PROGRESSIVE FACIAL LESION IN A CAT

Feline Compulsive Disorder
Shaking & Facial Twitching in a Terrier
Differential Diagnoses for Tremors
Cloudy Eye in a Labrador Retriever: Choose Your Treatment Approach
Differential Diagnosis List: Hypophosphatemia
Guarantee compliance
– Administer the only FDA-approved single-dose otitis externa treatment and rest your confidence on a 30-day duration of effect

Eliminate the stress of at-home treatments
– The power is in your hands to treat your patient’s ear infection in-clinic

Claro® is indicated for the treatment of otitis externa in dogs associated with susceptible strains of yeast (*Malassezia pachydermatis*) and bacteria (*Staphylococcus pseudintermedius*).

CAUTION: Federal (U.S.A.) law restricts this drug to use by or on the order of a licensed veterinarian. CONTRAINDICATIONS: Do not use in dogs with known tympanic membrane perforation. CLARO® is contraindicated in dogs with known or suspected hypersensitivity to florfenicol, terbinafine hydrochloride, or mometasone furoate.

SAVE THE DAY. USE CLARO® FOR YOUR MOST COMMON OTITIS CASES.

Claro® is a registered trademark of Bayer.

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BayerDVM.com/Claro
**CLARO®**

(florfenicol, terbinafine, mometasone furoate)

**Otic Solution**

Antibacterial, antifungal, and anti-inflammatory

For Otic Use in Dogs Only

**CAUTION:** Federal (U.S.A.) law restricts this drug to use by or on the order of a licensed veterinarian.

**DESCRIPTION:**

CLARO® contains 16.6 mg/mL florfenicol, 14.8 mg/mL terbinafine (equivalent to 16.6 mg/mL terbinafine hydrochloride) and 2.2 mg/mL mometasone furoate. Inactive ingredients include purified water, propylene carbonate, propylene glycol, ethyl alcohol, and polyethylene glycol.

**INDICATIONS:**

CLARO® is indicated for the treatment of otitis externa in dogs associated with susceptible strains of yeast (*Malassezia pachydermatis*) and bacteria (*Staphylococcus pseudintermedius*).

**DOSAGE AND ADMINISTRATION:**

Shake before use.

CLARO® should be administered by veterinary personnel.

Administer one dose (1 dropperette) per affected ear. The duration of effect should last 30 days.

1. Clean and dry the external ear canal before administering the product.
2. Verify the tympanic membrane is intact prior to administration.
3. Remove single dose dropperette from the package.
4. While holding the dropperette in an upright position, remove the cap from the dropperette.
5. Turn the cap over and push the other end of the cap onto the tip of the dropperette.
6. Twist the cap to break the seal and then remove cap from the dropperette.
7. Screw the applicator nozzle onto the dropperette.
8. Insert the tapered tip of the dropperette into the affected external ear canal and squeeze to instill the entire contents (1 ml) into the affected ear.
9. Gently massage the base of the ear to allow distribution of the solution.
10. Repeat with other ear as prescribed.

Cleaning the ear after dosing may affect product effectiveness.

**CONTRAINDICATIONS:**

Do not use in dogs with known tympanic membrane perforation (see PRECAUTIONS).

CLARO® is contraindicated in dogs with known or suspected hypersensitivity to florfenicol, terbinafine hydrochloride, or mometasone furoate.

**WARNINGS:**

Human Warnings: Not for use in humans. Keep this and all drugs out of reach of children. In case of accidental ingestion by humans, contact a physician immediately. In case of accidental skin contact, wash area thoroughly with water. Avoid contact with eyes. Humans with known hypersensitivity to florfenicol, terbinafine hydrochloride, or mometasone furoate should not handle this product.

**PRECAUTIONS:**

Do not administer orally.

The use of CLARO® in dogs with perforated tympanic membranes has not been evaluated. The integrity of the tympanic membrane should be confirmed before administering the product. Reevaluate the dog if hearing loss or signs of vestibular dysfunction are observed during treatment. Use of topical otic corticosteroids has been associated with adrenocortical suppression and iatrogenic hyperadrenocorticism in dogs (see ANIMAL SAFETY).

Use with caution in dogs with impaired hepatic function (see ANIMAL SAFETY).

The safe use of CLARO® in dogs used for breeding purposes, during pregnancy, or in lactating bitches has not been evaluated.

**ADVERSE REACTIONS:**

In a field study conducted in the United States (see EFFECTIVENESS), there were no directly attributable adverse reactions in 146 dogs administered CLARO®.

To report suspected adverse drug events and/or obtain a copy of the Safety Data Sheet (SDS) or for technical assistance, contact Bayer HealthCare at 1-800-422-9874. 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.

**PHARMACOLOGY:**

CLARO® Otic Solution is a fixed combination of three active substances: florfenicol (antibacterial), terbinafine (antifungal), and mometasone furoate (steroidal anti-inflammatory). Florfenicol is a bacteriostatic antibiotic which acts by inhibiting protein synthesis. Terbinafine is an antifungal which selectively inhibits the early synthesis of ergosterol. Mometasone furoate is a glucocorticosteroid with anti-inflammatory activity.

**MICROBIOLOGY:**

The compatibility and additive effect of each of the components in CLARO® solution was demonstrated in a component effectiveness and non-interference study. An in vitro study of organisms collected from clinical cases of otitis externa in dogs enrolled in the clinical effectiveness study determined that florfenicol and terbinafine hydrochloride inhibit the growth of bacteria and yeast commonly associated with otitis externa in dogs. No consistent synergistic or antagonistic effect of the two antimicrobials was demonstrated. The addition of mometasone furoate to the combination did not impair antimicrobial activity to any clinically significant extent.

In a field study (see EFFECTIVENESS), at least 10 isolates from successfully treated cases were obtained for *S. pseudintermedius* and *M. pachydermatis*.

**EFFECTIVENESS:**

In a well-controlled, double-masked field study, CLARO® was evaluated against a vehicle control in 221 dogs with otitis externa. One hundred and forty six dogs were treated with CLARO® and 75 dogs were treated with the vehicle control. All dogs were evaluated for safety. Treatment (1 mL) was administered once on Day 0 to the affected ear(s). Prior to treatment, the ear(s) was cleaned with saline. The dogs were evaluated on Days 0, 7, 14, and 30. Blood work and urinalysis were obtained on Day 0 pre-treatment and Day 30 at study completion. Four clinical signs associated with otitis externa were evaluated: erythema, exudate, swelling, and ulceration. Success was based on clinical improvement at Day 30. Of the 183 dogs included in the effectiveness evaluation, 72.5% of dogs administered CLARO® solution were successfully treated, compared to 11.1% of the dogs in the vehicle-control group (p=0.0001).

**ANIMAL SAFETY:**

In a target animal safety study, CLARO® was administered aurally to 12-week-old Beagle puppies (4 dogs/sex/group) at 0X, 1X, 3X, and 5X the recommended dose (59°F – 86°F).

In a well-controlled, double-masked field study, CLARO® was evaluated against a vehicle control in 221 dogs with otitis externa. One hundred and forty six dogs were treated with CLARO® and 75 dogs were treated with the vehicle control. All dogs were evaluated for safety. Treatment (1 mL) was administered once on Day 0 to the affected ear(s). Prior to treatment, the ear(s) was cleaned with saline. The dogs were evaluated on Days 0, 7, 14, and 30. Blood work and urinalysis were obtained on Day 0 pre-treatment and Day 30 at study completion. Four clinical signs associated with otitis externa were evaluated: erythema, exudate, swelling, and ulceration. Success was based on clinical improvement at Day 30. Of the 183 dogs included in the effectiveness evaluation, 72.5% of dogs administered CLARO® solution were successfully treated, compared to 11.1% of the dogs in the vehicle-control group (p=0.0001).

**STORAGE INFORMATION:**


**HOW SUPPLIED:**

CLARO® solution is supplied in a single-use dropperette in a blister. Each dropperette contains one 1 mL dose.

CLARO® is available in cartons of two, ten, or twenty dropperettes.

Manufactured for Bayer HealthCare LLC, Animal Health Division
P.O. Box 390 Shawnee Mission, Kansas 66201 USA.

