Besides fleas, lice, and ticks, a number of ectoparasites can affect cats. Some are common, some are rare, and some are seen more often in different regions of the country. Veterinary technicians should be aware of the many ectoparasites that can cause skin disease in cats, be proficient in performing the necessary diagnostic tests, and understand the various available treatment options in order to educate cat owners. It is important to note that many of the treatments used for ectoparasitic infestations are considered off-label; therefore, client consent should be obtained before beginning treatment with these products.

**OTOACARIASIS**

Otoacariasis, or otodectic mange, is the most common mite infestation in cats and is highly contagious. In younger cats, it is the most common cause of otitis externa. Otodectes cynotis mites are found primarily in the external ear canal, although they can also be seen around the face and neck. These mites can survive off the host for several days to months, with adults having a life span of about 2 months. Because transmission often occurs via direct contact during the neonatal period, otodectic mange is more commonly seen in kittens and young cats. Transient lesions have been reported in humans.

**Diagnosis**

Clinical features of otoacariasis include otitis externa, which is usually bilateral and may have minimal to extensive, dark-brown to black ceruminous exudate (composed of cerumen, blood, and mite feces). Cats with this condition often have pruritus, which can be severe, with self-inflicted excoriations common.

Diagnosis is made with microscopic evaluation of ear cytology, confirming the presence of the Otodectes mites (FIGURE 1). When the body is affected, skin scrapings may also be performed, although fewer mites are obtained with this method.

Conditions to be ruled out include otitis caused by bacteria and/or yeast, pediculosis, notoedric mange, and chigger bites.

**Treatment**

A number of standard topical otic and systemic products are used to treat otodectic mange. Treatment selection should take into account the number of animals that need to be treated, the severity of clinical signs, the patient’s temperament, and the owner’s ability and willingness to administer medication. All products should be used with caution in kittens. Treatment options include the following:
**CAUTION:** Federal (USA) law restricts this drug to use by or on the order of a licensed veterinarian.

**Description:** NexGard® (afoxolaner) is available in four sizes of beef-favored soft chewables: 11.3 mg (11 lbs. to 22 lbs.), 24.4 mg (23 lbs. to 60 lbs.), 48.8 mg (61 lbs. to 121 lbs.), and 137 mg (>122 lbs.). Each chewable contains 1 mg of afoxolaner per mg of afoxolaner. Afoxolaner has the chemical composition: 1-Naphthalenecarboxamide, 4-[5-[3-chloro-5-(trifluoromethyl)-phenyl]-4,5-dihydro-3H-isoxazol-3-yl]-N-(4-fluorophenyl) phenylmethyl) piperazine. Afoxolaner binds at alpha7 GABA receptors versus mammalian GABA receptors.

**Indications:** NexGard can be administered with or without food. Care should be taken that the dog consumes the complete dose, and treated animals should be observed for a few minutes to ensure that part of the dose is not lost or refused. If it is suspected that any of the dose has been lost or if vomiting occurs within two hours of administration, isolate with another full dose. If a dose is missed, administer NexGard and resume a monthly dosing schedule.

**Flavor: Beef and Prevention**

Treatments with NexGard may begin at any time of the year. In areas where flies are common year round, monthly treatments with NexGard should continue throughout the entire year. In areas where flies are seasonal, it is recommended to begin NexGard during the spring and continue at monthly intervals.

To minimize the likelihood of flea re-infestation, it is important to treat all animals within a household with an approved flea control product.

**Food, Treatments and Controls**

Treatment with NexGard may begin at any time of the year (see Effectiveness).

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

**Warnings:**

Not for use in humans. Keep this and all drugs out of the reach of children. In case of accidental ingestion, contact a physician immediately.

**Precautions:**

The safe use of NexGard in breeding, pregnant or lactating dogs has not been evaluated. Use with caution in dogs with a history of seizures (see Warnings).

