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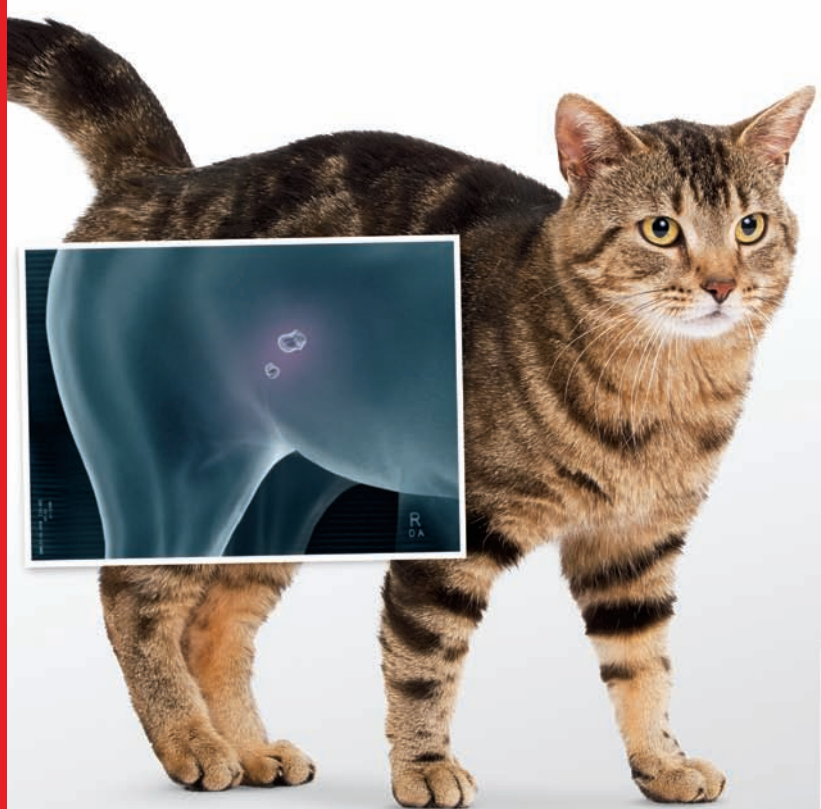

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Hypertonic phosphate enema intoxication in dogs and cats

Whether exposed due to an outdated therapeutic recommendation or a client attempting at-home treatment, your veterinary patients receiving these enemas need immediate attention. *By Laura A. Stern, DVM*

Hypertonic phosphate enemas (Fleet Enema—Fleet, and generic) contain sodium phosphate and other phosphates, typically at a concentration of 25 to 60 mg/ml, per the package label. They are used for bowel cleansing before a colonoscopy and to alleviate occasional constipation in people. Historically, these were used in veterinary medicine to treat the signs of megacolon in cats and chronic constipation in dogs and cats. But they are not typically recommended any more because of the risk of side effects and the availability of safer and effective alternatives, such as dioctyl sodium sulfosuccinate enemas and softgels.

Typically, pets are exposed due to outdated veterinary recommendations or because the owners are trying at-home treatments. The biggest concerns for toxicosis in dogs and cats are in situations in which a pet has underlying health conditions that predispose the pet to toxicosis, is given an enema orally, or does not defecate after being given the enema rectally.

Pharmacokinetics

Sodium and phosphorus from the enema are absorbed quickly from the gastrointestinal (GI) tract. Although we don't know the bioavailability in dogs and cats, in humans it is 60 percent. Phosphates are primarily excreted renally (90 percent). In healthy children, the half-life of phosphates is 4.8 to 10.6 hours; with renal insufficiency, the half-life increases to 17 hours.[1]

Mechanism of action

In people, phosphate enemas are used to relieve occasional constipation and for bowel cleansing prior to a colonoscopy.[1] Because phosphate enemas are hypertonic, they cause water to move into the colon and increase the water content of the stool, resulting in bowel evacuation within five to 10 minutes.

Excessive absorption of sodium and phosphorus can lead to hypernatremia and hyperphosphatemia. Hyperphosphatemia can lead to hypocalcemia, tetany, muscle stiffness or weakness. Sodium phosphate enemas are also hypertonic, which can cause fluid and electrolyte shifts as well as hyperosmolality. Dehydration

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and hypotension may occur secondary to GI upset. Hyperglycemia is thought to occur due to stress-induced release of catecholamines.[2]

Toxicity

Phosphate enema toxicosis is more likely in cats and small dogs, although marked signs have been reported in large-breed dogs. Clinical signs of toxicosis often occur when a retention enema is given or when the enema is given orally. Signs generally occur within 30 to 60 minutes of administration and may include depression, ataxia, vomiting, diarrhea (often bloody), tachycardia or bradycardia, pallor, weakness, tetany, tachypnea and seizures.

Laboratory abnormalities may include hyperphosphatemia, hypernatremia, hypocalcemia, hyperkalemia or hypokalemia, hypomagnesemia, hyperglycemia, metabolic acidosis with an increased anion gap (usually < 10 mEq/L) and hyperosmolality.[2] Animals with preexisting renal insufficiency, cardiac disease or GI diseases (ulcers, colitis, mucosal erosion, infection) can be at higher risk of severe signs.[2]

ASPCA Animal Poison Control Center data

A review of the ASPCA Animal Poison Control Center's toxicology database from 2003 to 2014 identified hypertonic phosphate enema toxicity cases involving nine dogs and 42 cats.[3] These cases were single agent (hypertonic phosphate enemas only) and were assessed as medium or high suspect cases based on history of exposure and clinical signs. (*See Table 1 for the most commonly reported clinical signs and blood work changes.*)

Of the 42 cats, follow-up information was available in 23 (52%).

Table 1

Most common clinical signs and blood work changes*

Cats

- Depression (n=29; 69%)
- Hyperphosphatemia (n=25; 60%)
- Hypocalcemia (n=22; 52%)
- Vomiting (n=17; 40%)
- Hypernatremia (n=17; 40%)
- Hypokalemia (n=11; 26%)
- Hyperglycemia (n=11; 26%)
- Hypothermia (n=10; 24%)
- Changes in breathing (n=7; 17%)
- Azotemia (n=7; 17%)
- Anorexia (n=7; 17%)
- Hypersalivation (n=7; 17%)
- Dehydration (n=7; 17%)
- Weakness (n=5; 12%)
- Diarrhea (n=5; 12%)
- Tachycardia (n=4; 10%)
- Increased alanine transaminase activity (n=4; 10%)
- Pale mucous membranes (n=4; 10%)
- Hyperkalemia (n=4; 10%)

Dogs

- Hyperphosphatemia (n=5; 56%)
- Hypocalcemia (n=4; 44%)
- Vomiting (n=4; 44%)
- Diarrhea (n=4; 44%)
- Lethargy/depression (n=3; 33%)

*Source: AnTox Database, Urbana, Illinois: ASPCA Animal Poison Control Center, 2003-2014.

View the references for this article online at **dvm360.com/EnemaTox**.

Eight (18%) recovered with treatment, six (14%) died and three (7%) were euthanized. The remaining four (9%) were still being treated or showing signs at the time of follow-up.

Of the nine dogs that were showing signs, five weighed less than 22 lb (10 kg) and the remaining four were between 22.1 and 88 lb (10.1 and 40 kg).[3] Of the dogs with known follow-up information, one (11%) recovered with treatment, two (22%) died and one (11%) was euthanized. One dog (11%) was still showing signs at the time of follow-up.

Hypokalemia, azotemia, anorexia, tremors and hemoconcentration were present in two (22%) dogs each. Hypernatremia, seizure and acidosis were present in one dog each.[3]

Monitoring

Monitor electrolyte concentrations and acid-base status until they return to normal. Baseline renal values should be obtained and a urinalysis should be performed to ensure that there is no underlying renal insufficiency. Also monitor blood glucose concentrations. The results of a complete blood count are generally unremarkable. Osmolality and osmol gap can provide useful information. Laboratory abnormalities generally return to normal within 24 hours.

Treatment outline

Treatment is aimed at controlling the electrolyte abnormalities and clinical signs being shown.

Decontamination. Asymptomatic pets with an oral ingestion can be given aluminum hydroxide. Aluminum salts will bind phosphorus and form insoluble aluminum phosphate. Activated charcoal is contraindicated since it doesn't bind the phosphorus and can potentially contribute to hypernatremia.

Electrolyte correction. Generally, 5% dextrose or 0.45% sodium chloride in 2.5% dextrose are the fluids of choice for rehydration and the treatment of the associated electrolyte abnormalities at a rate of 1.5 to 2 times maintenance (45 to 60 ml/lb/day), plus fluid deficit and ongoing losses. Oral water should be available and encouraged in patients able to safely drink.

Hypernatremia can be treated with the low-sodium fluids. A warm water enema at 5 ml/lb may also be helpful. Animals with chronic hypernatremia (more than 12 hours) will need to have the sodium slowly decreased—no more than 0.5 mEq/hr. Serum sodium concentrations should be monitored every one to four hours until they return to normal.

Hypocalcemia should be treated with calcium gluconate. If hypocalcemia-associated tetany is present, give 50 to 200 mg/kg of calcium gluconate slowly intravenously over 15 to 30 minutes along with electrocardiographic monitoring. If cardiac changes are seen or when improvement in the tetany is seen, the infusion should be discontinued. For

One and done.

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[1]Six R, Cherni J, Chesebrough R, et al. Efficacy and safety of cefovecin in treating bacterial folliculitis, abscesses, or infected wounds in dogs. *J Am Vet Med Assoc.* 2008;233(3):433-9.

zoetis

stable patients with hypocalcemia, give 150 to 250 mg/kg of calcium gluconate diluted with four times the volume of sterile water subcutaneously every six to eight hours.[2]

Potassium chloride should be supplemented in fluids of hypokalemic animals, not to exceed 0.5 mEq/hr. Insulin and dextrose therapy can be used to treat severe (> 6 mEq/L) hyperkalemia.[4] Hyperglycemia is transient and usually does not warrant treatment.