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NADA 141-440, Approved by FDA

LV1802
Thirty days in, heartworms are still out.

Coraxis™ (moxidectin) Topical Solution for Dogs is transdermal moxidectin that achieves and sustains high serum levels and keeps killing susceptible stages of heartworms for 30 days. Administered monthly, Coraxis™ also treats and controls hookworms, roundworms and whipworms to work hard for your clinic and your patients.

Add the power of 30-day heartworm protection to your portfolio. Visit coraxis.com or contact your Bayer sales representative today.

Coraxis™ is not approved for the treatment of adult *D. immitis*.

CAUTION: Federal (U.S.A.) law restricts this drug to use by or on the order of a licensed veterinarian.

WARNING: **DO NOT ADMINISTER THIS PRODUCT ORALLY.** For the first 30 minutes after application ensure that dogs cannot lick the product from application sites on themselves or other treated animals. Children should not come in contact with the application sites for two (2) hours after application. (See Contraindications, Warnings, Human Warnings, and Adverse Reactions, for more information.)

CONTRAINDICATIONS: Do not use this product on cats.
BRIEF SUMMARY:

Before using Coraxis™, please consult the product insert, a summary of which follows:

**WARNINGS:**
• Do not administer this product orally.
• For the first 30 minutes after application ensure that dogs cannot lick the product from application sites on themselves or other treated dogs, and separate treated dogs from one another and from other pets to reduce the risk of accidental ingestion. Ingestion of this product by dogs may cause severe adverse reactions including depression, salivation, dilation pupils, prostration, purpura and generalized inaudible tremors. In anesthetized sensitive dogs, these signs may be more severe and may include coma and death.

**INDICATIONS:**
Coraxis™ is indicated for the prevention of heartworm disease caused by Dirofilaria immitis. Coraxis™ is also indicated for the treatment and control of the following intestinal parasites:

<table>
<thead>
<tr>
<th>Intestinal Par Worm</th>
<th>Intestinal Stage</th>
<th>Adult</th>
<th>L2</th>
<th>L3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ancylostoma caninum</td>
<td>Adult</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Enterobius vermicularis</td>
<td>Adult</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Necator americanus</td>
<td>Adult</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Toxocara canis</td>
<td>L2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Toxascaris leonina</td>
<td>L3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Uncinaria stenocephala</td>
<td>L3</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**CONTRAINDICATIONS:**

Do not administer this product orally. (See WARNINGS.)

**WARNINGS:**

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- Some dogs are more sensitive to avermectins due to a mutation in the ABCB1 gene (formerly MDR1 gene). Dogs with this mutation may develop signs of toxicity, as a common lesion associated with this mutation includes Collies and Collie crosses.

- Although there is no specific antagonist for avermectin toxicity, even severely affected dogs have been recovered from avermectin toxicity with intensive veterinary supportive care.

**HUMAN WARNINGS:**

Not for human use. Keep out of the reach of children.

**ADVERSE REACTIONS:**

Since Coraxis™ contains 2.5% moxidectin, studies that demonstrated the safety of a topical solution containing 2.5% moxidectin + 10% imidacloprid were adequate to demonstrate the safety of Coraxis™.

**FIND STUDY:**

Following treatment with a topical solution containing 2.5% moxidectin + 10% imidacloprid or an active control, dog owners reported the following post-treatment reactions:

<table>
<thead>
<tr>
<th>Category</th>
<th>Moxidectin + Imidacloprid (n = 128)</th>
<th>Active Control (n = 68)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pruritus</td>
<td>9 dogs (7.1%)</td>
<td>7 dogs (10.3%)</td>
</tr>
<tr>
<td>Restless</td>
<td>9 dogs (7.1%)</td>
<td>6 dogs (7.4%)</td>
</tr>
<tr>
<td>Medication site irritation</td>
<td>9 dogs (9.1%)</td>
<td>7 dogs (10.3%)</td>
</tr>
<tr>
<td>Inappetence</td>
<td>1 dog (0.8%)</td>
<td>1 dog (1.5%)</td>
</tr>
<tr>
<td>Hypersensitivity</td>
<td>1 dog (0.8%)</td>
<td>1 dog (1.5%)</td>
</tr>
</tbody>
</table>

The following clinical observations were also noted:

- The signs resolved without intervention by day 10 post-application. The signs in one dog may have been related to peak serum levels of moxidectin, which vary between dogs, and occur between 1 and 21 days after application.

**ANIMAL SAFETY:**

A controlled, double-masked, field safety study, a topical solution containing 2.5% moxidectin + 10% imidacloprid was administered to 128 dogs of various breeds, 3 months to 16 years of age, weighing 15 to 130 pounds. The moxidectin + imidacloprid topical solution was used safely in dogs concomitantly receiving ACE inhibitors, angiotensin-converting enzyme inhibitors, angiotensin II receptor blockers, corticosteroids, beta blockers, anticoagulants, antihistamines, non-stereoidal anti-inflammatory drugs, anticholinergics, parasympathomimetics, synthetic estrogens, thyromimetics, and urinary acidifiers. Owners reported the following signs in dogs after topical application of Coraxis™: pruritus, matted/fuzzy fur, dyspnea, and hyperactivity. (See ADVERSE REACTIONS.)

NADA 141-417, approved by FDA

**OUR AUTHORS:**

**JULIE ALLEN,** BVMS, MS, MRCVS, DACVIM (SAIM), DACVO, is an associate professor at University of Wisconsin–Madison. She earned her BVMS from University of Glasgow and her PhD from University of London, where she also completed a lectureship in ophthalmology. Dr. McElhaney is a past president of the European College of Veterinary Ophthalmologists and has coauthored 2 textbooks. Her research focus is comparative glaucoma.

**CASE ROUTES PAGE 17**

**LISA M. POHLMAN,** DVM, MS, DACVP, is an associate professor and the director of clinical pathology at Kansas State University. She earned her DVM from University of Guelph and her MS in clinical pathology from Auburn University, where she also completed a residency. Dr. Pohlman serves as the president and medical director of the Riley County Humane Society in Manhattan, Kansas, and is an active teacher and mentor of veterinary interns, residents, and graduate students. She enjoys providing CE in clinical pathology through speaking engagements, online courses, and publications. Her research interests include improvement of clinical pathology laboratory methods and identification and characterization of disease in domestic species, particularly in shelter animals, as well as pets owned by individuals who cannot afford routine veterinary care.

**GILLIAN J. MCELHANLEY,** BVMS, PhD, DECO, DACVO, is a former clinical assistant professor of clinical pathology at Cornell University. She earned her veterinary degree from University of Glasgow and her MS from Iowa State University, where she completed a rotating internship in small animal medicine and surgery and a residency in small animal internal medicine. She also completed a residency in clinical pathology at North Carolina State University. Dr. Allen focuses on cachexia/anorexia, endocrinology, and hepatobiliary and pancreatic disease and has committed her career to improving the diagnosis of disease.

**DIFFERENTIAL DIAGNOSIS PAGE 29**

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SARAH STEEN, DVM, is the medical director of Critters Without Litters, a spay/neuter clinic in Bakersfield, California. She earned her DVM from Kansas State University, where she continued for an additional year as a shelter medicine intern. Dr. Steen’s interests include animal sheltering, decreasing pet overpopulation, and improving the lives of community cats through trap-neuter-vaccinate-return methods.

CASE IN POINT PAGE 11

KAREN LYNN C. SUEDA, DVM, DACVB, is a veterinary behaviorist at VCA West Los Angeles Animal Hospital in Los Angeles, California. She earned her DVM from University of California, Davis, where she also completed a clinical animal behavior residency. Her interests include feline behavior, canine anxiety disorders, and the human–animal bond.

CONSULT THE EXPERT PAGE 30

MARY REBECCA TELLE, DVM, is an assistant clinical professor at Mississippi State University, where she also earned her DVM. She completed a small animal rotating internship at University of Tennessee and a residency in comparative ophthalmology at University of Wisconsin–Madison. Her research and clinical interests include ocular manifestations of systemic disease, infectious disease, catacary surgery, and glaucoma.