**Adverse Reactions:**

In a well-controlled US field study, which included a total of 333 household dogs and 616 treated dogs (12 treated after administration of the oral active control), no adverse reactions were observed with NexGard. Over the 50-week study period, all observations of potential adverse reactions were recorded. The most frequent reactions reported were at or within +1% of the time of any of these months of observations were presented in the following table. The most frequent adverse reactions reported were vomiting, anorexia, and dry/flaky skin. Vomiting occurred generally self-limiting and of short duration and tended to decrease with subsequent doses in both groups. Five treated dogs experienced anorexia during the study, and two of those dogs experienced anorexia with the first dose but not subsequent doses.

**Table 1: Dogs With Adverse Reactions.**

<table>
<thead>
<tr>
<th>Adverse Reaction</th>
<th>Oral active control</th>
<th>NexGard</th>
<th>Total</th>
<th>Pct. (n=200)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vomiting with and without food</td>
<td>12.5</td>
<td>2.5</td>
<td>15</td>
<td>7.5</td>
</tr>
<tr>
<td>Dry/Flaky Skin</td>
<td>12.5</td>
<td>2.5</td>
<td>15</td>
<td>7.5</td>
</tr>
<tr>
<td>Anorexia</td>
<td>12.5</td>
<td>2.5</td>
<td>15</td>
<td>7.5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Adverse Reaction</th>
<th>Oral active control</th>
<th>NexGard</th>
<th>Total</th>
<th>Pct. (n=200)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dermatitis</td>
<td>12.5</td>
<td>2.5</td>
<td>15</td>
<td>7.5</td>
</tr>
<tr>
<td>Ataxia</td>
<td>12.5</td>
<td>2.5</td>
<td>15</td>
<td>7.5</td>
</tr>
<tr>
<td>Anorexia</td>
<td>12.5</td>
<td>2.5</td>
<td>15</td>
<td>7.5</td>
</tr>
</tbody>
</table>

**Mode of Action:**

Afoxolaner is a member of the isoxazoline family, shown to be a binding site to inhibit insect and acarine ligand-gated chloride channels, in particular those gated by the neurotransmitter gamma-aminobutyric acid (GABA), thereby blocking and post-synaptic transfer of chloride ions across cell membranes. Prolonged activation of chloride channels, in particular those gated by the neurotransmitter gamma-aminobutyric acid (GABA), may cause depolarization of cell membranes, leading to hyperexcitation, paralysis and death of insects and acarines. The selective toxicity of afoxolaner results from the pharmacological differences of mammalian versus insect GABA receptors.

**Effectiveness:**

In a well-controlled laboratory study, NexGard began to kill fleas four hours after initial administration and demonstrated >99% effectiveness at eight hours. In a separate well-controlled laboratory study, NexGard demonstrated 100% effectiveness against adult fleas 24 hours post-infection for 35 days, and >99% effectiveness at 12 hours post-infection through Day 21, and on Day 35. On Day 28, NexGard was 81.1% effective at 12 hours post-injection. Dogs in the treated and control groups were infested with fleas on Day 0. Generated flaps were 12- and 24-hours post-treatment (Day 11 and 11-12 days in the NexGard treated dogs, and 4-8 and 5-11 days in the control dogs at 12- and 24-hours, respectively). At subsequent evaluations post-infection, fleas from dogs in the control group were essentially unable to produce any eggs (1-5 eggs) whereas fleas from dogs in the control group continued to produce eggs (0-141 eggs). In a 50-day field study conducted in households with existing flea infestations of varying severity, the effectiveness of NexGard against fleas on the Day 30, 60 and 90 visits compared with baseline was 98.6%, 99.7%, and 99.9%, respectively. Collectively, the data from these studies indicate that NexGard kills fleas before they can lay eggs, thus preventing subsequent flea infestations after the start of treatment of existing flea infestations.

In well-controlled laboratory studies, NexGard demonstrated >99% effectiveness against Dermacentor variabilis (>96% effectiveness against Ixodes scapularis, and >93% effectiveness against Rhipicephalus sanguineus). 48-hours post-infection for 30 days. At 122 hours post-infection, NexGard demonstrated >95% effectiveness against Amblyomma americanum for 30 days.