Monitor for acidosis, but administering sodium bicarbonate is not recommended unless it is severe since the sodium will exacerbate the hypernatremia and hypocalcemia.[2]

Peritoneal dialysis may be indicated in patients with chronic renal failure, as they will have a decreased clearance of phosphate.[5] Hemodialysis can be used to treat hyperphosphatemia, hypernatremia, hypocalcemia and hypomagnesemia.[1]

Treating clinical signs. Hypotension should be treated with intravenous fluids. Dopamine at a 1 to 3 µg/kg/min constant-rate infusion can be considered in cases that are refractory to fluids alone.[6] Seizures can be treated with diazepam. Seizures that are refractory to benzodiazepines can be treated with propofol or barbiturates. Broad-spectrum antibiotic therapy may also be warranted in patients with chronic constipation or megacolon, as they may have compromised gut mucosa and may be at risk for sepsis.

Summary

Hypertonic phosphate enemas can cause serious and life-threatening signs in cats and dogs such as hyperphosphatemia, hypocalcemia, hypernatremia, cardiac arrhythmias and metabolic acidosis. Intensive care and diligent monitoring are indicated in most cases. Treatment is aimed at correcting electrolyte abnormalities, controlling GI upset, and restoring and maintaining normal hydration. The prognosis in animals exhibiting clinical signs with preexisting renal or cardiac disease can be poor. VM

Laura A. Stern, DVM
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A double dose of infectious disease:

Histoplasmosis in a fox hound puppy

Initial exposure to a tick-borne disease may have contributed to this puppy's susceptibility to this fungal disease, which can be deadly if disseminated. Would you be able to catch the signs of infection?

By Sallie A. Ruskoski, PhD, MT(ASCP), and Joseph D. Landers, DVM

In late June and early July of 2012, a kennel of about 40 American-English cross fox hounds had an outbreak of Rocky Mountain spotted fever (RMSF) as demonstrated by rising titers that went through all hounds, including seven 8-week-old puppies. The puppies were housed with the bitch in a barn in a stall separate from the kennels of the adults. All seven puppies became ill (fever of unknown origin) and were hospitalized.

Two male puppies succumbed to the RMSF on day 2. The remaining five puppies were hospitalized for five days and then treated with doxycycline for two weeks starting on day 2. The surviving puppies continued to grow and develop normally.

About seven weeks later, the owners of the five remaining puppies noticed that an intact female puppy (now 15 weeks old) began to suffer from intermittent anorexia, vomiting and fever (105 F [40.6 C]). Six days later, the puppy presented with mild diarrhea. The owners started the puppy on an antiemetic and metronidazole that they had on hand. The puppy was losing weight, sleeping more and not interacting as much with its litter mates. Five days later, after failure to improve, the puppy was brought to the veterinary hospital.

On physical examination, the puppy was thin, weighing 37.6 lb (17.1 kg). It was alert and had pale mucous membranes and a temperature of 102.2 F (39 C). Blood work (*Table 1*) showed a normocytic normochromic nonregenerative anemia, thrombocytopenia and a prolonged

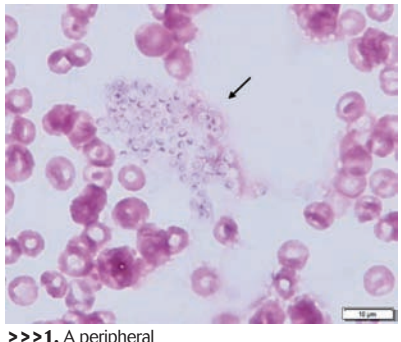
Table 1
Selected laboratory results

Parameter	Patient values	Reference range
Hct (%)	18.7	32–55
MCV (fl)	62	60–70
MCH (pg)	22.3	18–30
MCHC (g/dl)	36	30–77
Reticulocyte (k/µl)	26.5	10–110
WBC (k/µl)	6.73	5.5–16.9
Platelets (k/µl)	121	175–500
Activated clotting time (sec)	135	90–120

activated clotting time. The results of a cage-side ELISA for *Anaplasma* species, *Borrelia burgdorferi*, *Ehrlichia* species and *Dirofilaria immitis* were negative. Treatment was initiated with doxycycline (5.8 mg/kg b.i.d. orally), ciprofloxacin (29 mg/kg b.i.d. orally), vitamin K_1 (1.4 mg/kg b.i.d. subcutaneously for the first dose and then orally) and force-feeding.

Diagnosis and treatment

Over the next two days, the puppy remained pale and anorectic with an undulating fever. It responded when stimulated but mainly slept during the day. The hematocrit remained 21%. The results of a Coombs test and parvovirus test were negative. The puppy continued to be force fed and had dark and soft stools. Epoetin alfa injections (98.6 U/kg subcutaneously) were started and given every three days.



>>>1. A peripheral blood smear containing *Histoplasma capsulatum* fungemia yeast organisms free floating in the blood (*arrow*) (Wright's stain; 100X oil immersion).

See a larger version of this figure at **dvm360.com/HistoplasmaCase**.

On the fourth day, the puppy was bright, alert and reactive. Its mucous membranes were still pale, and it had a hematocrit of 27.8%, white blood cell (WBC) count of 4.43 k/µl, platelet count of 52 k/µl and temperature of 105.2 F (40.7 C). A round, thin, clear cell wall organism with a basophilic nucleus was observed microscopically on a blood smear stained with Wright's stain, which was identified as *Histoplasma* species (*Figure 1*).

A blood sample was cultured on Sabouraud dextrose agar (SDA) and a 5% sheep blood agar plate to confirm histoplasmosis. As we do before all transfusions, the puppy was pretreated with diphenhydramine (2.33 mg/kg), famotidine (0.46 mg/kg) and dexamethasone (0.26 mg/kg) intravenously and then transfused with fresh whole blood.

The day after transfusion, there was an increase in the hematocrit and platelets (33% and 128 k/µl, respectively) with a WBC count of 5.06 k/µl, a temperature of 102.8 F (39.3 C) and weight of 34.6 lb (15.7 kg). After discussing the guarded prognosis and cost of medications with the owners, the following treatment plan was agreed upon: 10 mg (0.6 mg/kg) prednisone once a day for 10 days, then reduced to 10 mg every other day, and 6.4 mg/kg fluconazole twice a day.

Although the use of prednisone can be controversial, it was used at a low dose in this case to control pyrexia, stimulate appetite and reduce lethargy. Fluconazole was to be administered for a minimum of three to six months or longer, if indicated. The epoetin alfa given every three days was continued, but all antibiotics were discontinued.

Outcome

The owners elected on day 6 to take the puppy home and monitor its temperature, treatment and force-feeding. They returned in three days for a repeat CBC and epoetin alfa injection. At the follow-up appointment, the owners reported that the puppy was eating some chicken breast, ground beef and treats but was still being force fed. The examination revealed the puppy was paler than after the blood transfusion and had lost a considerable amount of muscle mass. The owners stated that the puppy was more lethargic but still interacted when stimulated. The hematocrit was 26.4%, platelet count was 130 k/µl, temperature was 102.9 F (39.4 C) and WBC count was 18.15 k/µl, which was increased compared with the results three days prior.

The owners were informed that a blood transfusion was not indicated at this time and to continue the epoetin alfa injection, prednisone, fluconazole and force-feeding, with laboratory values repeated in three days. The owners called two days later and reported that the puppy had become blind and continued to have a fever. Ocular involvement is a clinical sign of disseminated disease with poor recovery. The owners elected to euthanize the puppy humanely because of the poor prognosis.

The blood sample on the blood agar plate grew in seven

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days, and budding yeast cells were observed microscopically. The blood sample on the SDA took five weeks to grow, with smooth macroconidia and small, round to teardrop microconidia along the hyphae being observed microscopically, thereby confirming the *Histoplasma capsulatum* fungemia diagnosis.

Discussion

Histoplasmosis capsulatum, a dimorphic soil-borne fungus, is endemic throughout the Mississippi and Ohio River valleys.[1-3] Dogs usually acquire *Histoplasma* species microconidia from inhalation, which is presumably how this hound puppy become infected.[4,5] In this case, it is possible that the puppy's immune system had been challenged and then possibly compromised because of the RMSF infection seven weeks prior. This may have facilitated an acute systemic histoplasmosis, leading to rapid deterioration of health.

Histoplasmosis can cause gastrointestinal signs such as vomiting and diarrhea in dogs, which can lead to lethargy and weight loss.[3] In addition, nonregenerative anemia and thrombocytopenia[4-6] are commonly seen. Clinicians should include histoplasmosis as a differential diagnosis in dogs with these clinical and laboratory signs, especially if they are in or have visited an endemic area recently.

Diagnosis of *H. capsulatum* can be difficult because of the clinical similarities with other organisms.[5] Impression smears from fine-needle aspirates are commonly used when diagnosing lesions.[3] The most direct way to isolate and identify the organisms is by culturing blood. However, the organism is slow-growing; it can take up to four weeks for the fungus to grow on SDA[7,8] as observed in cultures in this study. Lactophenol cotton blue stain was used in identification of the fungus grown on SDA.

An ELISA is not considered a reliable diagnostic test because of antibodies cross-reacting between *H. capsulatum* and *Blastomyces dermatitidis*.[3,4,8] Additionally, it is difficult to distinguish whether circulating antibodies are due to exposure or active infection. Antigen detection by nested polymerase chain reaction in the urine, blood and tissue is now performed in dogs to diagnose histoplasmosis.[3] There are no published data regarding the sensitivity and specificity of this test in dogs, but it is thought to be similar to the results in cats (94%) as well as people (95% to 99%).[8-10]

The owners of the puppy had the remaining littermates tested for histoplasmosis with an enzyme immunoassay that detects a galactomannan antigen located in the cell wall of *H. capsulatum* (Mira Vista Diagnostics). Urine was collected, and initially all four littermates had negative results (results below 0.4 to 0.8 ng/ml). Upon retesting three weeks later, two of the four littermates had positive test results at low levels, most likely from exposure through inhalation because of being in the same environment as the ill puppy. Currently, all four littermates are healthy and have no clinical signs of active histoplasmosis.

There are several antifungal medications that have been recommended for histoplasmosis treatment. Itraconazole is considered the treatment of choice for infections in dogs,[3,4,8] but it is expensive. Fluconazole can penetrate more efficiently in the central nervous system and eye, has fewer side effects than itraconazole and costs less. Amphotericin B is considered

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the gold standard when treating many systemic fungal infections. However, it is not used in most cases of histoplasmosis because of its significant nephrotoxicity. It is recommended that treatment continue for one to two months after resolution of clinical signs.[5,8] The owners in this case elected to go with fluconazole because of the decreased side effects and because it is considerably less expensive then the other two antifungal choices.