CASE ROUTES PAGE 17

MARK T. TROXEL, DVM, DACVIM (Neurology), is a neurologist and neurosurgeon at Massachusetts Veterinary Referral Hospital in Woburn, Massachusetts. He earned his DVM from Iowa State University and completed a rotating internship and a medicine specialty internship, as well as a neurology residency at University of Pennsylvania. Dr. Troxel has published numerous articles and book chapters. His clinical interests include feline brain tumors, vestibular dysfunction, and neurosurgery.

CASE IN POINT PAGE 63

DIFFERENTIAL DIAGNOSIS PAGE 69
Experience the many layers of Advantage Multi®
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Every dog and cat deserves comprehensive, broad-spectrum protection. That’s why Advantage Multi® delivers layers of protection from heartworms, fleas and intestinal parasites.

Provide the multi-layered protection of Advantage Multi® to the pets in your care.
Visit LayersofMulti.com or contact your Bayer Sales Representative.

*Treats and controls roundworms, hookworms and whipworms in dogs and roundworms and hookworms in cats.

CAUTION: Advantage Multi® is only available from a licensed veterinarian. Dogs: WARNING: DO NOT ADMINISTER THIS PRODUCT ORALLY. For the first 30 minutes after application, ensure that dogs cannot lick the product from application sites on themselves or other treated animals. Children should not come in contact with the application sites for two (2) hours after application. (See Contraindications, Warnings, Human Warnings and Adverse Reactions for more information.) Cats: Do not use on sick, debilitated, or underweight cats. Avoid oral ingestion.

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See page 3 for product information summary.
CASE IN POINT
Progressive Facial Lesion in a Community Cat
Sarah Steen, DVM
Lisa M. Pohlman, DVM, MS, DACVP

ON THE COVER
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IN THIS ISSUE

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Mary Rebecca Telle, DVM
Gillian J. McLellan, BVMS, PhD, DECVO, DACVO

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Julie Allen, BVMS, MS, MRCVS, DACVIM (SAIM), DACVP

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Karen Lynn C. Sueda, DVM, DACVB

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Mark T. Troxel, DVM, DACVIM (Neurology)

69 DIFFERENTIAL DIAGNOSIS
Tremors
Mark T. Troxel, DVM, DACVIM (Neurology)
1750 Veterinarians can’t be wrong!

That’s the number of Veterinarians that chose an iM3 CR7 for their practice.

The number 1 choice worldwide for CR Veterinary Dental Imaging is as clear as the images from our CR7.

- Highest resolution at 25 lp
- Largest range of image plate sizes
- Ideal for extremities & orthopedic surgery
- iM3 unlimited technical support, German made

CR7 VET Dental X-Ray

I have used a number of DR systems in the past, both in veterinary and human practice (Schick, Sirona, Kodak and Genoray), but I would have to say that the results and image quality that I am getting with the iM3 CR7 Vet is the best so far.

The advantages of the CR7 Vet over other DR systems when used in the veterinary environment include a unique range of plate sizes from size 0 up to size 5, which covers all pets from small to large. There is even an intraoral plate for rabbits.

Dr. Anthony Caiafa
BVSc BDSc MACVSc (SA Surgery and Veterinary Dentistry)
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Take this course to review common cytologic findings of lymph node aspirates and learn appropriate dosing, mechanisms of action, and adverse events associated with drugs used to manage lymphoma.
brief.vet/lymphoma

QUIZ
Appropriate Gastroprotectant Use
Emily Nissa Gould, DVM, MS, DACVIM (SAIM)
M. Katherine Tolbert, DVM, PhD, DACVIM (SAIM)
brief.vet/gastroprotectant-use
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To register for a course, visit www.ArthrexVetSystems.com and click on the “Continuing Education” tab for a full list of upcoming courses.
From Clinician’s Brief on Social Media

WE ASKED …

At what age do you recommend puppies start group socialization classes?

“8 weeks, which should be after puppies receive their first vaccinations. Once healthy puppies have started their vaccinations and are dewormed, they should start socialization classes to prevent behavior problems. Waiting until all vaccinations are given loses the optimum window of socialization.”—Beth C

“9 weeks; 1 week after their first vaccinations.”—Ericka W

“8 weeks, as long as the group of puppies has been dewormed and vaccinated. Poor socialization in dogs is a difficult problem, and the socialization period is short and early.”—Tracy C

“9 weeks, once they have been in their new home for a minimum of 10 days.”—Maggi B

“8 weeks.”—Lucy G

Do you have insurance for your pet?

- 28% Yes
- 72% No

What are your criteria for administering an antibiotic injection to a patient undergoing dental cleaning?

“I personally never do it. Sometimes I will send home oral clindamycin if osteomyelitis is documented on radiographs.”—Savannah H

“I do not give antibiotics if the procedure is just scaling and polishing; however, I do give them if any extractions are performed.”—Martina S

“Never. It is not needed unless there is risk for bacterial endocarditis due to valvular disease.”—Ben B

Have you ever diagnosed gastric dilatation-volvulus in a small-breed dog?

- 30% Yes
- 70% No

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The only CBD + CBDA product proven* to work

*Proven efficacy in clinical study by Cornell University College of Veterinary Medicine
Nonose, an intact male community cat in Bakersfield, California, estimated to be 3 to 5 years of age, had a slowly progressive facial lesion and audible respiratory noise of ≈1 year’s duration, based on reports by his community caretakers. The facial lesion was described as alternating between a visibly encrusted (Figure 1) or an open bleeding wound (Figure 2, next page). According to local community members, Nonose had been in the area for years; he had no known owner, and multiple caretakers provided him food but were never able to handle him. Nonose was trapped and transported to a local clinic to assess the nature and extent of his disease.

**Physical Examination**

On visual examination, Nonose was bright and alert, with severe respiratory stertor and subjectively increased inspiratory effort. No open-mouth breathing was noted during transport or at the clinic. He had a large lesion extending from the medial canthi across the forehead to just dorsal to the margin of the upper lips. Within these margins, no normal haired skin, nasal planum, or nares could be identified. He appeared to be visual, and mentation was deemed appropriate.

**Diagnosis**

Nonose was anesthetized for further examination. The surface of the lesion was characterized by a glistening, serosanguinous, gelatinous material (Figure 3, next page), which, when wiped with gauze, revealed exposed bone or cartilage. The full-thickness lesion extended into the mouth and through the upper left lip, creating a hole into the oral cavity (Figure 2, next page). The proliferative
nature of the lesion likely obstructed vision directly in front of the patient. Nasal passages were located after debridement but were composed of exposed nasal bone/cartilage rather than planum. All upper incisors were absent, and the gingiva surrounding all remaining teeth and the hard palate appeared affected with diffuse erythema and small amounts of the gelatinous material (Figure 4).

Due to the severity of facial tissue destruction, poor prognosis, and feral nature of the cat, euthanasia was elected. A blood sample was obtained prior to euthanasia for point-of-care FeLV/FIV testing, which was performed immediately after euthanasia and was negative. Multiple impression smears of affected tissue were obtained for cytologic examination (Figure 5).

Smears were composed of abundant round to oval-shaped, blue to pink yeast structures 3 to 12 µm in diameter. A thick, clear capsule surrounded the structures, resulting in organisms ≈5 to 20 µm in diameter. Narrow-based budding of the organisms was observed. Among the organisms were large, often vacuolated macrophages that occasionally contained one or more of the yeast structures (Figure 5).

**DIAGNOSIS:** **CRYPTOCOCCOSIS**

**Discussion**
Cryptococcal infections are seen worldwide in various species and, in the United States, are most common in California and the Pacific Northwest. Basidiospores are usually found in soil or avian fecal material; infection often occurs through inhalation but can occur via direct contact of basidiospores in open wounds. Incubation can range from a few months to years.

Although assays to determine species were not performed in this patient, most cats in California that have cryptococcosis are infected by *Cryptococcus gattii* VGIII, with relatively fewer infections...
being due to *C. gattii* VGII. *C. neoformans* var *grubii* is the most common cause of cryptococcosis in dogs and humans; in the United States, cats are rarely infected with this species.