**Animal Safety:**

In a margin of safety study, NexGard was administered orally to 8 to 9-week old Beagle pups at 1, 3, and 5 times the maximum recommended dose (2.5 mg/kg) for those treatments every 28 days. Followed by breakthroughs every 14 days, for a total of six treatments. The control group were sham-dosed. There were no clinically-relevant effects related to treatment on physical examination, body weight, food consumption, clinical laboratory (hematology, clinical chemistry, coagulation tests, gross pathology, histopathology or organ weights). Vomiting occurred occasionally in the treated and control groups, including one dog in the 5x g kg group that vomited four hours after treatment.

In a well-controlled field study, NexGard was used concomitantly with other medications, such as vaccines, anthelmintics, antibiotics (including topicals), vitamins, NADG, and corticosteroids. No adverse reactions were observed from the concurrent use of NexGard with other medications.

**Storage Information:** Store at or below 30°C (86°F) with excursions permitted up to 40°C (104°F).

**House Supplies:**

NexGard is available in four sizes of beef-flavored soft chewables: 11.3, 24.4, 48.8 or 137 mg afoxolaner. Each chewable is available in color-coded packages of 1, 3 or 6 beef-flavored chewables.

**NADA 141-406, Approved by FDA.**

Marketed by: FRONTLINE Vet Labs™, a Division of Merial, Inc.

Made in Brazil.

**TECHPOINT**

Veterinary technicians should be aware of the many ectoparasites that can cause skin disease in cats, be proficient in performing the necessary diagnostic tests, and understand the various available treatment options in order to educate cat owners.

**Fipronil spot-on formulation:** 2 drops instilled into each ear canal, with the remaining drug applied topically, as directed, to prevent further cutaneous involvement; treatment should be repeated in 2 weeks

**Selamectin:** 1 or 2 treatments applied topically given 30 days apart

**Ivermectin:** 300 mcg/kg SC every 1 week for 2 or 2 treatments, or applied topically (0.5 mL/ear) for 1 or 2 treatments

**Imidacloprid (10%) and moxidectin (1%):** 1 or 2 doses applied topically, given 30 days apart

**FIGURE 1. Microscopic image of an Otodectes mite.** Image courtesy of Dr. Sheila Torres at the University of Minnesota.
All in-contact animals should be treated. Ideally, the environment (including bedding and grooming equipment) should be cleaned using an acaricidal agent.

TROMBICULIASIS

Trombiculiasis is an infestation caused by chigger mites (Trombicula spp) and is typically seen in the summer and autumn. The mites live in rotting organic material, and their life cycle is completed in 50 to 70 days. Only the larval stage is parasitic and feeds on animals, including humans (in whom it can cause papular, pruritic lesions, often on the limbs and trunk).

Clinical features of trombiculiasis in cats include erythema, hair loss, excoriations, erosions, scaling, and crusts. Areas involved are mainly on the head, occurring at the base of the pinnae, Henry’s pocket, and the neck. They can also be found around the digits of the feet. Pruritus is severe and persists even after the larvae are gone.1

Diagnosis

Although the mites are not always present at the time of the examination, they can be observed with the naked eye, with a magnifying glass, or microscopically (removed from host and mixed with mineral oil on a microscope slide). They are orange-red and therefore can be easily distinguished from Otodectes mites.

Treatment

Treatment of trombiculiasis requires 1 or 2 applications of a parasiticide. If pruritus is present, a short (2- to 3-day) course of corticosteroids may offer relief.2 Clients should be advised to treat the outdoor environment by removing yard debris and possibly using pesticide sprays and to prevent the cat from roaming outdoors.

CHEYLETIELLOSI S

Cheyletiellosis, a dermatosis caused by the parasitic mite Cheyletiella, is seen in cats (Cheyletiella blakei), dogs (Cheyletiella yasguri), and rabbits (Cheyletiella parasitivorax). It is a highly contagious disease and may be seen more often in young animals, as well as in cats living in shelters or catteries. The mite lives on the skin surface (in a pseudotunnel in epidermal debris) and typically affects the animal’s dorsal area. Cheyletiella mites are large and can appear as “dandruff” that is observed moving on the patient. The mites periodically attach to the epidermis and pierce the skin. Eggs are attached loosely to the hair. The life cycle is completed on the host in about 21 days.3

Although cheyletiellosis has zoonotic importance, the mites do not reproduce on humans. People in the household can be infested, which should be determined while obtaining the patient history. Humans may have skin irritation or a papular rash, which usually resolves once the cat and environment have been treated. Affected clients should be advised to seek advice from their physician.