There is currently no vaccine available for histoplasmosis, so early detection and treatment is imperative for a possible positive outcome. There is no practical way to prevent the organism in the environment. Clinicians should be suspicious of fungal infections in young dogs in endemic regions if the dogs display signs of anorexia, lethargy, diarrhea, fever and nonregenerative anemia that do not respond to initial antibiotic therapy and continue to show no clinical improvement chronically. Although the outcome was grave, this case demonstrates the value of careful examination of a peripheral blood smear that identified *H. capsulatum* and directed the appropriate treatment plan. VM

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The authors thank Drs. Robin Allison and Andrew Hanzlicek for their contributions in identification and treatment, respectively, and Jay Bullard, SI(ASCP) for his assistance in the laboratory.

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The *ups and downs* of controlling **flea infestations**

Flea infestations can be a rollercoaster of emotions for pet owners. Here's how to help manage the ups and downs.

By Michael Dryden, DVM, MS, PhD

If one of your veterinary patients has a severe flea infestation, you'll likely help the owners take control of the situation with flea-control products. Take a look at this data (see chart, next page) from a case handled by veterinary parasitologist Dr. Michael Dryden of a dog in Tampa, Florida.[1] In this case, direct control on the dog was attempted with a fipronil-(s)-methoprene topical spot-on given on days 0, 28 and 56. To quantify flea counts in the environment, two intermittent-light flea traps were placed in two rooms in the home for 16 to 24 hours at each counting period.

"Something isn't working here..."

Around day 21 you or your

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Flea counts in a home and on a dog after flea product administration

	Days after initial treatment							
	0	7	14	21	28	42	56	90
Flea counts in traps	261	312	378	678	230	34	4	1
Reduction from day 0		-19.54%	-44.83%	-159.77%	11.88%	86.97%	98.47%	99.62%
Area flea counts on dog	125	55	65	186	130	6	4	0
Reduction from day 0		56%	48%	-48.8%	-4%	95.2%	96.8%	100%

client might think, "Something isn't working here. Flea counts are up." Flea resistance to the topical product may even be suspected.

But not so fast, says Dryden. "Keep in mind that the fleas collected in intermittent-light flea traps on days 7, 14, 21 and 28 were likely produced from flea eggs laid before treatment was initiated," he says. "One of the biggest unknowns in a household is how many flea eggs were laid before treatment was initiated and what percentage of those eggs will develop into adult fleas. In such a household, it is possible that a flea problem may appear to get worse after treatment."

Dryden says that the fleas emerging on day 42 came from eggs that had been laid three to eight weeks previously. "The precipitous drop in emergent flea trap counts after day 28 is directly related to the reproductive suppression of the fipronil–(s)-methoprene formulation during the month immediately after the first application," says Dryden.

Another factor is that as the month ticks by, the topical product loses some of its potency because of the active ingredients' half-lives, resulting in slower speed of kill. When the product is reapplied 28 days later, full potency is once again achieved. "It is important to understand that this is not product failure—it is just an indication of a slowing speed of kill," says Dryden.

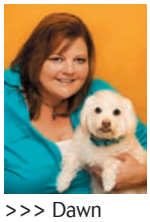
So if a client trying to eliminate a flea infestation comes to you concerned that the number fleas isn't drastically down within the first month, tell them, just wait a bit. It is working. "Switching products should be a last resort," says Dryden. "As evidenced by the data from this case, if a product switch had occurred, the second product would have received the credit for the dramatic reduction in the flea infestation, when, in fact, the first product was responsible." Head over to **dvm360.com/residualactivity** for more details on this case.

Reference
1. Dryden MW, Burkindine S, Lewis T, et al. Efficacy of selamectin in controlling natural flea infestations on pets and in private residences in comparison with imidacloprid and fipronil, in Proceedings. Am Assoc Vet Parasitol Annu Mtg, 2001; P34.

I rocked my hospital's (preventive) inventory

This practice manager found a way to handle her practice's inventory of preventives better.

By Dawn Rosch



>>> Dawn Rosch, a 2015 *Veterinary Economics* Practice Manager of the Year nominee.

My father always told me, "Manage the pennies and the dollars will come." When I took over as veterinary practice manager, I went line by line through the expenses and looked for areas to save money. One such area was our inventory management system.

Take a look

When you walk into a department store, you see the jewelry locked in a glass case. In my practice, I treat our flea, tick and heartworm preventives like a jewelry department.

In the past, products for dispensing were located in four areas of the hospital, unlocked on various countertops. Single doses were kept inside plastic bags alongside the dispensing stock. The bulk stock was kept in an unlocked storeroom. All employees were allowed to restock product. Inventory was counted monthly and was consistently off by 75 to 100 doses.

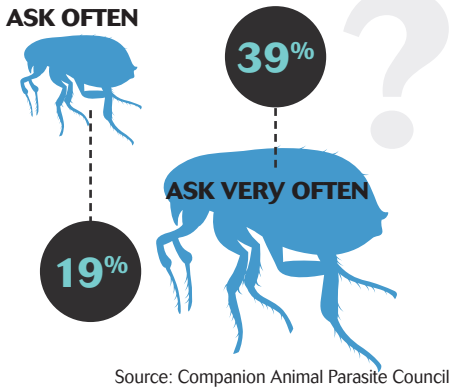
To tighten up security, I consolidated the dispensable product in one location at the reception counter and bought a nut-and-bolt organizer from the hardware store to manage all the single doses. Each drawer contains an index card listing the number of doses. Once dispensed, the receptionist writes the client's name next to the dose number, and when the card is completed it's returned to me. This way, we verify that every dose dispensed has been accounted for.

When we replenish general inventory, a moderate amount of surplus product is kept under lock and key in the pharmacy. Only one employee has a key and is in charge of filling the display. She keeps a log to record the inventory coming into and out of the cabinet. Our main locked storeroom contains the bulk of our supply and is managed by a different employee. She replenishes the stock in the pharmacy cabinet, maintains her own storeroom log and double-checks the pharmacy log for accuracy.

That's not all. Flea, tick and heartworm products are counted every two weeks during peak season. If there is a discrepancy, I want to know immediately. With this new program, inventory of these common items is only off by a few doses.

Considering we sell approximately $150,000 worth of these products annually, the savings with appropriate inventory management is significant.

57% of clients say they often ask about diseases caused by fleas. Is your practice's message on point?



Source: Companion Animal Parasite Council

GETTY IMAGES/DEAN GOLJA

Choose a team approach to parasite problems

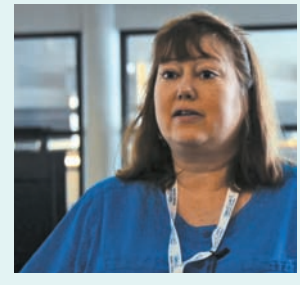
From check-in to check-out, Dr. Karen Felsted sees opportunities for client education at every stage of veterinary appointments.

In 2013, just 34 percent of dogs and 22 percent of cats were given flea and tick preventives that were purchased from a veterinary practice, according to the Merial Pet Owner Experience Study. Products are available inexpensively from other sources, and pet owners don't understand the value of flea and tick control, which threatens the veterinary pharmacy business. How do practices take steps to improve compliance and keep client's purchases at your clinic? Communication is a big part of it, and the whole team needs to be involved.

What can you do right now?

>>>Talk to clients. Don't just assume that the conversations are happening. Review the number of recommendations per visit for active patients, and use exam room audits or medical record audits. Set up a system to make sure that every client gets information so your message doesn't slip through the cracks. For example, Dr. Felsted recommends the receptionist start the appointment with a flea questionnaire. Then the technician can initiate the flea and tick preventive conversation. And finally the veterinarian will review the data and make a product recommendation.

>>> Use communication effectively. Pet owners are **seven times** more likely to accept a recommendation if it's presented clearly and they can understand it. Use words that make sense to clients and emphasize the importance of preventives. Tell a story or client anecdote. Personal experience is an effective hook. For example, Dr. Felsted found fleas on her indoor-only cat that she had tracked in



herself. And use visual aids. Make flea presence local with a map from CAPC or pull out a jar of fleas and flea dirt.

>>> Deal with skeptical clients. Fleas can jump and are everywhere outdoors. Ask about where the dog or cat goes beyond walks. Do they visit dog parks or do other animals come to visit the client's home? Fleas can be tracked in by other people or animals. Use resources available at **dvm360.com/fleacontrol** or **dvm360.com/CAPC** and what you've learned at CE sessions to reinforce your point.

Remember, unless your practice reinforces how important preventives are clients won't take the recommendation seriously. Leverage each team member and offer stellar client service, Dr. Felsted says.

Not only is a flea-infested pet a flea egg distributor, wildlife such as opossums, raccoons, foxes, coyotes, and mongooses (in tropical locations), also commonly carry cat fleas, and, of course, so do stray dogs and cats. As these animals move through the neighborhood and yards, flea eggs drop off.

– Michael Dryden, DVM, MS, PhD

Prime pets for fle

Use these videos and audio tools to help educate your clients about the dangers (and headaches) that go along with fleas—both inside the house and in their backyard.

Flea hideouts in the house

Communication about fleas can be tricky when clients aren't convinced that their homes can be hotbeds for these pesky parasites. You probably see plenty of pet owners who believe their indoor-only cat could never get fleas, or that just because they don't have carpet, their homes aren't susceptible to an infestation. Expert veterinary parasitologist Dr. Michael Dryden doesn't hold back when it comes to fleas—get his expert tips about their sneaky hideouts and make sure your clients are aware of where these pesky parasites might be lurking.

Scan the QR code above for advice from Dr. Dryden on ridding the home of pesky parasites.

Scan for this handout to help clients understand why their home is an ideal environment for fleas—and what they can do.

Get your flea updates now—just scan the code above.

Updates on preventives

Catch up on the latest in veterinary parasite preventives to make sure your patients are protected. A whole new drug class is out to eradicate fleas and ticks in dogs, but any form of flea and tick preventive is absolutely paramount in all pets, says veterinary parasitologist Dr. Andrew Moorhead.