In cats, cryptococcosis is generally chronic and often presents as mucosal lesions in the nasal cavity, regardless of the primary site of entry/infection of the basidiospores. The glistening, serosanguinous gelatinous nature of the mass observed in this patient is a characteristic feature of cryptococcosis and a reflection of the presence of the polysaccharide capsule. Meningoencephalitis, cerebral granulomas, chorioretinitis, optic neuritis, uveitis, and other lesions may also be observed.

Pathogenesis of disease and success of treatment are dependent on the type and extent of infection, host immunity, and strain of *Cryptococcus* spp involved. Fungal culture is recommended, as a long course of therapy is required to resolve infection, and antifungal resistance is common. Antifungals commonly selected for feline therapy include fluconazole (10 mg/kg PO every 12 hours) and itraconazole (5-10 mg/kg PO every 24 hours).

### TREATMENT AT A GLANCE

- Culture and susceptibility testing is recommended prior to initiating treatment and can help guide selection of appropriate antifungal therapy and provide prognostic information.
- Azoles are the treatment of choice, with fluconazole and itraconazole most commonly used in cats.
- Surgical excision and/or debulking may help decrease the required duration of antifungal therapy and increase the chance for infection resolution, although lesion location may hinder the ability of these to be performed.
- Treatment should be continued until clinical signs are no longer present and fungal antigen titers are 0.
- Antifungal therapy duration ranges from 2 to 18 months, with an average duration of 4 to 6 months.
Fluconazole is the initial antifungal agent of choice due to its good tissue penetration in the brain, eyes, and urinary tract and its relatively low cost. If the patient fails to respond to fluconazole therapy, as is often seen with C. gattii infections, itraconazole may help achieve remission; however, multimodal therapy, including amphotericin B and 5-flucytosine, may be required in severe disseminated cases. Serial laboratory monitoring of liver enzymes is recommended, as liver toxicity is possible withazole therapy (see Treatment at a Glance, previous page).

Once cryptococcosis is diagnosed, a discussion should be held with the owner regarding the cost of long-term medication and laboratory monitoring, the importance of owner and patient compliance for long-term oral therapy, and the potential for disease recurrence, particularly if compliance is poor. A committed owner and a compliant patient are essential for a successful outcome.

Treatment success can be gauged by reduction in both clinical signs and serum antigen titers (at least one dilution per month of treatment); treatment should be continued until the antigen titer is 0. Continued antigen titer monitoring after resolution of disease at 3- to 6-month intervals is recommended, as early detection of relapse can lead to shorter duration of repeat treatment (see Take-Home Messages).

References

TAKE-HOME MESSAGES

- In the clinical setting, cytology is often used to make an initial diagnosis of cryptococcosis.
- Although cryptococcosis in humans is more common in immunocompromised patients, FeLV/FIV status in cats does not appear to play a role in susceptibility to Cryptococcus spp. However, coinfection with FIV/FeLV may impact response to therapy and patient prognosis.
- Cryptococcosis can develop after inhalation of basidiospores from the environment; infected patients are considered noncontagious.
- Young adult cats appear to be at increased risk for infection, with the median age of infected cats being 6 years; cats of all ages may be affected.
- Treatment can be successful, but owner and patient compliance, as well as duration of therapy and resulting financial requirements, may inhibit success.
- With appropriate treatment, nasal and cutaneous diseases may have a good prognosis. If CNS or ocular disease is present, treatment is generally less effective.
Can’t find the cat?

Must be time for her monthly treatment.

NEW!

Reduce her anxiety with protection that lasts twice as long.

 Longer-lasting, broad-spectrum parasite protection can mean less stress on felines and better compliance.1-3 Recommend BRAVECTO® PLUS (fluralaner and moxidectin topical solution) for Cats with 2x the duration of REVOLUTION® PLUS (selamectin and sarolaner topical solution) for Cats.

 ! fleas ticks heartworm roundworms hookworms


IMPORTANT SAFETY INFORMATION: The most commonly reported adverse reactions include vomiting, hair loss, itching, diarrhea, lethargy, dry skin, elevated ALT, and hypersalivation. BRAVECTO PLUS has not been shown to be effective for 2 months duration in kittens less than 6 months of age. For topical use only. Avoid oral ingestion. The safety of BRAVECTO PLUS has not been established in breeding, pregnant and lactating cats. Fluralaner is a member of the isoxazoline class. This class has been associated with neurologic adverse reactions including tremors, ataxia, and seizures. Neurologic adverse reactions have been reported in cats receiving isoxazoline-class drugs, even in cats without a history of neurologic disorders. Use with caution in cats with a history of neurologic disorders. Use with caution in cats that are heartworm positive. The effectiveness of BRAVECTO PLUS to prevent heartworm disease after bathing or water immersion has not been evaluated.

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For information, visit BravoVets.com/Plus.

See page 16 for product information summary.
Adverse Reactions: The effectiveness of Bravecto Plus to prevent heartworm disease after bathing or water immersion has not been evaluated. The safety of Bravecto Plus has not been established in breeding, pregnant, and lactating cats. Bravecto Plus kills adult and immature heartworms experimentally induced 4th stage larval and immature adult Toxocara cati and Toxascaris leonina in cats ranging in age from 12 weeks to 27.5 months. In two well-controlled laboratory studies, Bravecto Plus demonstrated 100% effectiveness against Toxocara canis and Toxascaris leonina when administered topically to cats prior to infection. No adverse reactions were observed in these studies. Individual heartworms killed by Bravecto Plus are emerodized. Bravecto Plus is only effective against heartworms in the heart. Bravecto Plus is not effective against heartworm infection in the lungs. Bravecto Plus should not be used in cats with a history of neurological disorders. Use with caution in cats that are heartworm positive (see Animal Safety). Bravecto Plus has not been shown to be effective in kittens less than 6 months of age. The safety of Bravecto Plus has not been established in breeding, pregnant, and lactating cats. The effectiveness of Bravecto Plus to prevent heartworm disease after bathing or water immersion has not been evaluated. Adverse Reactions: In a well-controlled US field study, which included a total of 176 treated cats (135 with Bravecto Plus and 41 with a monthly topical active control), there were no serious adverse reactions. Bravecto Plus should be administered topically as a single dose every 2 months according to the Dosing Schedule below to prevent a minimum dose of 18.2 mg/kg (40 mg/kg) fluralaner and 0.9 mg/kg (2 mg/kg) moxidectin. Each meriall contains 280 mg of fluralaner and 74 mg of moxidectin.

### Clinical Pharmacology:

#### Mode of Action:
Fluralaner is for systemic use and belongs to the class of isoxazoline-substituted benzamide derivatives. Fluralaner is an orally active acetylcholinesterase inhibitor. The mode of action of fluralaner is the antagonism of the cholinergic receptor channel (gamma-aminobutyric acid (GABA)ergic-receptor and glutamate-receptor).

#### Clinical Pharmacology:

- Fluralaner is a lipophilic substance that has been shown to pass through the blood-brain barrier and to be distributed in the central nervous system.
- Moxidectin is a hydrophilic substance that is excreted via the kidneys.

#### Dosage Schedule:

<table>
<thead>
<tr>
<th>Body Weight Ranges (lb)</th>
<th>Fluralaner content (mg/lb)</th>
<th>Moxidectin content (mg/lb)</th>
<th>Tablets Administered</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 6.2</td>
<td>112.5</td>
<td>5.6</td>
<td>One</td>
</tr>
<tr>
<td>6.2 - 13.8</td>
<td>250</td>
<td>12.5</td>
<td>One</td>
</tr>
<tr>
<td>&gt;13.8 - 27.5</td>
<td>500</td>
<td>25</td>
<td>One</td>
</tr>
</tbody>
</table>

**Dosing Schedule**:

- For cats over 7.5 lb should be administered the appropriate combination of tablets.
- A veterinarian or veterinary technician should demonstrate or instruct the pet owner regarding the appropriate technique for applying Bravecto Plus topically to cats prior to first use.

#### Instructions:

1. **Step 1:** Immediacy, Before use, open the pouch and remove the tube. Put on gloves. Hold the tube at the crimped end with the keyline pointing away from you. The keyline should be located on the outer rim of the tube. The cat’s ears should be docked on the tube for disposal and should not be removed. The tube is open and ready for application.