Diagnosis

Scales are the most common clinical sign. Other presentations are variable and may include erythema, papules, crusts, and hair loss. Cats may or may not be pruritic. Scales may be removed as a result of cats’ grooming behavior; therefore, this clinical sign may go unnoticed by the pet owner.

Because Cheyletiella mites can be killed by flea products, the disease is diagnosed less often in temperate climates where year-round flea control is the norm.3,5 The mites may also be difficult to find because asymptomatic carriers exist, further allowing the incidence of this disease to be underestimated.

The diagnosis is made by confirming the presence of mites or eggs, which can be accomplished through a variety of methods. Sometimes the mites can be found on direct examination of the patient using a handheld magnifying glass. Another method is to collect scale and hair, using a flea comb or acetate tape, and then examine the material collected with a magnifying glass or microscopically. A trichogram can also be performed to look for Cheyletiella eggs attached to the hair. Superficial skin scrapings can also be done. When performing superficial skin scrapings, using broad strokes over a large area will yield more success in finding mites. Fecal flotation may be used to identify mites or eggs that cats have ingested while grooming.

Cheyletiella mites are easy to identify by their mouthparts, which terminate in hooks (FIGURE 2). If no mites are found on the patient, other pets in the household...
Taking the Bite out of Feline Mites

should be examined. Finally, if no mites or eggs are found, a therapeutic trial should be performed using miticidal therapy. If the patient fails to respond to this treatment, then cheyletiellosis may be ruled out as a diagnostic differential.

Other diagnostic differentials include diabetes mellitus and liver disease if seborrhea is present. Otherwise, flea bite hypersensitivity, notoedric mange, pediculosis, atopic dermatitis, and food hypersensitivity should be considered for cats that present with pruritus.

**Treatment**

Although cheyletiellosis can be challenging to diagnose, it is fairly easy to treat in single-cat households and is curable. All in-contact pets should be treated and, in some cases (severe and/or chronic infestation, multiple pets in the household, affected humans in the household), environmental treatment is recommended. Although no veterinary products are labeled for the treatment of Cheyletiella dermatitis, a variety of topical and systemic drugs have been found to be effective.

**BOX 1 Information for Clients About Lime Sulfur Dip**

Although lime sulfur dip is a very safe and effective treatment, it can be difficult to dip cats. The product is malodorous, will temporarily stain pets’ haircoat yellow, will stain porous surfaces (e.g., concrete), and will tarnish jewelry. Owners should be advised to wear gloves and protect eyes and skin from contact with the solution. Ideally, the dip application should be performed in a well-ventilated area. After dipping, the cat should be kept warm and allowed to dry naturally. To prevent accidental ingestion of dip solution, an Elizabethan collar may be used until the cat is dry.

Topical products include the following:

- **Lime sulfur dip:** Weekly for 4 to 6 treatments (BOX 1)
- **Fipronil 0.25% spray:** 1 or 2 pumps/lb every 2 weeks for 3 or 4 treatments
- **Fipronil 10% spot-on formulation:** Every 3 to 4 weeks for 2 or 3 applications or every 2 weeks to resolve clinical signs more quickly
- **Selamectin:** Applied topically every 30 days for 3 treatments

Cats with medium to long coats may be clipped to enable easier application and penetration of topical products.

Systemic treatment involves ivermectin 300 mcg/kg SC every 2 weeks for 3 treatments or PO every 7 days for 6 treatments.

If environmental treatment is needed, recommendations include cleaning and washing pet bedding, grooming equipment, toys, cat carriers, collars, and other pet items with hot water and spraying with insecticide spray. This cleaning regimen should be performed every 2 weeks throughout the treatment period. Any items that cannot be disinfected should be discarded. Although the mites are thought to die soon after leaving the host, it has been reported that mites may live off the host for 10 days or longer.