No QR code reader? No problem. Get these tools at **dvm360.com/fleacontrol.**

a protection

The harsh reality: Where did that flea come from?

It's hard for your clients to understand that the flea they just spotted on their pet stems from a problem that may have started a few months ago. Here Dr. Michael Dryden discusses the tricky conversation you have to have with pet owners to help them understand the flea life cycle—and get a handle on the situation at home.

Wild ones to watch for

In North America, we see a number of species of wildlife that carry fleas—from opossums and squirrels to raccoons and rabbits. But which ones carry the type of flea that can be problematic for dogs and cats? Here Dr. Michael Dryden shares which wild creatures are a threat to the pets in your clients' backyards.

Listen in! Scan the QR codes, above, to hear expert parasitologist Dr. Michael Dryden.

>>> Sneaky raccoons and other wildlife could be the source of your clients' flea frustrations. Make sure clients understand how to protect their pets from the great outdoors.

GETTY IMAGES/BEYONDMYLENS

Use these **pleas** to **stop fleas**

Use your social media network to educate clients and raise awareness about flea facts and figures with these tweets and posts.

You know your clients are itching to learn more about fleas. Now their social media streams can be hopping with flea information they need to know to protect their pets.

When the dog has #fleas, don't forget to treat the guinea pig. It only takes one infected #pet to infest the others. #pethealth

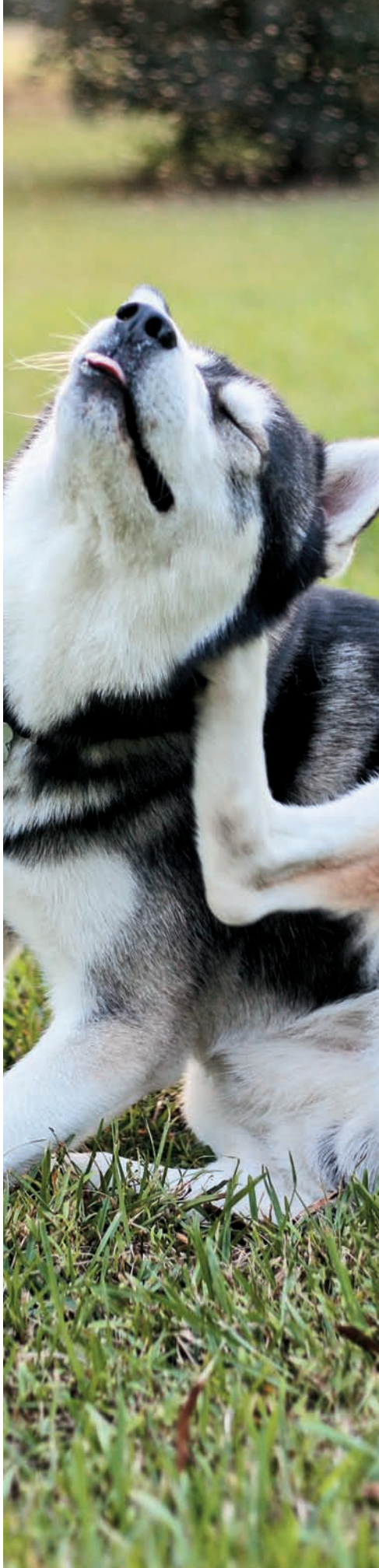
Sure you've seen a few fleas on Fluffy, but it's not like one or two are a big deal, right? Wrong. A few fleas can turn into a massive infestation in a hurry. Quick! Come see us so we can free Fluffy from fleas ASAP.

#Flea allergy dermatitis accounts for about 50% of all canine and feline dermatological cases. Signs: Scratching neck/licking. #pethealth

If your pretty kitty is scratching, licking constantly, or you spot crusty bumps around her neck, she could have flea allergy dermatitis. This condition accounts for about 50 percent of all canine and feline dermatological cases. Get in touch so we can keep your pet from becoming a statistic.

A few #fleas aren't a big deal, right? Wrong. They can turn into a massive infestation in a hurry. Come see us ASAP! #pethealth

Scan this code to send your first flea plea to clients!



GETTY IMAGES/PATTIE STEIB

Fleas in 2015

Is there a communication gap between veterinary professionals and pet owners when it comes to fleas? We have the data.

DOGS

99% of dog owners are AWARE of **FLEAS** in their area

39% *report being very concerned about fleas*

42% *report being somewhat concerned about fleas*

However **15%** of dog owners **DON'T USE FLEA PROTECTION**

CATS

100% of cat owners are AWARE of **FLEAS** in their area

35% *report being very concerned about fleas*

36% *report being somewhat concerned about fleas*

However **24%** of cat owners **DON'T USE ANY FLEA PROTECTION**

GOOD NEWS!

51% of pet owners recall discussing fleas at their pet's last health/wellness exam.

BAD NEWS

the flea concern gap for cats: **94%** of veterinarians are concerned about fleas in cats, but only **71%** of cat owners report being concerned about fleas.

SOURCE: COMPANION ANIMAL PARASITE COUNCIL

Are technicians the key?

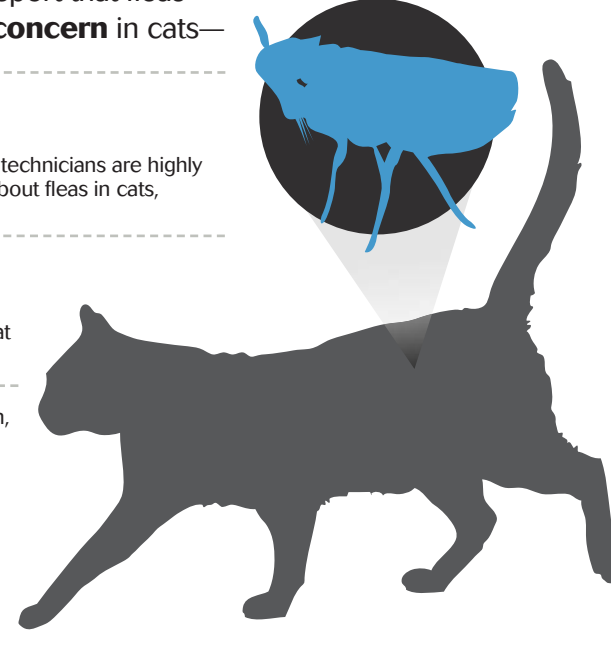
Veterinary technicians report that fleas are their **top parasite concern** in cats—

79% of veterinary technicians are highly concerned about fleas in cats,

16% are somewhat concerned

But despite high levels of concern,

42% of technicians report that their training on fleas happens only once every six months.



TOP 10 BARRIERS
to successfully preventing fleas

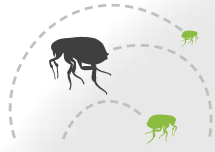
Take 20 minutes in your next team meeting to discuss each of these barriers to flea prevention with your team—and make a plan for better client communication about these pesky parasites.

1

Not knowing where fleas come from. Pet owners often don't understand what an infestation is. They don't know that every flea on their pet came from a site of infestation (home, yard, park).

2

Thinking that fleas jump from one pet to another. Once fleas jump onto a dog or cat, they live their entire lives on that animal.



3

Not realizing that neighborhood pets, and feral and wild animals visit their yards and deposit flea eggs.

4

Thinking indoor cats don't get fleas. But people can bring "hitchhiker" fleas into the home, and there you go—Fluffy's got fleas.

5

Worrying that fleas in their house equal a dirty home (which can be a huge communication hurdle). No, we don't think you're dirty.

6

Not knowing how flea prevention products work. Pet owners expect to never see fleas on their pets if they are treated. They think flea-control products repel fleas and they think all fleas are killed in minutes.

7

Not understanding the life cycle—that it takes three to eight weeks, or longer, for all stages of flea development to be exhausted. Pet owners expect a flea infestation to resolve within days of beginning treatment. But they may see more fleas on their pets, even after treatment.

8

Thinking that putting pets outside will help the problem. Except without the pets to feed on, the fleas may attack the owners.

9

Believing that treating the yard with insecticides should solve the problem. But adult fleas don't live free in the environment. It is the eggs, larvae, and pupae that form the environmental infestation. Treating the yard may be helpful, but it is a small part of the solution.

10

Thinking that once a flea problem is solved they can stop treating their pets. Pet owners don't understand that flea infestations are present in the yard, neighborhood, parks, etc., and their pets will pick up fleas and re-establish infestations in the home.

Getting the history— *and setting expectations*

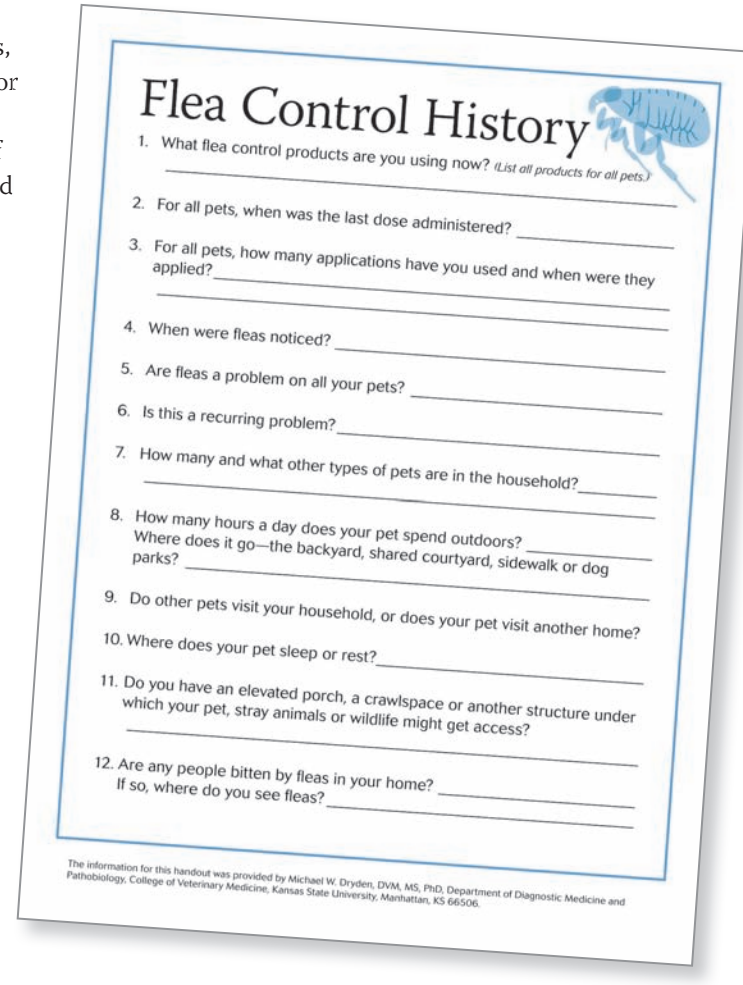
Flea control starts with a thorough history. Use this tool to help your team gauge where clients are where it comes to prevention.