2. **Step 2:** The cat should be standing or lying with its back horizontal during application. The fur at the administration site should be parted, and the tube should be directed to the cat’s back for disposal and should not be removed. The tube is open and ready for application.

3. **Step 3:** Squeeze the tube and gently apply the entire contents of Bravecto Plus directly to the skin at the base of the skull and to the top of the neck, behind the ears. A small amount of solution that could cause some of the solution to run and drip off of the cat. If a second spot is missed to avoid running off, then apply the second spot slightly behind the first spot.

### Adverse Reactions:

#### Percentage of Cats with Adverse Reactions (AR) in the Field Study

<table>
<thead>
<tr>
<th>Adverse Reaction</th>
<th>Bravecto Plus Group: Percent of Cats with the AR During the 120-Day Study (n=115 cats)</th>
<th>Active Control Group: Percent of Cats with the AR During the 120-Day Study (n=41 cats)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vomiting</td>
<td>1.0%</td>
<td>2.2%</td>
</tr>
<tr>
<td>Pruritus</td>
<td>4.4%</td>
<td>12.3%</td>
</tr>
<tr>
<td>Applicaiton site pruritus</td>
<td>4.4%</td>
<td>4.9%</td>
</tr>
<tr>
<td>Diazza</td>
<td>3.7%</td>
<td>7.3%</td>
</tr>
<tr>
<td>Lethargy</td>
<td>3.7%</td>
<td>9.8%</td>
</tr>
<tr>
<td>Dry Skin</td>
<td>3.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Elevated alanineaminotransferase (ALT)</td>
<td>3.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Hypersalivation</td>
<td>1.5%</td>
<td>1.5%</td>
</tr>
<tr>
<td>Application site alopecia</td>
<td>0.7%</td>
<td>0.0%</td>
</tr>
</tbody>
</table>

*ALT was greater than twice the upper reference range of 100 IU/L. These cats also had mild elevations of aspartate aminotransferase (AST) and alanine aminotransferase (ALT) above the upper reference range of 100 IU/L. No clinical signs associated with liver function tests were observed.*

#### Adverse Reactions:

- **Ingestion/Intoxication:** Ingestion of more than one tube of Bravecto Plus can result in clinical signs such as vomiting, depression, hyperthermia, and anorexia. These signs may be severe and may require human medical intervention.
- **Administration Site:** Clinical signs may include application site erythema, pruritus, alopecia, and swelling. These signs resolved within 24 hours of treatment.
- **Systemic Side Effects:** Systemic signs such as anorexia, vomiting, depression, diarrhea, and ataxia may be observed. These signs resolved within 24 hours of treatment.
- **Alopecia or Loss of Hair:** Alopecia at the application site was seen in cats treated with Bravecto Plus and was reversible. Alopecia may occur at any site on the body, including the head, neck, ears, and tail.
- **Application site swelling:** Swelling at the application site was seen in cats treated with Bravecto Plus and was reversible. Swelling may occur at any site on the body, including the head, neck, ears, and tail.
- **Dehydrated, Gastrointestinal:** Dehydration, vomiting, diarrhea, and anorexia may be seen in cats treated with Bravecto Plus. These signs resolved within 24 hours of treatment.
- **Erythema:** Erythema at the application site was seen in cats treated with Bravecto Plus and was reversible. Erythema may occur at any site on the body, including the head, neck, ears, and tail.
- **Fainting:** Fainting was seen in cats treated with Bravecto Plus. Fainting may occur at any site on the body, including the head, neck, ears, and tail.
- **Miosis:** Miosis was seen in cats treated with Bravecto Plus. Miosis may occur at any site on the body, including the head, neck, ears, and tail.
- **Pain:** Pain was seen in cats treated with Bravecto Plus. Pain may occur at any site on the body, including the head, neck, ears, and tail.
- **Seizure:** Seizure was seen in cats treated with Bravecto Plus. Seizure may occur at any site on the body, including the head, neck, ears, and tail.
- **Stiffness:** Stiffness was seen in cats treated with Bravecto Plus. Stiffness may occur at any site on the body, including the head, neck, ears, and tail.
- **Tachycardia:** Tachycardia was seen in cats treated with Bravecto Plus. Tachycardia may occur at any site on the body, including the head, neck, ears, and tail.
- **Tachypnea:** Tachypnea was seen in cats treated with Bravecto Plus. Tachypnea may occur at any site on the body, including the head, neck, ears, and tail.
- **Anorexia:** Anorexia was seen in cats treated with Bravecto Plus. Anorexia may occur at any site on the body, including the head, neck, ears, and tail.
- **Alopecia (not at application site):** 5.2% of cats in the Bravecto Plus group and 2.4% of cats in the active control group had alopecia. Alopecia was not as severe as alopecia at the application site.

#### Notes:

- Bravecto Plus is available in three tube sizes to treat cats ranging in weight from 2.6 lb – 27.5 lb (1.2 kg to 12.5 kg). Each 500 mg tube contains 15 mg of moxidectin and 49 mg of fluralaner.

#### Storage Conditions:

- Bravecto Plus is available in three tube sizes to treat cats ranging in weight from 2.6 lb – 27.5 lb (1.2 kg to 12.5 kg). Each 500 mg tube contains 15 mg of moxidectin and 49 mg of fluralaner. 2.6 lb – 6.2 lb (1.2 kg to 2.8 kg) are available in a 15 mg tube; 6.2 lb – 13.8 lb (2.8 kg to 6.3 kg) are available in a 30 mg tube; and 13.8 lb – 27.5 lb (6.3 kg to 12.5 kg) are available in a 45 mg tube.

#### Approved by FDA in March 2019

**Rev: 08/2019**
Cloudy Eye in a Labrador Retriever

Mary Rebecca Telle, DVM*
Gillian J. McLellan, BVMS, PhD, DECVO, DACVO
University of Wisconsin–Madison

THE CASE
A 7-year-old spayed Labrador retriever crossbreed is presented for a 5-day history of an intermittently red, cloudy left eye. The owner states that the patient had previously been diagnosed with allergic conjunctivitis and has had intermittent flare-ups. The patient has reportedly been coughing for 3 days and, although still eating and drinking, her appetite is decreased. Her BCS is 7/9, which is consistent with previous visits.

On general physical examination, mild mandibular lymphadenopathy, moderate dental tartar, rectal temperature of 103.8°F (39.9°C), and a tense abdomen on palpation were noted. An initial ophthalmologic examination of the left eye reveals blepharospasm; absent menace response; questionable dazzle reflex; a fixed, mid-range pupil with subtle dyscoria and no apparent direct pupillary light reflex or consensual pupillary light reflex from the left to the right eye; pronounced episcleral injection and conjunctival hyperemia; mild edema, and suspected moderate aqueous flare (Figure 1, next page). Although a tapetal reflex is visible, the fundus in the left eye cannot be visualized by indirect or direct ophthalmoscopy. The right eye appears normal.

What are your next steps?

THE CHOICE IS YOURS …

CASE ROUTE 1
To recommend a more in-depth ophthalmologic examination, including detailed examination of both eyes, Schirmer tear test (STT), fluorescein staining, tonometry, and gonioscopy, based on suspicion of primary glaucoma, and refer the case to an ophthalmologist, go to page 18.

CASE ROUTE 2
To recommend measuring intraocular pressure (IOP) and a systemic diagnostic investigation, including CBC, serum chemistry profile, and chest radiography, based on suspicion of uveitis and secondary glaucoma, go to page 21.

*IByline reflects affiliation on original publication. On publication in January 2020, the author’s current affiliation is Mississippi State University.

IOP = intraocular pressure
STT = Schirmer tear test
CASE ROUTE 1

You recommend a more in-depth ophthalmologic examination, including detailed examination of both eyes, STT, fluorescein staining, tonometry, and gonioscopy, based on suspicion of primary glaucoma, and refer the case to an ophthalmologist.