Ideally, treatment should continue for 2 to 4 weeks after resolution of clinical signs. A recheck examination should be scheduled after 4 to 6 weeks of treatment. A physical examination should be performed and, if clinical signs persist and mites or eggs were found previously, diagnostic tests should be repeated. Moreover, the owner should be asked to describe his or her treatment regimen to determine whether recommendations were followed. If they were not, the veterinary technician should use this opportunity to provide additional client education for owners of patients that have not improved as anticipated.

**NOTOEDRIC MANGE**

Notoedric mange (sometimes referred to as *feline scabies*) is caused by the *Notoedres cati* mite, which lives in the epidermis. *N. cati* is very contagious via direct contact and has a life cycle similar to that of *Sarcoptes scabiei*.
Notoedric mange is a pruritic disease; signs often involve the face and pinnae (FIGURE 3) and can spread to the feet and perineum (possibly from cats’ grooming behavior and sleeping positions).³

**Diagnosis**

Clinical features of notoedric mange include alopecia, erythema, scales, and crusting, which can become very thick and yellow to gray in color. Self-trauma from pruritus may also be seen, and these excoriations may become secondarily infected. Peripheral lymphadenopathy is common. Fortunately, *N. cati* is usually present in large numbers and can be found easily with a skin scraping.¹ It is similar in appearance to Sarcopes mites, but smaller. This mite also infests foxes, dogs, and rabbits,²,³ and humans may also have transient lesions. Notoedric mange is rare in some areas of the country and common in others.³

Conditions to rule out include otoacariasis, cheyletiellosis, atopic dermatitis, food hypersensitivity, pemphigus (foliaceus or erythematosus), and systemic lupus erythematosus.³

**Treatment**

Treatment options include:

- **Lime sulfur dip:** Performed weekly until resolution (6 to 8 treatments)³ (BOX 1)
- **Selamectin:** Applied topically every 2 weeks for 3 treatments⁵

All in-contact cats should be treated, and the environment should be cleaned with an acaricidal agent. Response is usually good provided all cats are treated and reexposure is prevented.

**DEMODICOSIS**

Demodicosis is being recognized more often in cats and can be difficult to manage. Cats can have either localized or generalized demodicosis and can be infested with either the *Demodex cati* or *Demodex gatoi* mite. Additionally, a third, as yet unnamed *Demodex* mite has been identified (it resembles *D. gatoi* but is larger, with other anatomic differences).² The localized form of demodicosis appears to be rare; generalized demodicosis may be more common in purebred Siamese and Burmese cats.¹,³

Cats with diagnosed demodicosis should have a minimum database performed, including a complete blood count, serum biochemistry profile, fecal exam, feline leukemia virus (FeLV) test, and feline immunodeficiency virus (FIV) test. Often, an associated underlying immunosuppressive disease, such as FIV, FeLV, diabetes mellitus, hyperadrenocorticism, toxoplasmosis, systemic lupus erythematosus, or squamous cell carcinoma in situ is present in patients with generalized disease.³

**Diagnosis**

*D. cati* is similar in appearance to *Demodex canis* (long, slender tail), lives in the hair follicles and sebaceous glands, and can be found in healthy cats as normal flora. The ova of this mite also differ in appearance from those of *D. canis*; *D. cati* ova are slimmer and oval versus the spindle-shaped *D. canis* ova. All other life stages are narrower. Clinical signs of *D. cati* infestation include alopecia, patchy erythema, scaling, crusting, and ceruminous otic discharge (especially in FIV-positive cats). These cats may or may not be pruritic; however, if pruritus is present, it can be intense.

