



Toxin considerations in the small animal patient

Written by: *Renee Schmid, DVM, DABT, DABVT*

Director, Veterinary Medicine and Senior Veterinary Toxicologist, *Pet Poison Helpline*

Spring brings a renewed excitement for enjoying the outdoors, brushing off the gardening tools, and grabbing the frisbee for fun at the park. While not limited to Springtime, our toxin topics today are worthy of keeping top of mind as pets may have an increased risk of exposure due to an increase in outdoor and social activities around the household and in the workplace. First, we'll look at onions and garlic, plants to be aware of while you are designing your garden or planning the menu for your next barbeque. Next, we'll discuss common concerns with potential on the job exposures for working dogs. Working dog heroics are on full display daily and while they and their handlers are trained to be aware of certain concerns, it is ideal for any veterinary professional caring for these animals to also be aware of potential exposure risks, so they are better prepared to care for these animals if an exposure does occur. **Many of these toxins may also be found in public places, such as parks, and expose pets while they play their favorite game of fetch or are out for a stroll with their companion.**

Onion and Garlic poisoning (Allium)

Written by: *Dr. Kia Benson, DVM, Consulting Veterinarian, Pet Poison Helpline*

Onions, garlic, chives, shallots, scallions (also known as green onions), and leeks all belong to the Allium genus of plants. The majority of Allium species are native to the Northern Hemisphere, and many have been cultivated by humans as food for thousands of years.

Sources for Allium species exposure include vegetables in kitchens or gardens, as concentrated salts or powders in spices or in flavorings added to snacks, or as dried flowering plants used as ornamental decorations. Allium species can even be found in some commercial pet food products; however, the amount added to such products is not expected to be a concern unless a pet would overdose on the product.

All plants in the Allium genus are poisonous to dogs and cats and their toxic effects are not decreased by normal cooking methods, processing, freezing, or rotting. Any ingestion should be dealt with promptly.

Allium poisoning targets the gastrointestinal and hematologic systems and signs are dose dependent. Mild poisoning can result in gastrointestinal upset within several hours, while moderate to severe poisoning can also cause Heinz body anemia, eccentrocytosis, and hemolytic anemia resulting in tachycardia, hypotension, pale or discolored mucous membranes, hemoglobinuria, methemoglobinemia, tachypnea and dyspnea. Signs of anemia can be delayed, taking up to 5 days to occur.

The amount of an Allium species plant needed to cause poisoning can vary based on species of animal, age, weight, and breed. Cats are more sensitive to Allium species poisoning than dogs. However, certain Japanese breeds of dogs like the Akita, Shiba Inu, Hokkaido, Kishu Ken, Shikoku, and Kai Ken may have an increased risk of sensitivity to poisoning due to genetically elevated levels of glutathione reductase and potassium in their red blood cells.

The mechanism of action of Allium species involves the production of volatile sulfur containing compounds including dipropyl, dimethyl, and n-propyl disulfides when plant cellular tissue is chewed, sliced, or processed. These compounds alter glucose-6-phosphate dehydrogenase (G6PD) function causing oxidative injury to red blood cells resulting in Heinz bodies, eccentrocytosis, and hemolysis.

Treatment for Allium species poisoning consists of symptomatic and supportive care including decontamination, anti-emetics, and baseline blood work with intermittent rechecks of blood work for 5 days after exposure, focusing on red cell quantity and morphology. While the patient is at home, owners will need to monitor mucous membrane color, respiratory effort, and urine color during this time. If anemia develops, hospitalization

with therapy including blood transfusion, oxygen support, and other supportive care may be needed. For adequate treatment and observation, dogs or cats may need to stay in hospital for as short as 1 day to as long as 3-5 days in more severe cases.

Prognosis for Allium species poisoning is generally good with early treatment and if effects of anemia can be supported.