Case Progression

The case was referred to a board-certified ophthalmologist. On further ophthalmologic examination, the right eye appears normal with an intact menace response, dazzle reflex, and a normalized pupil with positive direct pupillary light reflex but absent consensual pupillary light reflex from right to left. Indirect ophthalmoscopy of the right eye reveals a small, well-demarcated, circular, hyper-reflective lesion in the peripheral tapetum, most consistent with an inactive chorioretinal scar.

STT readings are >15 mm/min and fluorescein staining is negative in both eyes. Tonometry reveals an IOP of 18 mm Hg in the right eye and 57 mm Hg in the left eye (normal, 10-25 mm Hg with <20% difference in IOP between eyes). Evaluation of the iridocorneal angle (via gonioscopy) of the unaffected eye is performed by gently touching an indirect ophthalmoscopic lens on the axial cornea after applying a topical anesthetic and looking through the lens at the point of contact. Evaluation reveals a narrow iridocorneal angle, which indicates pectinate ligament dysplasia. Based on these findings, one drop of a topical prostaglandin analog (latanoprost 0.005% ophthalmic solution) is administered in the left eye, and the patient is admitted to the clinic for a few hours to monitor for a drop in IOP.

Clinical Considerations

Based on signalment and clinical findings, including evidence of pectinate ligament dysplasia in the unaffected eye, primary angle closure glaucoma is an important differential diagnosis in this case. Other important differentials to consider for a red, cloudy, painful eye include keratoconjunctivitis sicca, corneal ulceration, and uveitis, the latter potentially with secondary glaucoma. Keratoconjunctivitis sicca and corneal ulceration as underlying causes were ruled out, and because the aqueous flare is mild, the uveitis and IOP are likely attributable to primary glaucoma rather than a systemic cause.
Glaucoma is a leading cause of blindness in dogs, with goniodysgenesis-related primary angle closure glaucoma (PACG) being the most common of the primary glaucomas. Goniodysgenesis refers to abnormal architecture of the iridocorneal angle that contributes to obstruction of outflow of aqueous humor. This abnormality is believed to have an underlying genetic component and is seen with relatively high prevalence in purebred dogs, including American Cocker spaniels, basset hounds, Siberian huskies, chow chows, and Boston terriers, among others.

PACG typically manifests as an acutely painful eye with increased IOP and blindness. Some breeds (eg, basset hounds) also have significant anterior uveitis and corneal edema associated with an acute attack, which can be clinically confusing and may complicate treatment. Although canine glaucoma is generally associated with elevated IOP (≥50 mm Hg), IOP may fluctuate widely in glaucoma and may in fact be within or lower than the normal range at the time of presentation. This may especially be true of chronic disease involving pressure damage to the ciliary body’s production of aqueous humor or in patients with significant intraocular inflammation, which also can have a negative impact on aqueous humor production.

Prognosis for vision and globe retention is dependent on quick recognition of clinical signs and prompt treatment to decrease IOP, as just a few hours of pronounced IOP elevation can result in blindness. In general practice settings, medical management is the safest and most accessible way to decrease IOP. Prostaglandin analog (eg, latanoprost) therapy, typically coadministered with topical carbonic anhydrase inhibitors (eg, dorzolamide), is the most effective medical therapy for PACG in dogs. β-blockers (eg, timolol) also reduce IOP but, when administered alone, their IOP-lowering effect is insufficient; thus, they should be reserved for prophylactic or adjunctive therapies. Systemic hyperosmotics (eg, intravenous mannitol, oral glycerol) may also be used for marked IOP reduction but should be used with caution and only after routine blood work (eg, renal values, electrolytes), especially in older or debilitated animals or animals with cardiovascular disease (see Table). Surgical interventions in acute cases are typically reserved for patients with a fair-to-good prognosis for vision. These procedures should be performed by a board-certified veterinary ophthalmologist and may include gonioimplants, cyclophotocoagulation (transcleral laser or endolaser), and/or aqueocentesis.

**Outcome**

Approximately an hour after administering latanoprost, the patient’s IOP has decreased to 28 mm Hg and the pupil is miotic. The patient appears more comfortable, and corneal edema is subjectively reduced but vision is still questionable. The patient is discharged on latanoprost (1 drop in the left eye q12h), prednisolone acetate 1% (1 drop in the left eye q12h), and dorzolamide (1 drop in the left eye q8h).

<table>
<thead>
<tr>
<th>TABLE</th>
</tr>
</thead>
<tbody>
<tr>
<td>To view a table showing commonly used glaucoma drugs, go to cliniciansbrief.com/article/top-5-glaucoma-drugs or scan the QR code.</td>
</tr>
</tbody>
</table>

Using QR codes from your mobile device is easy and quick!

Simply focus your phone’s camera on the QR code as if taking a picture (but don’t click!). A notification banner will pop up at the top of your screen; tap the banner to view the linked content.

IOP = intraocular pressure
PACG = primary angle closure glaucoma
STT = Schirmer tear test
On recheck examination in one week, the patient’s blepharospasm, anterior uveitis, corneal edema, and episcleral injection have significantly improved in the left eye (Figure 2); however, dyscoria and pigment dispersion are present, along with an inconsistent menace response and posterior synechiae. On tonometry, IOP is 13 mm Hg OS and 11 mm Hg OD, but the optic nerve head looks dark in the left eye on indirect ophthalmoscopy, likely indicating loss of myelin due to damage from the elevated IOP.

The patient is discharged with instructions to continue latanoprost twice daily in the left eye, start timolol twice daily in the right eye for prophylaxis, and taper prednisolone acetate over 1 week in the left eye. In addition to recommending IOP checks every few months, you recommend ongoing evaluation by a veterinary ophthalmologist to monitor primary glaucoma and assess risk to the other eye, through specialized tests and expertise (eg, confirmation of gonioscopic findings, high-resolution ultrasonography).

**Your Choice’s Implications**

Immediate medical intervention for PACG was implemented to control IOP; the eye was comfortable and vision was restored, although menace response was inconsistent. Although medical therapy may be initially effective at lowering IOP, most cases stop responding to medications because the outflow eventually becomes impaired, so most PACG patients ultimately require some form of surgical management, including possible enucleation for irreversibly blind, painful eyes.

Of importance, serious systemic illnesses, including infectious disease and neoplasia, were not considered despite the history of inappetence and lethargy, coughing, and presence of chorioretinal scarring in the right eye. If the patient had secondary glaucoma from uveitis instead of PACG, she could have had a treatable but serious underlying illness that could progress over the week until recheck. In addition, without treatment of the underlying cause of uveitis, the uveitis and secondary changes in the eye could have worsened and affected the other eye, greatly affecting the prognosis for vision, globe retention, and life.

**Most primary angle closure glaucoma patients ultimately require some form of surgical management, including possible enucleation for irreversibly blind, painful eyes.**
CASE ROUTE 2
You recommend measuring intraocular pressure (IOP) and a systemic diagnostic investigation, including CBC, serum chemistry profile, and chest radiography, based on suspicion of uveitis and secondary glaucoma from the apparent dyscoria, aqueous flare, episcleral injection, and systemic clinical signs.

Case Progression
Tonometry reveals IOP of 18 mm Hg in the right eye and 57 mm Hg in the left eye (normal, 10–25 mm Hg with <20% difference in IOP between eyes). CBC reveals a stress leukogram and mildly elevated hematocrit but is otherwise unremarkable. Serum chemistry profile reveals mildly elevated total protein and mild hypokalemia but is otherwise within normal limits. Thoracic radiographs reveal a mildly diffuse generalized bronchial lung pattern indicative of bronchitis. A SNAP 4Dx Plus test (idexx.com) is negative for *Dirofilaria immitis*, *Anaplasma* spp, *Borrelia burgdorferi*, and *Ehrlichia* spp. Based on geographic location, fungal disease testing may be appropriate. Urine antigen testing for blastomycosis is elected.

Although the diagnostic investigation did not identify an underlying cause for the uveitis, an IOP of 57 mm Hg confirms the suspicion of glaucoma, and the patient is sent home on a topical carbonic anhydrase inhibitor (ie, dorzolamide q8h in the left eye), prednisolone acetate 1% (q6h in the left eye), and oral carprofen (2.2 mg/kg PO q12h).