Demodicosis caused by *D. cati* typically affects middle-aged or older cats. When localized, the most common
areas affected are the head and neck—specifically the pinnae, chin, and periocular areas. When generalized, the trunk and limbs may also be involved. The proliferation of mites may be related to an underlying systemic condition or immunosuppression. Multiple deep skin scrapings should be performed. Co-infestation with *D. gatoi* or the unnamed mite has been reported.³

*D. gatoi* is a short-bodied, more superficial mite that inhabits the stratum corneum. This species is considered contagious to other cats.⁴ Clinical signs of *D. gatoi* infestation are usually related to pruritus, which can be moderate to severe, and include alopecia (sometimes bilaterally symmetric; FIGURE 4), scaling, and excoriations. Pruritus may have a sudden onset and may not be responsive to steroids. Multiple superficial skin scraping samples should be obtained using broad strokes and may be more successful if taken from areas less likely to have been self-groomed by the patient. In patients that are nonpruritic, the mites are usually found.

Other methods of diagnosis include tape prep samples and fecal flotation. When viewing skin scrapings microscopically, using a 10× objective with increased contrast will help to see the small, translucent mites. Negative test results do not rule out this disease, however, and a treatment trial may be warranted (especially as the clinical signs associated with demodicosis caused by *D. gatoi* can mimic allergic disease and self-inflicted alopecia). Examination and diagnostic testing of other cats in the household may be warranted, even if the cats are not showing clinical signs.

**Treatment**

Localized demodicosis caused by *D. cati* may be self-limiting and resolve spontaneously.⁶ In general, cats respond well to treatment, which can include lime sulfur dip, ear medications containing pyrethrin, or amitraz (1:9) in mineral oil.³

Along with miticidal therapy for generalized demodicosis, treatment for any underlying conditions should be included. Unless the underlying disease is identified and managed, demodicosis will be difficult to cure. The most commonly recommended therapy is lime sulfur dip. A 2% concentration is applied weekly for a minimum of 6 weeks.⁴ Treatment should be continued until 2 negative skin scrapings taken 4 to 6 weeks apart are obtained (*D. cati*). With *D. gatoi* infestation, all cats in the household should be treated. The affected cat(s) should be reevaluated after the third dip; if significant improvement is noted, treatment should be continued for another 3 to 5 dips. If this treatment is to be used at home, owners should be informed of product drawbacks (BOX 1).

The following treatment options have been used in cases of *D. cati* infestation. However, use of these products is considered off-label, and more information is needed to understand their efficacy. Cats given these treatments should be monitored closely for adverse effects.

→ **Amitraz:** Dips (125 or 250 ppm) are applied every 5 to 7 days for 4 to 6 weeks.⁵

FIGURE 4. Bilaterally symmetric alopecia in a cat infested with *Demodex gatoi*. Image courtesy of Dr. Sheila Torres at the University of Minnesota.
→ **Doramectin:** Doses of 400 to 600 mcg/kg SC are given weekly until 2 negative skin scrapings taken 4 to 6 weeks apart are obtained; treatment is then continued for an additional 4 weeks.⁴

→ **Ivermectin:** An injectable form of ivermectin is used, but it is administered orally. Recommended dosing is 200 to 400 mcg/kg q24–48h until 2 negative skin scrapings taken 4 to 6 weeks apart are obtained; treatment should then be continued for an additional 4 weeks.⁴ Although ivermectin toxicity is rare in cats, if seen, it is usually in kittens within 1 to 12 hours after administration and can manifest as abnormal behavior, lethargy, ataxia, weakness, apparent blindness, coma, and death.³

For cats with *D. gatoi*, besides the recommended lime sulfur dip, the following treatment options have been used. However, such use is considered off-label, and more information is needed to understand their efficacy. Cats given these treatments should be monitored closely for adverse effects, and all in-contact cats should be treated.

→ **Amitraz:** Dips (either at 125 or 250 ppm) applied weekly for 12 weeks¹.³

→ **Ivermectin:** Given every other day¹.³

→ **Moxidectin 10% and imidacloprid 2.5%:** Applied topically every 7 to 14 days⁷

It is important to rule out other feline dermatoses that involve excessive grooming as a clinical sign, such as flea bite hypersensitivity, notoedric mange, atopy, food hypersensitivity, and psychogenic alopecia.³ A therapeutic trial for demodicosis may be performed before more aggressive diagnostic testing for these other dermatoses. Typically, if demodicosis is present, a positive response will be seen after 3 treatments. ■

References