Toxin hazards for working dogs

Written by: Dr. Meredith Sammons, DVM, Consulting

Veterinarian, Pet Poison Helpline

Working dogs are a vital part of law enforcement, search and rescue, and public safety operations. They can be asked to perform a variety of tasks from subject apprehension to detecting items such as bombs, drugs, food items, or other specific chemical signals. They can also be used in the search for both living and deceased individuals. The tasks that working dogs perform take them into a variety of environments where they could be exposed to numerous toxins, expected and unexpected.

Illicit Drugs

While illicit drug exposure is an expected exposure for drug detection dogs, any working dog interacting with people or places people have been has the potential to be exposed. Most common exposures would be to powder or tablet forms of drugs. While working dogs are taught not to lick or ingest things they encounter in their working environment. Illicit drug exposure may be unavoidable in some settings.

Illicit drugs with expected effects:

- **Fentanyl and other opioids-** cardiovascular and central nervous system depression
- **Methamphetamine/amphetamines-** cardiovascular and central nervous system stimulation
- **Marijuana-** central nervous system depression with potential cardiovascular depression and GI upset
- **Benzodiazepines-** central nervous system depression with potential respiratory depression
- **Ketamine-** respiratory and central nervous system depression

With illicit drug exposure, seeking immediate veterinary care and if possible, obtaining identification of what the dog may have been exposed to is the best response.

Inhaled Toxins

Inhaled toxins present a real yet unpredictable risk to working dogs. Common inhaled toxin exposures include smoke/carbon monoxide, pepper spray (Oleoresin capsicum spray), petroleum product fumes, and caustic or corrosive chemical fumes. Exposures risks include burning buildings, sites that contain industrial chemicals, and overspray from pepper spray release on a subject.

Common signs of inhaled toxin exposure can include coughing, sneezing, increased respiratory effort, or respiratory distress. While these signs often occur within seconds to minutes of an exposure, some chemical fumes cause delayed lung injury that may not be seen for hours to days or even longer.

Initial therapy for inhaled toxin exposures include removing the dog from the exposure site into fresh air and identifying what they were exposed to (if able to be done safely). As many inhaled toxins can be ocular or dermal irritants, if the dog is stable, a quick water wash over their body to remove residue from their coat and face can be helpful. Seeking emergency veterinary care is the next priority.

Dermal and Ocular Toxins

Dermal and ocular toxin exposure is a potentially unavoidable risk given the environments that many working dogs are required to work in. Toxin concern via these routes can include chemicals in drug manufacturing labs, industrial chemicals in searched buildings, and pepper spray (Oleoresin capsicum spray) used during subject apprehension. Natural or other disaster site work can cause exposure to petroleum products, smoke/carbon monoxide, and caustic or corrosive chemicals that may have leaked or spilled.

Clinical signs of exposure can develop within minutes or can be delayed hours to days. Ocular signs often include epiphora, redness, and blepharospasm. Dermal signs can include erythema, cellulitis, alopecia, pruritis, ulceration, and pain. Topical decontamination by wiping product off or water rinses can be provided and then emergency veterinary care should be sought for any symptomatic dogs or dogs with potential exposure to dermal or ocular toxins.

Toxin Exposure Treatment

Treatment for all of these toxin exposure types is a three-tiered approach of decontamination and removal from the exposure source, symptomatic and supportive medical care, and reversal/antidote agents (if applicable). Supportive care measures will be specific to the affected systems and may include GI support, hydration support, cardiovascular monitoring, anticonvulsants, analgesics, anti-inflammatories, oxygen therapy +/- ventilatory support, and sedatives based on noted clinical signs. While some toxin exposures may be mild enough to warrant a decontamination and monitoring approach, some can be severe enough to require extensive critical care.

Many of these toxin exposures carry the potential for a rapid onset of signs. This coupled with the potential that the location of exposure (natural disaster sites, rural, or limited access locations) may limit access to rapid and comprehensive veterinary care can make toxin exposures in working dogs a very real and potentially life-threatening job hazard.