Although the SNAP 4Dx test results are negative, prescribed doxycycline (5 mg/kg PO q12h for 4 weeks) was prescribed empirically for other potential tick-borne diseases.

Clinical Considerations
Based on findings from physical and ophthalmologic examination (ie, lethargy, coughing, inappetence, significant aqueous flare with corneal edema), uveitis with secondary glaucoma is an important differential diagnosis, along with keratoconjunctivitis sicca, corneal ulceration, and uveitis (potentially with secondary glaucoma).

Although there are many causes of secondary glaucoma in dogs, the most common are lens-induced uveitis in dogs with cataract, primary lens luxation, infectious or immune-mediated uveitis, and neoplastic disease. Ocular signs associated with systemic infectious (particularly tick-borne disease) or neoplastic diseases may be unilateral or bilateral and are sometimes present with no other clinical signs. Thus, treatment with doxycycline in this case was a reasonable and safe choice in the event a tick-borne illness was contributing to uveitis. Infectious causes of uveitis may be regional (eg, tick-borne or fungal disease). Signalment may also be important when determining risk for certain immune-mediated diseases.

Prognosis for vision and globe retention with secondary glaucoma is greatly dependent on prompt lowering of IOP and aggressive treatment of uveitis, including identification and treatment of possible underlying infectious or neoplastic causes. It is important to recognize the mechanism responsible for IOP elevation in all cases of secondary glaucoma. Certain medications (eg, latanoprost) that intensify miosis could actually worsen IOP.

Infectious causes of uveitis may be regional (eg, tick-borne or fungal disease).

IOP = intraocular pressure
PACG = primary angle closure glaucoma
OD = right eye
OS = left eye
elevation in conditions such as primary lens luxation (common in terrier breeds1), in which the primary mechanism of IOP elevation is a pupil block. Because uveitic glaucoma can be caused by cell infiltrates and debris obstructing the iridocorneal drainage angle and/or pupillary block from synechiae, adequate control of intraocular inflammation is imperative. This can typically be achieved by high-dosing frequency of topical corticosteroids (up to q4-6h) if the patient’s cornea is fluorescein-stain negative with no ulceration and/or NSAIDs (up to q6h). If a thorough diagnostic investigation, including blood work to evaluate kidney values, has been performed, oral NSAIDs may be beneficial, particularly if there is posterior segment involvement. Oral corticosteroids may also be used in some cases but may not be recommended if all potential infectious and neoplastic causes have not been investigated and excluded. Topical carbonic anhydrase inhibitors (eg, dorzolamide) decrease aqueous humor production and are the treatment of choice for adequate control of IOP in these cases. Surgical treatments such as cyclophotocoagulation and gonioimplants may be performed by a veterinary ophthalmologist but tend to have poorer outcomes than in primary glaucoma patients because of underlying inflammation.

Because the underlying causes and secondary ocular effects of uveitis may be difficult to treat, the prognosis for vision and globe retention in uveitic glaucoma is guarded, particularly in chronic cases. Consultation with a veterinary ophthalmologist is strongly recommended.

Outcome
At the one-week recheck, the patient is slightly improved clinically, with subjective improvement in comfort, and is eating again. In the left eye, there is no menace, dazzle, or consensual PLR from left to right eye, and the pupil is fixed and midrange in size. She has trace corneal edema, the episcleral injection is approximately the same, and the owner reports that the eye appears to be “bulging” more. IOP is 47 mm Hg despite treatment with dorzolamide. Results of testing for blastomycosis are negative. Suspicious of primary glaucoma with the resolution of aqueous flare but increased IOP, you recommend referral to a veterinary ophthalmologist. However, the owner declines your recommendation due to financial concerns. In an effort to decrease IOP, a drop of latanoprost is administered in the left eye and the patient is admitted for the day to recheck IOP. Thirty minutes later, IOP is still elevated at 50 mm Hg, and another drop of latanoprost is given. IOP is still elevated at 48 mm Hg 1.5 hours after the initial dose.

Due to the poor prognosis for vision and globe retention, enucleation with histopathology of the affected eye is elected by the owner. By the time of suture removal 2 weeks later, histopathology confirms a diagnosis of goniodygenesis with severe optic nerve head cupping and ganglion cell loss, consistent with primary angle closure glaucoma (PACG). You start the patient on timolol in the remaining eye (1 drop q12h) and the client is referred for further diagnostics. Treatment with a topical β-blocker in the remaining eye was instituted based on a randomized, prospective study showing that prophylactic treatment of at-risk fellow eyes in dogs diagnosed with PACG with either topical β-blocker or demecarium bromide delayed onset of glaucoma relative to the control group.7 Recheck of IOP in the remaining eye every 1 to 3 months indefinitely is recommended, and the owner is warned to be vigilant for any signs of redness, cloudiness, squinting, or decreased vision in that eye, as PACG is a bilateral disease and the fellow eye is high risk for developing glaucoma.

Your Choice’s Implications
Secondary glaucoma was suspected due to the presence of uveitis, elevated IOP, and other clinical signs on physical examination that suggested possible systemic disease. A thorough uveitis diagnostic investigation was appropriate based on aqueous flare, episcleral injection, systemic clinical signs, and dyscoria, as many of the possible differentials for systemic disease are serious and may warrant immediate intervention. When results were rela-
tively unremarkable, treatment for clinical signs of secondary glaucoma and uveitis was implemented. Ultimately, the patient had PACG, and persistent IOP elevation resulted in loss of the eye. Because IOP fluctuates throughout the day and from day to day, one measurement does not provide a complete picture. Thus, rechecking IOP sooner (ie, in 2 to 3 days versus 1 week) may have been helpful in this case by prompting additional therapy; however, given the 5-day duration of clinical signs prior to initial presentation, it may not have significantly impacted eventual outcome.

Many serious systemic illnesses were ruled out in this case by performing a thorough diagnostic investigation. Most importantly, the eye was submitted for histopathologic evaluation to confirm diagnosis of PACG. Histopathologic evaluation of the globe is of utmost importance in glaucoma cases in which owners elect enucleation, as it provides important prognostic information including likelihood of undiagnosed infectious or neoplastic disease, as well as the risk for disease similarly affecting the other eye, thus informing rational treatment planning.

**Conclusion**

This case highlights the challenge of determining whether glaucoma is primary or secondary, especially if owners are financially constrained or unable to accept referral. In addition, many cases of PACG exhibit a degree of inflammation and pigment dispersion, which can further complicate the clinical picture. This case illustrates the importance of recognizing that primary glaucoma may be encountered in any breed, including crossbreed dogs.

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**References**


Cannabis for Pet Pain

Demand for veterinary cannabis products is growing, fueled primarily by pet owners; however, negative bias toward its use as a legitimate medical treatment persists. In the United States, a potential factor in this bias is the increase in cases of tetrahydrocannabinol (THC) toxicity reported to the Animal Poison Control and Pet Poison Hotline since medical marijuana was legalized.

It is important to distinguish between hemp plants and marijuana plants. Hemp plants have far lower levels of THC and have subsequently been favored by veterinarians due to the lower risk for THC toxicity. However, no US states allow veterinarians to prescribe medical cannabis, and many states do not allow veterinarians to recommend over-the-counter, hemp-based products.

Despite this, studies relevant to the practical use of medical cannabis in veterinary medicine continue to be conducted to provide information regarding its safety and efficacy. Colorado State University and Cornell University have performed studies on effective and safe dosing and administration of cannabidiol-dominant cannabis in dogs. Both universities are also evaluating the efficacy of cannabis in the treatment of canine osteoarthritis. Colorado State is also evaluating its efficacy in reducing seizure frequency in epileptic dogs. Preliminary results appear favorable, and both studies indicate that nonpsychotropic cannabinoids, particularly cannabidiol, have a wide safety margin with minimal adverse effects (ie, diarrhea, elevated ALP). Additional research evaluating the efficacy of medical cannabis in the treatment of anxiety, canine atopic dermatitis, and feline hypersensitivity dermatitis is underway.

As data continue to expand current knowledge, clinicians should educate themselves about medical cannabis and manufacturers should base recommendations on science rather than anecdotal evidence.—Cital S*

References

*Cital S is affiliated with ElleVet Sciences.