Flea control starts with a thorough history and a physical examination to look for fleas, flea feces, tapeworm segments, and evidence of pruritus or dermatitis. Your findings will assist you in determining the severity of the infestation, allow assessment of clinical disease associated with the flea infestation, and assist you in designing an overall control program.

Set realistic expectations

Few pet owners thoroughly understand how flea products work. They may have false perceptions about the speed of kill, residual activity, and repellency as well as how flea infestations are controlled. As a result, clients may come to us, sometimes quite unhappy, saying that a certain product we sold or recommended is not working. Given a lack of knowledge of flea biology and of how flea products work, our clients may have product performance expectations that cannot be met.

So the first step in battling fleas may simply be setting proper client expectations. Select the best flea product to meet a client's and pet's needs; advise pet owners about additional control measures, if needed; explain and demonstrate correct product administration; and, most critical, tell clients what to expect once a pet leaves your practice and goes back to its flea-infested home.



Flea Control History

1. What flea control products are you using now? *(List all products for all pets.)*
2. For all pets, when was the last dose administered?
3. For all pets, how many applications have you used and when were they applied?
4. When were fleas noticed?
5. Are fleas a problem on all your pets?
6. Is this a recurring problem?
7. How many and what other types of pets are in the household?
8. How many hours a day does your pet spend outdoors? Where does it go—the backyard, shared courtyard, sidewalk or dog parks?
9. Do other pets visit your household, or does your pet visit another home?
10. Where does your pet sleep or rest?
11. Do you have an elevated porch, a crawlspace or another structure under which your pet, stray animals or wildlife might get access?
12. Are any people bitten by fleas in your home? If so, where do you see fleas?

The information for this handout was provided by Michael W. Dryden, DVM, MS, PhD, Department of Diagnostic Medicine and Pathobiology, College of Veterinary Medicine, Kansas State University, Manhattan, KS 66506.

Download this handout and have it ready for your team to use when discussing fleas with pet owners. Scan the code to download now.

To download these free handouts and other tools for your clients, visit **dvm360.com/fleacontrol**.

Filling in the knowled

Don't let clients jump to conclusions when it comes to fleas. Give them these handouts to clear up any confusion.

When clients ask why they should treat pets that don't go outside, use this tip from **Dr. Marty Becker**: "Let's say you have multiple pets. You could easily have a dog that goes to the dog park and comes against a pet that has fleas and then brings them home, so you now have fleas in your house."

FROM YOUR VETERINARIAN

What *you* need to know about **fleas**

Know thy enemy—and make sure your pet, your family and your home are kept flea-free.

Utter the "F" word (fleas, that is) and you'll likely inspire looks of horror. Fleas are every pet owner's worst nightmare. Why? Because these bloodsucking bugs can wreak havoc on your beloved pet and home.

It's all about the life cycle

One adult female flea lays up to 50 eggs a day, which hatch and reproduce exponentially in a short time. Within the next two weeks, the eggs hatch into larvae, very small caterpillar-like creatures. The immature flea can remain in this stage for several days to a few weeks.

The larvae then spin a cocoon and enter the pupae stage. Adults usually emerge from their cozy covering within 14 days but can survive in the cocoon for several months until vibration, pressure, heat, noise, or carbon dioxide jolts them from their deep sleep.

Once they emerge from the cocoon, adult fleas must find a warm-blooded host within a few days—or they'll die. Once a flea finds your pet, it will live out its life happily feeding off your four-legged friend. In no time, these hungry parasites can become a persistent, itchy, and dangerous problem.

Signs of flea infestation include:

- flea feces, or pepper-like specks, in your pet's coat or on his bedding
- flea eggs, or light-colored specks, in your pet's coat or on his bedding
- itchy skin (scratching)
- biting at his fur or legs
- patchy hair loss, especially near the tail or neck
- lethargy (especially in severe cases)
- tiny, dark brown insects scurrying around on your pet.

Fleas usually are more annoying than lethal, but they can spread tapeworms to your pet and other family members. Very small or young pets can develop anemia, a potentially life-threatening condition, because of blood loss from flea infestation. Call your veterinarian immediately if you find fleas on a puppy or kitten less than 12 weeks old or if your adult pet suddenly acts lethargic.

Intermittent flea exposure increases your pet's risk for developing an allergic reaction called flea allergy dermatitis (FAD). Studies show that about 80 percent of allergic dogs also develop FAD.

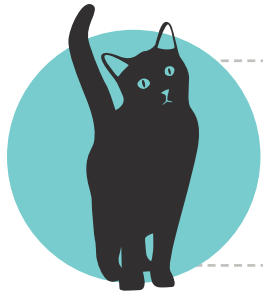
Risk factors and detection

All pets are at risk for a flea infestation. Pets who spend time outdoors are particularly susceptible. Why? Many adult fleas live outside and on wildlife hosts until they find a happy home on your pet. Indoor dogs also are at risk because they can pick up fleas when they go outside to exercise or relieve themselves.

If you suspect your pet has fleas, it's important to act right away. Call your veterinarian if your pet exhibits any of the signs detailed in the chart, left.

GETTY IMAGES/ALICSOMS

Your clients might believe that they have all the information they need when it comes to fleas—and yet, Bella might still be coming in to your practice, itching and scratching. Have your team clear up any confusion with this handout explaining exactly what fleas mean for pets —and hopefully Bella and her family will have a flea-free future. Scan the code below to download now.



"Clients should know that the flea species that infests cats, *Ctenocephalides felis*, is the same species that infests dogs. If pet owners do not understand this basic aspect of flea biology, it can directly lead to flea control failures because they may not see the need to treat every potential flea host in the home."

—Michael Dryden, DVM, MS, PhD

ge gaps

FROM YOUR VETERINARIAN

If *you've* been **infested**

First: Don't panic. Follow these tips and talk to your veterinarian about how to handle a dreaded flea infestation.

If you started using flea medications after you discovered a flea infestation, you'll need to treat your house too. Why? Fleas can live for several months in your house and yard, and flea eggs can survive in your carpet, cushions, and drapes for years.

And your pet isn't the only one at risk: People can get irritating flea bites too. Ridding your home of these pests takes time and a concerted approach.

Here's what to do:

To get rid of housebound fleas, use professional flea foggers in each room and sprays for hard-to-reach spots. Clean the flea eggs out of your house by vacuuming several times a week, taping the vacuum bags shut, and throwing them away each time. Also clean your dog's favorite hangout spots and wash her bedding regularly.

If your dog spends time outdoors in a kennel, be sure to wash the bedding or discard old hay if you use it. Spray doghouses and kennels with an indoor flea spray, and let all treated areas dry before you let your pet outside.

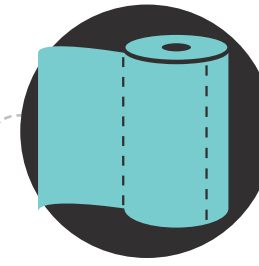
If your flea problem is recurring, you may need to treat your yard as well. Use professional, concentrated yard sprays for the outdoor fight. You can buy many that attach easily to the end of a garden hose for application.

It's especially important to spray moist and shaded areas of your yard. But be sure not to use any environmental treatments directly on your pet.

Ridding your pet and her environment of these hardy pests is a tough job, but you'll rest easier knowing that your dog doesn't have to endure the maddening itching and scratching or the insidious diseases these parasites can inflict.

GETTY IMAGES/CHARLES MANN

To anyone who has dealt with a flea infestation: We feel you. It can be a rollercoaster of emotions and frustration. Share your empathy with pet owners—and make sure they have all the information they need to protect their homes from fleas with this handout explaining the action steps to take after a flea infestation. Scan the code below to get this handout now.



Have clients use this simple test for fleas: If you find any pepper-like specks on the dog's fur, collect them onto a lightly moistened white paper towel and rub the towel together. A reddish color means you've found flea dirt—blood that fleas have ingested and excreted. If it turns tan or gray, your pet probably just needs a bath.

There are approximately **2500** species and subspecies of fleas worldwide

94% of which parasitize mammmals

and the other

6% parasitic on birds.

For all the tools you need to educate clients and fight fleas, go to **dvm360.com/fleacontrol.**

Defuse *disgruntled* pet owners (And help those itchy pets!)

We have all been in the exam room with about-to-explode clients. The pet sits in front of you, gnawing helplessly at his raw red skin, like the flashing light on a ticking time bomb. Your client's short fuse is about to ignite.

So what can you do to defuse the situation?

The first step is listening—really listen to how itchy their pet is and how much sleep they're not getting and let them know that you hear them. Use a soft, understanding statement like the one pictured here. By listening and mirroring back what the client has expressed you can begin to create a bond of trust with clients. They need to know you're going to present their frustrations to the doctor.

> *"I'm so sorry you've been dealing with this for so long. It can be frustrating to watch your baby struggle. I know you just want him to be comfortable."*

If a flea allergy is the culprit, explaining flea prevention offers the fastest kill is important, since one flea can set a flea-allergic pet into an itch-fest that will drive everyone crazy.

Sending pet owners home with a written report is key to compliance. It's easy to misunderstand spoken instructions. If this is the first time the pet is receiving this care, pet owners need written instructions to refer to at home.

"Sending home written discharge instructions is important. This gives clients something to refer back to and helps decrease confusion," says Dr. Eliza Roland, a veterinarian with VCA Seaside Animal Hospital in Calabash, N.C. "We talk about a lot of things during an allergy discussion, and this can be very confusing for owners. Having something written down empowers and educates clients."

