

# Strychnine

## History

- This poisonous alkaloid was discovered in seeds from the tree species *Strychnos nux-vomica* and *Strychnos ignatii*.
- Use of strychnine as a rodenticide began in Germany in the 16<sup>th</sup> century for pest control.
- Strychnine is now the most common poisoning in dogs worldwide.
- Strychnine sulfate is a bitter, white, water-insoluble powder.
- 0.5-1% strychnine sulfate bait may be purchased over the counter in the United States and Canada for use in rodent burrows.
- Strychnine degrades quickly in the environment, with 90% of strychnine degrading in the soil within 40 days.
- A 2% liquid formulation of strychnine is also available in Canada.
- The Fish and Wildlife Division of Alberta Sustainable Resource Development is licensed to use strychnine to control wolf, coyote, and black bear populations.

## Species sensitivity

- Fish, aquatic invertebrates, birds, and mammals are susceptible to strychnine poisoning.
- The toxic dose of strychnine for a dog is 0.5-1.2 mg/kg body weight.
- Secondary poisoning of scavengers consuming strychnine-poisoned rodents is possible.

## Mechanism of action

- Strychnine is rapidly absorbed and metabolized by the body with a wide tissue distribution.
- Strychnine causes uncontrollable excitation of neurons in the spinal cord and the brain by antagonizing the inhibitory neurotransmitter glycine.
- Excitation of the central nervous system leads to uncontrollable muscle contractions and convulsions.

## Clinical signs

- Poisoned animals will show clinical signs of toxicity 10 minutes to 2 hours after ingestion of strychnine.
- Vomiting is not a consistent feature of strychnine poisoning.
- Initially, animals display anxious behaviour, rapid breathing, and drooling, followed by difficulty walking and muscle stiffness. Seizures begin with extension of the limbs and an arched back.
- Animals will often display a 'sardonic grin' due to spasm of the facial muscles and jaw.
- Seizures may be intermittent initially, and stimulation from noise, light, or touch may induce a seizure episode.
- The animal remains conscious during the early stages of toxicity.
- As more strychnine is absorbed, seizures become more severe and prolonged, and the animal's body temperature rises.
- Breathing is impaired due to spasm of the diaphragm and respiratory muscles.
- Untreated animals suffocate to death in 1-2 hours.

## Diagnosis

- Laboratory analysis of stomach contents or vomit is the most reliable method to detect strychnine.
- There are no specific findings on post mortem.

## Treatment

- The prognosis guarded to poor.
- Frequently, animals die before presentation to a veterinarian, due to the rapid onset of toxicity.
- If treated early, complete recovery is possible in 1-2 days.
- Treatment consists of sedation to control seizures, flushing of the stomach to remove undigested toxin, and administration of activated charcoal to prevent further gastrointestinal absorption. Sensory stimulation is kept to a minimum, and the patient is supported with IV fluids, muscle relaxants, and oxygen/ventilation.

## References

Alberta Sustainable Resource Development, Fish and Wildlife Division., June, 2009. Use, Storage, and Handling of Vertebrate Toxicants for Problem Wildlife Control and Wildlife Management.

Dekker, M., May, 2004, Strychnine Toxicosis, <http://www.vin.com/Members/Associate/Associate.plx?from=GetDzInfo&DiseaseId=1257>, accessed: October 2013.

Talcott, P.A. (2013). Strychnine. In *Small Animal Toxicology, Third Edition*. Eds. Peterson, M.E. and Talcott, P.A. Elsevier Saunders, St. Louis, Missouri, pp 827-831.