes of preventing toxicity in children, pets, and wildlife. Products available for residential consumers will be required to be enclosed in bait stations that are inaccessible to children and non-target animal species. Companies will be prohibited from selling rodenticide baits in pellet form. The EPA will also ban the sale of some of the more toxic chemicals to residential consumers; banned chemicals will include brodifacoum, bromadiolone, difethialone, and difenacoum. These chemicals will still be available for residential use, but only by pest control professionals. "After June 4, 2011, any rodenticide manufacturers who distribute or sell rodenticide products that do not meet the new risk mitigation goals will face EPA actions to remove those products from the market" (EPA.gov).

Suggested Reading

Gupta, R. C. 2007. Non-anticoagulant rodenticides. Pages 548-563 *in* R. C. Gupta, editor. Veterinary Toxicology. Academic Press, New York, New York, USA.

Michigan Department of Natural Resources. Wildlife Disease. Strychnine Poisoning. <http://www.michigan.gov/dnr/1,1607,7-153-10370_12150_12220-27278--,00.html>.
Michigan Department of Natural Resources. Wildlife Disease. Zinc Phosphide. <http://www.michigan.gov/dnr/1,1607,7-153-10370_12150_12220-26326--,00.html>.

Murphy, M. J. 2007. Anticoagulant rodenticides. Pages 525-547 *in* R. C. Gupta, editor. Veterinary Toxicology. Academic Press, New York, New York, USA.

Ruder, M. G., R. H. Poppenga, J. A. Bryan, M. Bain, J. Pitman, and M. K. Keel. 2011. Intoxication of Nontarget Wildlife with Rodenticides in Northwestern Kansas. Journal of Wildlife Diseases 47: 212-216.

Stone, W. B., J. C. Okoniewski, and J. R. Stedelin. 1999. Poisoning of Wildlife with Anticoagulant Rodenticides in New York. Journal of Wildlife Diseases 35: 187-193.

United States Environmental Protection Agency. 2011 News Releases: EPA Takes Major Actions to Reduce Americans' Risks from Mouse and Rat Poisons/Move will better protect children, pets and wildlife. <http://yosemite.epa.gov/opa/admpress.nsf/1e5ab1124055f3b28525781f0042ed40/5689a230c1490219852578a80053a4b7!OpenDocument>