One more tip

Talking **fleas**

If your practice *isn't* absolutely killing it at flea preventive sales and client compliance, make sure you and you team are:

- Making clear, specific client recommendations.
- Carrying only one to three preventive products. Pet owners can be easily overwhelmed by too many choices, and inventory costs on too many choices can spiral out of control.
- Are always following up with client reminders on proper dosing and refills for flea preventives.

"At least **75%** of atopic dogs are flea-allergic, so they need good flea control."

—Ian B. Spiegel, VMD, MHS, DACVD

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BRAVECTO®
(FLURALANER)

FLEA AND TICK MANAGEMENT JUST TOOK A GREAT LEAP FORWARD—

12-WEEK PROTECTION,* ONE ORAL CHEW[1]

That was then.

4 WEEKS 00 DAYS 00 HOURS

This is now.

12* WEEKS 00 DAYS 00 HOURS

Order BRAVECTO today—contact your Merck Animal Health sales representative or distributor partner.

***Bravecto kills fleas, prevents flea infestations, and kills ticks (black-legged tick, American dog tick, and brown dog tick) for 12 weeks. Bravecto also kills lone star ticks for 8 weeks.**

IMPORTANT SAFETY INFORMATION: The most common adverse reactions recorded in clinical trials were vomiting, decreased appetite, diarrhea, lethargy, polydipsia, and flatulence. Bravecto has not been shown to be effective for 12-weeks' duration in puppies less than 6 months of age. Bravecto is not effective against lone star ticks beyond 8 weeks after dosing.

Please see Brief Summary on following page.

Reference: 1. Bravecto [prescribing information]. Summit, NJ: Merck Animal Health; 2014.

Available by veterinary prescription only.

www.BravectoVets.com

See brief summary on page 16

MERCK Animal Health

NADA 141-426, Approved by FDA

BRAVECTO® (FLURALANER)

BRIEF SUMMARY (For full Prescribing Information, see package insert)

Caution:
Federal (USA) law restricts this drug to use by or on the order of a licensed veterinarian.

Indications:
Bravecto kills adult fleas and is indicated for the treatment and prevention of flea infestations (*Ctenocephalides felis*) and the treatment and control of tick infestations [*Ixodes scapularis* (black-legged tick), *Dermacentor variabilis* (American dog tick), and *Rhipicephalus sanguineus* (brown dog tick)] for 12 weeks in dogs and puppies 6 months of age and older, and weighing 4.4 pounds or greater.

Bravecto is also indicated for the treatment and control of *Amblyomma americanum* (lone star tick) infestations for 8 weeks in dogs and puppies 6 months of age and older, and weighing 4.4 pounds or greater.

Contraindications:
There are no known contraindications for the use of the product.

Warnings:
Not for human use. Keep this and all drugs out of the reach of children. Keep the product in the original packaging until use, in order to prevent children from getting direct access to the product. Do not eat, drink or smoke while handling the product. Wash hands thoroughly with soap and water immediately after use of the product.

Precautions:
Bravecto has not been shown to be effective for 12-weeks duration in puppies less than 6 months of age. Bravecto is not effective against *Amblyomma americanum* ticks beyond 8 weeks after dosing.

Adverse Reactions:
In a well-controlled U.S. field study, which included 294 dogs (224 dogs were administered Bravecto every 12 weeks and 70 dogs were administered an oral active control every 4 weeks and were provided with a tick collar); there were no serious adverse reactions. All potential adverse reactions were recorded in dogs treated with Bravecto over a 182-day period and in dogs treated with the active control over an 84-day period. The most frequently reported adverse reaction in dogs in the Bravecto and active control groups was vomiting.

Percentage of Dogs with Adverse Reactions in the Field Study

Adverse Reaction (AR)	Bravecto Group: Percentage of Dogs with the AR During the 182-Day Study (n=224 dogs)	Active Control Group: Percentage of Dogs with the AR During the 84-Day Study (n=70 dogs)
Vomiting	7.1	14.3
Decreased Appetite	6.7	0.0
Diarrhea	4.9	2.9
Lethargy	5.4	7.1
Polydipsia	1.8	4.3
Flatulence	1.3	0.0

In a well-controlled laboratory dose confirmation study, one dog developed edema and hyperemia of the upper lips within one hour of receiving Bravecto. The edema improved progressively through the day and had resolved without medical intervention by the next morning.

For technical assistance or to report a suspected adverse drug reaction, contact Merck Animal Health at 1-800-224-5318. Additional information can be found at www.bravecto.com. For additional information about adverse drug experience reporting for animal drugs, contact FDA at 1-888-FDA-VETS or online at http://www.fda.gov/AnimalVeterinary/ SafetyHealth.

How Supplied:
Bravecto is available in five strengths (112.5, 250, 500, 1000, and 1400 mg fluralaner per chew). Each chew is packaged individually into aluminum foil blister packs sealed with a peelable paper backed foil lid stock. Product may be packaged in 1, 2, or 4 chews per package.

Distributed by:
Intervet Inc (d/b/a Merck Animal Health)
Summit, NJ 07901

Made in Austria

141487 R2

MERCK Animal Health

A new way of *looking* at **glaucoma**

Elevated intraocular pressure is now considered a risk factor for developing this common ocular disease, not the means of diagnosis. *By Micki Armour, VMD, DACVO*

Glaucoma is a complicated and often frustrating cause of vision loss in small animals. The pathogenesis of glaucoma is only partially understood, but the end result is loss of retinal ganglion cell function, axonal destruction in the optic nerve and vision loss.

Because clinical signs of glaucoma have been described in people without overt increases in intraocular pressure (IOP), and because optic nerve microcirculation and retinal ganglion cell function impairment have been observed before elevations in IOP in beagles with hereditary glaucoma, elevated IOP is now considered a risk factor for glaucoma, not the primary cause.[1-4]

Moreover, glaucoma is considered to be a group of many diseases, rather than one single disease, with a common outcome. In fact, in people, glaucoma is considered a neurodegenerative disease and a brain disease and is affected by alterations in systolic blood pressure and intracranial pressure.

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Normal aqueous humor production—and when it goes awry

Normal aqueous humor dynamics involve aqueous humor production by the nonpigmented epithelial cells of the ciliary body via active transport, passive diffusion and ultrafiltration, with concurrent drainage from the globe through multiple mechanisms. In dogs and cats, most aqueous humor exits the eye through the iridocorneal angle and trabecular meshwork (conventional outflow), with a smaller volume exiting the globe through uveoscleral vasculature (unconventional outflow).

To maintain a stable IOP, the rate of drainage must match the rate of aqueous humor formation. Diurnal variations in IOP have been observed in most species studied, and, in dogs, IOP tends to decrease mildly with age.

Diagnostic evaluation

A normal IOP in any given patient depends on multiple variables, but IOPs in excess of 25 to 30 mm Hg in dogs and cats are generally concerning.

Accurate evaluation of IOP can be difficult because of patient noncompliance or other factors. Patient positioning, increased jugular pressure,

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On to treatment …

Dr. Armour lays out your best treatment options for patients with glaucoma at **dvm360.com/GlaucomaTx**.

the type of tonometer used, excessive eyelid manipulation during measurements, corneal thickness and cleanliness of the tonometer have all been identified as factors contributing to erroneous IOP estimation.[2,5,6]

To diagnose glaucoma, also perform a menace response, dazzle reflex and cotton ball test. A maze and obstacle course are also helpful, as well as determining whether the patient is goniodysgenic with gonioscopy.

Glaucoma as a primary disease

In dogs, glaucoma is most commonly diagnosed as a primary disease. Abnormalities in iridocorneal anatomy can be observed on biomicroscopic evaluation (gonioscopy). These visible abnormalities are considered to be linked to microscopic abnormalities in the conventional drainage system as a whole. Dogs with abnormally appearing iridocorneal angles (excessively narrow or closed) are considered goniodysgenic and are at risk of bilateral glaucoma in their lifetimes.

Primary glaucomas have been classified as either open angle or closed angle in both human and veterinary medicine. Open-angle glaucoma is most common in people, while in dogs most cases are closed angle. The difference is clinically significant since open-angle glaucomas are generally chronic, milder (increases in IOP of a few points are considered significant) and more responsive to medical therapy, while closed-angle glaucoma as observed in dogs is generally associated with an acute, marked increase in IOP that is accompanied by pain and acute vision loss.

The difference is also significant in that, because of availability of funding, most pharmacologic studies evaluating anti-glaucoma medications are based on the treatment of open-angle glaucomas. This includes veterinary studies, in which a rare colony of beagles with open-angle glaucoma are the target of most pharmacologic medical research.

In cats, a rare form of glaucoma known as feline aqueous humor misdirection syndrome (FAHMS) has been described in which changes in the anterior vitreous face result in aqueous humor accumulation in the vitreal chamber (rather than the anterior chamber), resulting in progressive anterior chamber shallowing and elevations in IOP.[7]

Most feline glaucomas, however, are secondary to chronic intraocular inflammation and can be especially difficult to treat given the dearth of effective anti-glaucoma medications in this species. Typically, uveitis leads to a secondary glaucoma in cats.

Glaucoma as a secondary disease

Common causes of secondary glaucoma include uveitis, intraocular hemorrhage, intraocular surgery, lens instability, retinal detachment and intraocular neoplasia. The pathogenesis of the secondary glaucomas usually involves either pre-iridal fibrovascular membrane (PIFM) development (in the cases of uveitis, intraocular hemorrhage, intraocular surgery, lens instability, retinal detachment and occasionally neoplasia), direct obstruction of the conventional outflow system (also in the case of lens instability and neoplasia), or both. PIFMs develop over the anterior or posterior surface of the iris and grow anteriorly to occlude the iridocorneal angle. To date, there is no known treatment available to prevent the development of these membranes in at-risk eyes. VM

Dr. Micki Armour is a veterinary ophthalmologist with Eye Care for Animals in Leesburg, Virginia, and Frederick, Maryland.

View the references for this article at **dvm360.com/GlaucomaDx**.

