The marijuana plant contains more than 100 cannabinoids, but the main toxic element is psychoactive tetrahydrocannabinol (THC, ∆9-THC). THC is naturally found in hemp products, but by law cannabidiol (CBD) and hemp products cannot exceed 0.3%. If pets ingest enough CBD or hemp products, they can become symptomatic from the THC. However, evaluating the toxicity of THC-containing products is challenging due to the lack of good quality control. One study that evaluated the amounts of CBD and THC in 75 products found that THC content was accurately labeled in only 17% of products, underlabeled in 23%, and overlabeled in 60%. In addition, THC content varies widely among plants and even among similar products; for example, the THC content in gummies can range from 1 mg up to 300 mg or more. Thus, knowing exactly how much THC an animal may have consumed is difficult to determine, and evaluation and treatment are usually based on clinical signs.

It seems that I am seeing more marijuana/THC poisonings in practice than ever before. Is it just me?

No, it is not just you. Over the past few years, the number of pets exposed to THC-containing products has increased. Legalization of marijuana in many states for either medicinal or recreational use has given more pets access to THC-containing products (e.g., dried plant material, edibles, vapes, topicals, concentrates). Edibles (e.g., cookies, brownies, gummies) have increased in popularity and are attractive to pets. Although cats as well as dogs are willing to ingest plant material, dogs are more likely to consume edibles. Edibles may also contain chocolate, which would need to be factored into the toxicity.

More potent forms of marijuana are leading to more severely affected pets, prompting owners to seek veterinary care. Through selective breeding of

Abstract

Increased legalization of marijuana use in the United States is accompanied by increased cases of tetrahydrocannabinol intoxication in pets. Diagnostic testing is limited, and diagnosis is usually based on clinical signs. Symptomatic and supportive treatments usually lead to good outcomes.
marijuana plants, THC levels have become higher than ever. THC levels in plant material used to be 1% to 4% but now can be found to be up to 24% and extracts can be up to 50% (or even up to 90% THC by weight in a product known as shatter). Given that a single marijuana brownie can be 4 servings for a human, it is not difficult for pets to quickly become intoxicated. Also, with the increased normalization surrounding marijuana use, people are now more willing to admit when their pet has ingested or inhaled their marijuana.

Another source of poisoning is human feces. In humans, approximately 65% to 90% of an oral dose is excreted in the feces as active metabolites. Dogs that ingest contaminated feces in parks, on trails, or on incontinence diapers can become symptomatic.

How does marijuana affect dogs and cats?

THC is highly lipid soluble and is rapidly distributed to the brain and other tissues. It stimulates cannabinoid receptors throughout the body. Two main cannabinoid receptors, CB₁ and CB₂, have been identified in dogs.

CB₁ receptors, primarily found in the central nervous system (CNS), are associated with psychoactive effects. These receptors are located within lipid membranes of presynaptic neurons. When these receptors are stimulated, both excitatory and inhibitory neurotransmitter release is inhibited. The density of CB₁ receptors in the cerebellum is higher in dogs than in other species.

CB₂ receptors are absent in the CNS but present in the peripheral nervous and immune systems of dogs and cats, among other species, where they play a part in inflammation and pain regulation.

What are the most common clinical signs?

Clinical signs can be seen as soon as 30 minutes after oral ingestion but can be delayed several hours and may last up to 72 hours. Patients that consume small amounts of marijuana commonly have diarrhea; those that consume higher doses may exhibit other signs of THC intoxication (BOX 1).

Dogs

In dogs, the most common clinical signs of marijuana ingestion are hyperesthesia, lethargy, and urinary incontinence. However, approximately 25% of patients may instead exhibit stimulation. Ataxia, disorientation, bradycardia, hypothermia, mydriasis, and tremors are not uncommon. Animals that consume THC concentrates may become comatose and hypotensive.

Cats

Most common: ataxia, lethargy
Less common: vomiting

Take-Home Points

- Cases of tetrahydrocannabinol (THC) intoxication are increasing due to increased access, potency, and client willingness to admit exposure.
- THC affects CB₁ (psychoactive) and CB₂ (inflammation and pain) receptors in dogs.
- Clinical signs can appear from 30 minutes to several hours after ingestion and can last up to 72 hours.
- Treatment is symptomatic and supportive and varies according to the time since THC exposure.
- Prognosis after supportive treatment is usually good; death from THC intoxication is rare.
- Cases of marijuana intoxication do not need to be reported.

BOX 1 Signs of Marijuana Intoxication in Animals

Dogs

Most common: hyperesthesia, lethargy, urinary incontinence
Less common: ataxia, disorientation, bradycardia, hypothermia, mydriasis, tremors
Occasional: stimulation
Rare: coma, hypotension

Cats

Most common: ataxia, lethargy
Less common: vomiting
Cats
Clinical signs in cats are similar to those in dogs and most commonly include ataxia; lethargy; and, despite the antiemetic effects of THC, vomiting.