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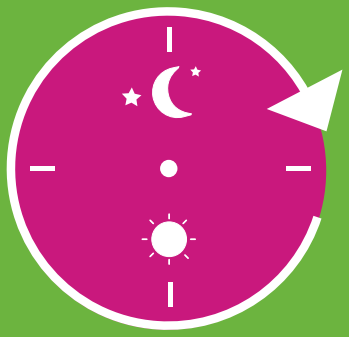

surgical pain control

*Administered subcutaneously for up to 3 days.

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- Demonstrated safety and efficacy in **more than 200 cats** treated with SIMBADOL
- Up to 3 once-daily subcutaneous doses for a **total of 72 hours of pain control**

INDICATION: SIMBADOL is indicated for the control of postoperative pain associated with surgical procedures in cats.

IMPORTANT SAFETY INFORMATION

WARNINGS, PRECAUTIONS and CONTRAINDICATIONS: Due to serious human safety and abuse concerns, including physical or psychological dependence, life-threatening respiratory depression and additive CNS depressant effects, read the full prescribing information before using this drug, including the complete Boxed Warning. Not for use in humans. Hospital staff should be trained in the handling of potent opioids and should avoid accidental exposure. For subcutaneous (SQ) injectable use in cats. Opioid excitation has been observed up to 8 hours after anesthetic recovery. Use with caution in cats with impaired hepatic function. SIMBADOL has not been evaluated in breeding, pregnant, or lactating cats, in cats younger than 4 months of age or moribund cats. Do not use in cats with known hypersensitivity to buprenorphine hydrochloride or any of the components of SIMBADOL, or known intolerance to opioids.

See attached full Prescribing Information, including the complete Boxed Warning for human safety and adverse reactions.

See brief summary on page 190

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zoetis

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1.8 mg/mL

For subcutaneous use in cats

BRIEF SUMMARY: Before using SIMBADOL, please consult the full prescribing information, a summary of which follows.

CAUTION: Federal law restricts this drug to use by or on the order of a licensed veterinarian.

HUMAN SAFETY WARNING

Abuse Potential
SIMBADOL contains buprenorphine (1.8 mg/mL), an opioid agonist and Schedule III controlled substance with an abuse potential similar to other Schedule III opioids. Buprenorphine has certain opioid properties that in humans may lead to dependence of the morphine type. Abuse of buprenorphine may lead to physical dependence or psychological dependence. The risk of abuse by humans should be considered when storing, administering and disposing of SIMBADOL. Persons at increased risk for opioid abuse include those with a personal or family history of substance abuse (including drug or alcohol abuse or addiction) or mental illness (suicidal depression).

Life-Threatening Respiratory Depression
Respiratory depression, including fatal cases, may occur with abuse of SIMBADOL.

Additive CNS Depressant Effects
SIMBADOL has additive CNS depressant effects when used with alcohol, other opioids, or illicit drugs that cause central nervous system depression.

Accidental Exposure
Because of the potential for adverse reactions associated with accidental injection, SIMBADOL should only be administered by veterinarians or veterinary technicians who are trained in the handling of potent opioids.

See Human Safety for detailed information.

INDICATION: SIMBADOL is indicated for the control of postoperative pain associated with surgical procedures in cats.

DOSAGE AND ADMINISTRATION: The dosage of SIMBADOL is 0.24 mg/kg (0.11 mg/lb) administered subcutaneously once daily, for up to 3 days. Administer the first dose approximately 1 hour prior to surgery. Do not dispense SIMBADOL for administration at home by the pet owner (see Human Safety).

CONTRAINDICATIONS: SIMBADOL is contraindicated in cats with known hypersensitivity to buprenorphine hydrochloride or any of the components of SIMBADOL, or known intolerance to opioids.

WARNINGS: For subcutaneous (SQ) injectable use in cats.

Human Safety: **Not for use in humans. Keep out of reach of children.** Because of the potential for adverse reactions, hospital staff should avoid accidental exposure and contact with skin, eyes, oral or other mucous membrane during administration. SIMBADOL contains buprenorphine, a mu opioid partial agonist and Schedule III controlled substance with an abuse potential similar to other Schedule III opioids. SIMBADOL can be abused and is subject to misuse, abuse, addiction and criminal diversion. SIMBADOL should be handled appropriately to minimize the risk of diversion, including restriction of access, the use of accounting procedures, and proper disposal methods, as appropriate to the clinical setting and as required by law. Abuse of SIMBADOL poses a hazard of overdose and death. This risk is increased with concurrent abuse of alcohol and other substances including other opioids and benzodiazepines. Buprenorphine has been diverted for non-medical use into illicit channels of distribution. All people handling opioids require careful monitoring for signs of abuse. Drug abuse is the intentional non-therapeutic use of a prescription drug for its rewarding psychological or physiological effects. Abuse of opioids can occur in the absence of true addiction. Naloxone may not be effective in reversing respiratory depression produced by buprenorphine. The onset of naloxone effect may be delayed by 30 minutes or more. Doxapram hydrochloride has also been used as a respiratory stimulant.

PRECAUTIONS: Hyperactivity (opioid excitation) has been observed up to 8 hours after anesthetic recovery (see ADVERSE REACTIONS). Safety has not been evaluated in moribund cats. Use in such cases should be based on the risk-benefit assessment of the veterinarian. Use with caution in cats with impaired hepatic function. The use of SIMBADOL has not been evaluated in breeding, pregnant, or lactating cats, or in cats younger than 4 months of age.

ADVERSE REACTIONS: In two controlled field studies, the following adverse reactions were reported.

Adverse Reactions in Two Field Studies

	SIMBADOL (N = 224)		Control (N = 226)	
Adverse Reaction[a]	**During Surgery[b]**	**After Surgery**	**During Surgery[b]**	**After Surgery**
Hypotension[c]	68 (30.4%)	51 (22.8%)	60 (26.5%)	40 (17.7%)
Tachycardia[d]	55 (24.6%)	73 (32.6%)	30 (13.3%)	44 (19.5%)
Hypothermia (≤98.0°F)	38 (17.0%)	1 (0.4%)	47 (20.8%)	0
Hyperthermia (≥103.0°F)	1 (0.4%)	91 (40.6%)	0	33 (14.6%)
Hypertension[e]	10 (4.5%)	40 (17.9%)	17 (7.5%)	18 (8.0%)
Anorexia	0	40 (17.9%)	0	35 (15.5%)
Hyperactivity	0	26 (11.6%)	0	11 (4.9%)
Reduced SpO_2 (≤90%)	8 (3.6%)	1 (0.4%)	11 (4.9%)	0
Bradycardia (≤90 beats/min)	5 (2.2%)	1 (0.4%)	4 (1.8%)	1 (0.4%)
Tachypnea (≥72 breaths/min)	0	5 (2.2%)	1 (0.4%)	6 (2.7%)
Arrhythmia	1 (0.4%)	1 (0.4%)	2 (0.9%)	0
Blindness	0	2 (0.9%)	0	1 (0.4%)
Apnea/Death	1 (0.4%)	1 (0.4%)	0	0
Ataxia	0	1 (0.4%)	0	0
Hyperesthesia	0	1 (0.4%)	0	0

a. Cats may have experienced more than one type or occurrence of an adverse reaction. Cats experiencing the same reaction both during and after surgery are presented in both time periods.
b. During surgery is the time from the administration of the anesthetic induction agent until discontinuation of the gas anesthetic.
c. Hypotension is defined as a mean blood pressure of ≤60 mmHg during surgery and ≤90 mmHg after surgery.
d. Tachycardia is defined as a heart rate of ≥180 beats per minute during surgery and ≥200 beats per minute after surgery.
e. Hypertension is defined as a mean blood pressure of ≥120 mmHg during surgery and ≥160 mmHg after surgery.

To report suspected adverse events, contact Abbott Animal Health at 1-888-299-7416, FDA at 1-888-FDA-VETS or FDA online at http://www.fda.gov/AnimalVeterinary/SafetyHealth.

EFFECTIVENESS: The effectiveness of SIMBADOL was demonstrated in two randomized, masked, placebo-controlled, multi-site field studies involving client-owned cats of various breeds. A descriptive, interactive pain assessment system was used by the trained assessor over the 72-hour post-operative period to determine pain control, and treatment success was defined as a cat that completed the 72-hour post-operative period without rescue analgesia. A statistically significant difference ($P \leq 0.005$) in the number of successes in the treatment group over the placebo control group was observed. The results of two field studies demonstrate that SIMBADOL is effective and has an acceptable safety margin for the control of postoperative pain in cats.

HOW SUPPLIED: SIMBADOL (buprenorphine injection) is supplied in a carton containing one 10 mL amber glass vial. Each multidose vial contains 1.8 mg/mL of buprenorphine.

NADA 141-434, Approved by FDA
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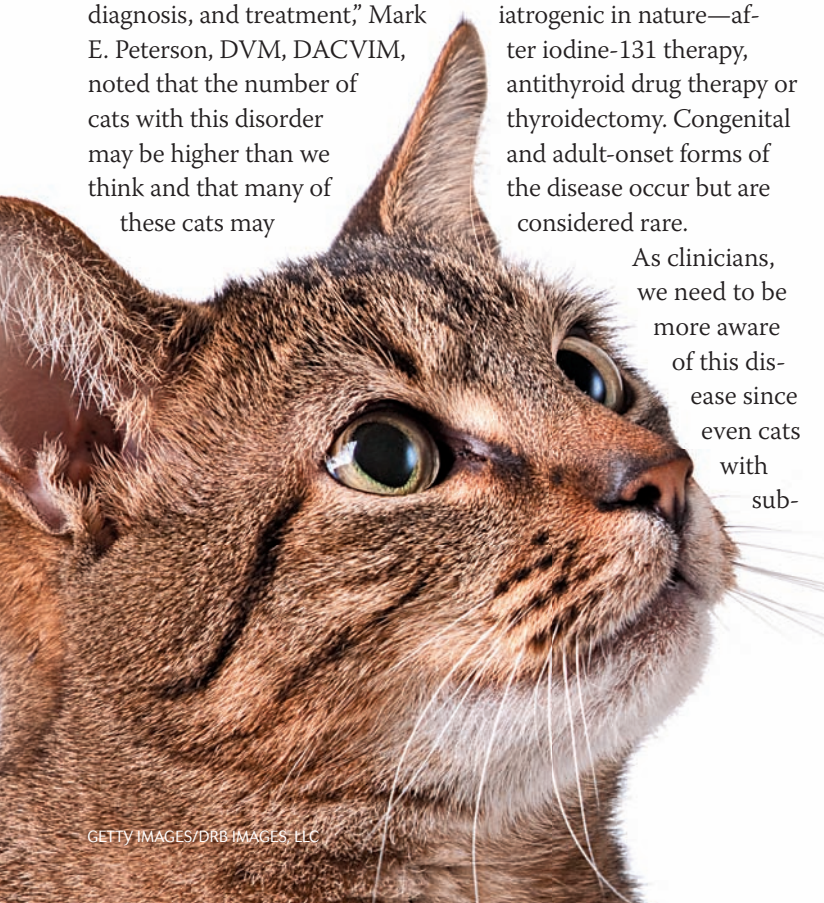
Updates from the **ACVIM Endocrinology Course**

Cats were a big focus at the American College of Veterinary Internal Medicine Endocrinology Course, held March 13–15 in Las Vegas. Find out the latest on hypothyrodism, hyperthyroidism, acromegaly and more in your feline patients.

Hypothyroidism in cats— how it is diagnosed and treated?

In his presentation "Feline hypothyroidism: Current aspects on prevalence, diagnosis, and treatment," Mark E. Peterson, DVM, DACVIM, noted that the number of cats with this disorder may be higher than we think and that many of these cats may benefit from therapy. Peterson explained that most cases of hypothyroidism in cats are iatrogenic in nature—after iodine-131 therapy, antithyroid drug therapy or thyroidectomy. Congenital and adult-onset forms of the disease occur but are considered rare.

As clinicians, we need to be more aware of this disease since even cats with subclinical or mild forms may benefit from thyroid replacement therapy. Peterson pointed out that up to 20% to 50% of cats with hypothyroidism may have azotemia, which will improve with treatment of the hypothyroidism. Diagnosing hypothyroidism in cats could be challenging, as even cats that are ultimately diagnosed with this disorder may initially have a thyroxine (T_4) concentration in the low end of the reference range. The same can be true of a free T_4 concentration, even if performed by using equilibrium dialysis.



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Patient evaluation and monitoring

For patients in which hypothyroidism is suspected, either based on clinical signs or history (e.g. post iodine-131

These "Lecture Link" summaries were contributed by Jennifer L. Garcia, DVM, DACVIM, a veterinary internal medicine specialist at Sugar Land Veterinary Specialists & Emergency Care in Houston, Texas.

therapy), Peterson recommends evaluating the T_4 concentration in conjunction with a thyroid-stimulating hormone (TSH) concentration. While the only commercially available TSH assay is canine-specific, the assay cross-reacts with feline TSH as well. As in dogs, finding a low or low-normal T_4 concentration in conjunction with an elevated TSH concentration is supportive of a diagnosis of hypothyroidism in cats.

Three months after iodine-131 therapy or antithyroid drug therapy is initiated or a thyroidectomy is performed, Peterson recommends monitoring T_4 concentrations for up to six months. This should be considered sooner in cats that develop evidence of renal disease. He suggests that a post-treatment T_4 concentration should be in the mid-normal range. Cats with values lower than this should have a measurement of their TSH concentration, but Peterson says some cats will experience an increase in their TSH concentrations prior to a decrease in their T_4 concentrations.

Treatment recommendations

So which cats should be treated with thyroid hormone therapy? Peterson suggests that cats that have supportive clinical signs—lethargy and weight gain—and low T_4 or high TSH concentrations should be treated. Cats that have no clinical signs but have supportive laboratory test results and azotemia should also be treated.

For cats that require thyroid hormone supplementation, Peterson recommends a starting dose of levothyroxine 0.75 mg orally twice a day. This is higher than what is commonly used in dogs because cats metabolize the hormone much more quickly and don't absorb it as well as dogs. Administration on an empty stomach is recommended. To monitor cats that are receiving replacement therapy, Peterson recommends a four-hour post-pill T_4 concentration with a therapeutic goal in the mid-normal range. VM

Diagnosing feline hyperthyroidism: It's not always as *simple* as it seems

In his presentation, "Diagnosis of hyperthyroidism: A critical evaluation of our current available tests," Mark Peterson, DVM, DACVIM, discussed some of the pitfalls in relying too heavily on thyroid (thyroxine, or T_4) testing alone. While a total T_4 concentration will be enough to make an accurate diagnosis of hyperthyroidism in more than 90% of cases, he warned to always pay attention to the clinical signs and physical examination findings. There are cats that can have a false elevation in their T_4 concentration, so supportive clinical signs as well as a palpable thyroid nodule will help rule in or rule out the diagnosis.

When it comes to successfully palpating for evidence of a thyroid nodule, Peterson detailed a few of his favorite techniques:

- Stand behind the cat with the cat facing away from you—the cat feels less stressed if it can't see you. Peterson also puts the cat in a basket with a towel so the cat feels more secure and is less squirmy. Use your thumb and index finger to gently run the length of the trachea from the larynx to the thoracic inlet.
- Alternatively, with the cat in the same position, turn its head to the left and palpate.

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Repeat with the cat's head turned in the other direction.

For patients in which a thyroid nodule can be palpated but there are no clinical signs and there is no elevation in T_4 concentration, he recommends monitoring signs at home and rechecking the level in six to 12 months.

Peterson also noted that there are different cut-off values from laboratory to laboratory. This means that a T_4 concentration that is normal at one laboratory, may actually be elevated at another. This serves as another reminder of the importance of the physical examination and clinical signs when trying to diagnose hyperthyroidism. VM

One more update online …

Does diabetic remission in cats really exist? If so, how do we achieve it? Scan the QR code below or visit **dvm360.com/ACVIMdiabetes** for a bonus summary.

Feline acromegaly: More common than we think

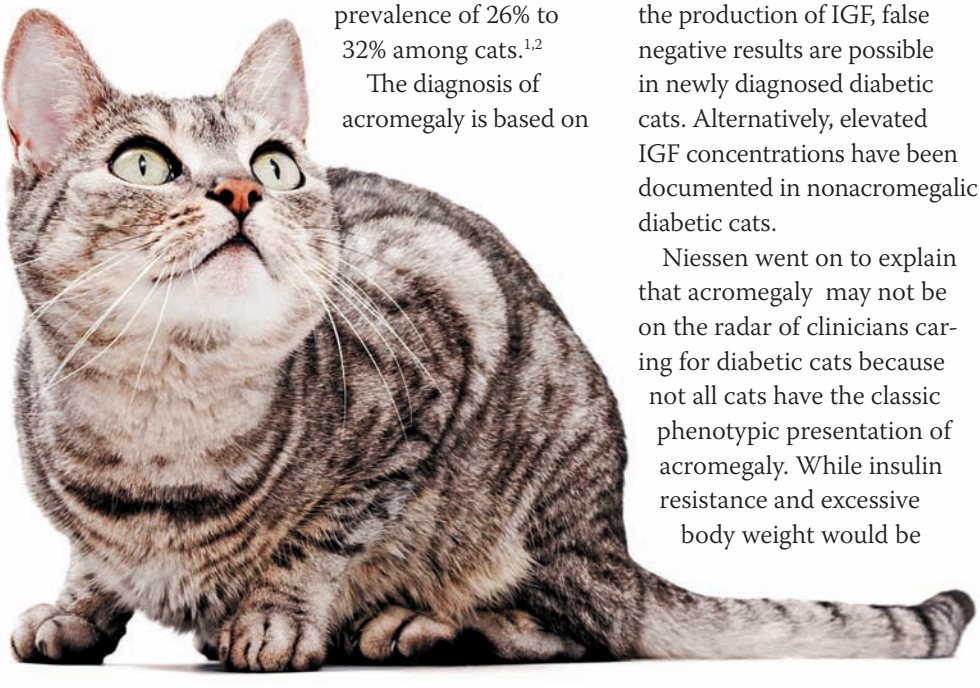
In his presentation, "Acromegaly", Stijn Niessen, DVM, PhD, DECVIM, PGCVetEd, FHEA, MRCVS, discussed what we currently know about this once rare disease. Of note, Niessen points out that recent studies have shown the prevalence of this disorder is higher than what we thought even a decade ago.

Recent reports suggest a prevalence of 26% to 32% among cats.[1,2]

The diagnosis of acromegaly is based on documentation of elevated insulin-like growth factor (IGF) concentrations, with studies suggesting that a concentration > 1,000 ng/ml is supportive of a diagnosis.[1] Niessen stated that there is a risk of false positive and false negative results with this test, but this cut-off appears to provide the greatest sensitivity for diagnosis. Because insulin is required for the production of IGF, false negative results are possible in newly diagnosed diabetic cats. Alternatively, elevated IGF concentrations have been documented in nonacromegalic diabetic cats.

Niessen went on to explain that acromegaly may not be on the radar of clinicians caring for diabetic cats because not all cats have the classic phenotypic presentation of acromegaly. While insulin resistance and excessive body weight would be expected in these cases, cats of varying weights and insulin requirements are possible. He noted that any diabetic cat that gains weight even while its diabetes is unregulated would have to be considered as a candidate for this disease.

Therapy for this disorder has also evolved, Niessen said, with hypophysectomy now considered the gold standard if there is not contraindication to the procedure (e.g. comorbidities such as significant renal or cardiac disease, excessive tumor size). Radiotherapy is still an alternative, though results are less predictable. Medical management of this disease with long-acting somatostatin analogues such as pasireotide is promising, but further studies are still needed. VM



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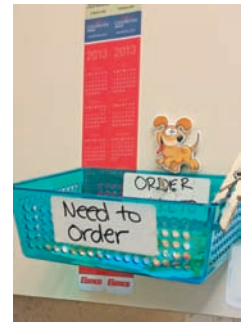

baskets for easy access—one in the pharmacy and one in the treatment area. Now I know what we need and have all the necessary information to place an order. After I place the order, I put the tag in the already ordered basket. When the item arrives, the tag goes back on the product (at the reorder point), and the item goes onto the shelf.

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Nashville, Tennessee

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Julie Hemen, CVT
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Dr. Miller helps us to remember the true meaning behind the Fourth of July in this blast from the past at **dvm360.com/miller**.

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