Are there any diagnostic tests that can prove THC exposure?
Urine drug-screening tests have not been validated for use in animals. Immunoassays and gas chromatography–mass spectrometry can detect THC and its metabolites in canine and feline urine; however, these tests may also give false-negative results as most mammals excrete THC primarily in the bile.

Dogs
Unlike humans, dogs exposed to marijuana excrete small quantities of THC and metabolites in the urine. However, most over-the-counter urine drug tests will give a false-negative result for THC in dog urine. False-negative results may be caused by ingestion of dronabinol (synthetic THC), efavirenz (antiviral), nonsteroidal anti-inflammatory drugs, promethazine, riboflavin (vitamin B₂), and baby shampoo/soap.

Most true-positive results are secondary to fecal ingestion (ingesting the metabolite tested for), presumably because different metabolites are produced in dogs (8-OH-∆⁹-THC) than in humans (11-OH-∆⁹-THC) and current tests detect the metabolite of humans. Different metabolites may also explain the urinary incontinence that is seen in dogs only, not other species.

Cats
Because cats do make some of the same metabolites as humans (e.g., 11-OH-∆⁹-THC), over-the-counter test results may be positive.

What treatment is needed for THC intoxication?
There is no antidote, and treatment is symptomatic and supportive. Treatment options vary according to time since exposure. Asymptomatic animals can potentially be decontaminated. Many pets that have ingested plant material can be managed at home with confinement if they can be monitored for the ability to walk and respond to stimuli.

Because marijuana has antiemetic effects, inducing emesis may not be successful but can be attempted for patients recently orally exposed (< 30 minutes). For dogs, a locally acting emetic (e.g., 3% hydrogen peroxide) may be more effective than apomorphine or ropinirole, which work on the central chemoreceptor trigger zone. For cats, dexmedetomidine can be tried to induce emesis. Activated charcoal is generally not recommended for dogs or cats since most cases of THC intoxication are mild.

For patients that are more than mildly symptomatic, intravenous fluids should be started if dehydration or hypotension develops. Respiratory rate, heart rate, blood pressure, and body temperature should be monitored. For young patients, blood glucose should also be monitored. Patients should be kept warm and quiet, with minimized sensory stimuli. If recumbent, body position should be rotated every 4 hours. For agitated patients, diazepam or low-dose acepromazine (if the patient is normotensive) can be used. Although THC has antiepileptic properties, vomiting can occur (e.g., if chocolate from edibles was ingested) and lead to aspiration and death for some patients.

Hypotensive or comatose patients may benefit from intravenous lipid emulsion therapy (20% solution) as THC is lipid soluble. The dosing regime is an initial bolus of 1.5 mL/kg (over 20 to 30 minutes) and then a constant-rate infusion of 0.25 mL/kg/min (over 30 to 60 minutes). Repeat the constant-rate infusion in 4 hours, provided no lipemia is detected. Dialysis or hemoperfusion has no role in treatment as THC is highly protein bound (97% to 99%) and its volume of distribution is large (10 L/kg, with high lipophilicity).

What is the lethal dose?
Lethal doses for dogs and cats have not been established. The range of sensitivity among individuals is wide, and fortunately, death is rare. For patients that receive appropriate treatment, the prognosis is good and no permanent effects should be expected.

One study established that oral doses of 3000 to 9000 mg/kg of ∆⁹-THC were not lethal to dogs or monkeys. All dogs that received treatment recovered within 24 hours. Of note, that dose is approximately 1000 times the amount noted to cause clinical signs in dogs. However, there are published reports of death in 2 dogs that ingested edibles and a 12-week-old ferret that ingested plant material.
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Kulpa et al determined that cats given 41.5 mg/kg of THC (oil) exhibited mild gastrointestinal signs, lethargy, hypothermia, ataxia, and elevated third eyelids. All recovered without treatment.

If I am in a state where marijuana is still illegal, do I need to report cases of intoxication? No, veterinarians are not required to report marijuana intoxication cases to law enforcement. Doing so would stop some people from seeking help for their pets. Remind clients seeking treatment for exposed pets to treat THC products like any medication and keep them out of the reach of pets and children to avoid repeated intoxication.

**SUMMARY**

As more states legalize marijuana use, cases of marijuana intoxication will likely continue to rise. The variety of clinical signs, lack of diagnostic tests, and wide variation in content of edible products can sometimes make diagnosis challenging. Similarly, the range of individual sensitivity is also wide; however, most patients respond well to appropriate supportive treatment, with no permanent effects.

**References**