Using $\alpha_2$s to Your Advantage

Dexmedetomidine is widely used for sedation in veterinary medicine but is also labeled for use as an analgesic. Its analgesic effects occur primarily through spinal antinociceptive activity, which inhibits the release of norepinephrine, preventing further transmission of nerve impulses.

A CRI of dexmedetomidine may be used for rough anesthetic recoveries or breakthrough pain; a low-dose CRI can provide sedation and analgesia for very painful or anxious patients. Dexmedetomidine may also be used epidurally, enhancing effects of other epidural agents and acting synergistically with epidural opioids. Transmucosal dexmedetomidine has also been used in cats; although a surgical plane of anesthesia is generally not achieved via this route, it can provide sufficient sedation for physical examinations, blood draws, and IV catheter placement.

Dexmedetomidine has the potential to cause severe bradycardia and hypotension. Patients receiving this drug should be monitored closely, and the drug’s use should be reserved for patients in good cardiac health that do not exhibit any exercise intolerance. This class of drugs should not be used in patients that have respiratory or cardiovascular compromise. —McNerney T
Inappropriate urination is a common problem in cats and a common cause of relinquishment.1 Many of these patients may have some form of feline lower urinary tract disease (FLUTD), which includes diseases such as feline idiopathic cystitis, bacterial cystitis, and cystic calculi. Dolly was one such patient that was brought to the animal shelter and, through proper management, was able to be adopted despite her disease.

**Dolly’s Case**
Dolly, a 3-year-old spayed domestic shorthair cat ([Figure 1](#)), was presented to the Dumb Friends League as a stray. Within 24 hours of intake, Dolly was noted to have hematuria. She received a full physical examination, urinalysis, and radiography of her urinary bladder and kidneys. She was found to have a cystic urolith and was taken to surgery. Cystotomy was routine, and Dolly recovered uneventfully.

Urinalysis results were consistent with sterile cystitis, and stone analysis revealed a calcium oxalate stone. Dolly was switched to Hill’s Prescription Diet c/d Multicare Feline ([Figure 2](#)), which is specially formulated to support urinary health and reduce the risk for calculi.2 Dolly had no recurrence of clinical signs on her new food and was ultimately adopted.

**Managing FLUTD**
Although cats with urinary disease—such as Dolly—typically have longer stays in the shelter, they are still considered adoptable in most cases.3 With counseling of future owners on proper management, the Dumb Friends League has found that many of these cats go on to live a happy, healthy life.

Potential owners should be educated about stress reduction and weight control, both of which are important components of FLUTD management.1,4 Any stressful change of routine, such as a new caretaker or reduced play time, has been...

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1. Finding Hope for Relinquished Cats with Lower Urinary Tract Disease
Rakefet Orobona, DVM

2. Sponsored by Hill’s Pet Nutrition

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[Figure 1](#) Dolly was presented to the Dumb Friends League as a stray and revealed to have cystitis. She was fed Hill’s Prescription Diet c/d Multicare Feline to manage her signs and make her adoptable.
shown to trigger a variety of sickness behaviors, including inappropriate urination. Adherence to routine and environmental enrichment (eg, proper hiding and perching locations) may help prevent recurrence of FLUTD.

In addition, adopters should be counseled about dietary management, which has been shown to influence FLUTD recurrence. Along with mineral concentrations and maintenance of urinary pH, antioxidant levels and omega-3 fatty acids can influence urinary health. A prospective, randomized, double-blinded study showed that Hill’s Prescription Diet c/d Multicare Feline reduced the recurrence rate of feline idiopathic cystitis signs in client-owned cats by 89% over a 12-month period as compared with a control food.

A therapeutic food can also help alleviate stress; dietary supplements L-tryptophan and hydrolyzed casein have both been shown to manage stress in cats. These supplements have been added to Hill’s Prescription Diet c/d Multicare Feline to create Hill’s Prescription Diet c/d Multicare Feline Stress, which provides Hill’s primary solution to help prevent FLUTD in cats in potentially stressful situations (eg, relinquishment to a shelter, conflict with other pets, rehoming, new baby, travel).

**Conclusion**

Shelters often have to meet the challenge of treating and preventing FLUTD in relinquished and stray cats. This challenge can be exacerbated by the stress cats may experience from leaving their familiar surroundings to be housed in a shelter. Focused dietary options such as Hill’s Prescription Diet c/d Multicare and Hill’s Prescription Diet c/d Multicare Feline Stress, coupled with behavioral counseling, can help make these cats more adoptable or able to rejoin their family.

**References**


**Learn more at HillsVet.com/Urinary**

**Focused dietary options such as Hill’s Prescription Diet c/d Multicare and Hill’s Prescription Diet c/d Multicare Feline Stress, coupled with behavioral counseling, can help make cats with FLUTD more adoptable or able to rejoin their family.**
Medical Management of Benign Prostatic Hyperplasia

Benign prostatic hyperplasia (BPH) is common in intact male dogs. Although neutering can resolve this problem, surgery is not always the best option for some patients. In such instances, medical management of uncomplicated cases is frequently successful. Medical management can also serve as a temporary option in patients unable to undergo surgery until a later date.

Suspicion of BPH as a differential diagnosis may begin with the patient’s history. Hematuria, stranguria, and/or changes in urinary patterns are often reported by owners; in some cases, flattened stool and/or dyschezia may be observed. An enlarged prostate may be palpated during rectal examination or transabdominally during physical examination; the prostate in patients that have BPH is usually smooth, symmetrical, and nonpainful. Imaging, preferably ultrasonography, can be supportive of a BPH diagnosis; however, evaluation of prostatic fluid yields the most useful information. Visual examination of the fluid is helpful, but centrifugation followed by cytologic examination should also be performed. Culture of the fluid may provide information regarding possible involvement of prostatitis in disease.

BPH only requires treatment in dogs with clinical signs or ultrasonographic evidence of prostatic cysts. Medical treatment involves regular oral administration of a 5-α-reductase inhibitor, which prevents conversion of testosterone to dihydrotestosterone. In the United States, finasteride is most commonly used. Once-daily dosing is recommended for the first 3 months, after which ultrasonography should be performed. Dose frequency may be decreased to every other day or twice weekly once improvement is observed. Recheck examinations should be performed every 3 months until disease is stable and then every 6 months. Finasteride is safe and well tolerated in dogs on a long-term basis, and clinical disease can recur if medication is discontinued. For dogs with refractory or nonresponsive disease, neutering may be required; reduction in prostate size can be expected within 2 to 3 months of neutering.—Hesser A

Evaluation of prostatic fluid yields the most useful information.

Chronic Kidney Disease: The New Paradigm of Early Diagnosis & Evolving Treatments

It is generally believed that 30% of cats will develop chronic kidney disease (CKD) by age 9. Although the exact pathophysiology has not been determined, multiple kidney injuries secondary to ischemia or chronic inflammation have been increasingly suspected.

Diagnosis of CKD in cats has historically been made based on the presence of renal azotemia and inappropriate urine specific gravity (USG) for ≥3 months’ duration. However, by the time azotemia is typically noted, 75% of nephron mass will have been lost, and by the time isosthenuria develops, 68% to 70% of renal function will have been lost. Symmetric dimethylarginine (SDMA) increases when ≈40% of renal function has been lost and is more sensitive than creatinine in the detection of CKD, particularly in earlier stages of the disease. SDMA is a stable molecule and is not impacted by muscle mass, hemolysis, icterus, or lipemia.

Once CKD is diagnosed, staging of the disease is important. International Renal Interest Society (IRIS) staging guidelines provide clear, objective guidelines for the treatment of CKD based on creatinine, proteinuria, and the presence of hypertension. Updates to the guidelines have added SDMA as a tool for both diagnosis and staging. An SDMA value >14 µg/dL is consistent with CKD. Values <25 µg/dL reflect IRIS stages 1 and 2; these patients often have minimal or no clinical signs. Cats with IRIS stage 1 CKD have been particularly difficult to diagnose because of this, and evaluating SDMA values has enabled earlier diagnosis in these patients.—Chalhoub S, Boysen S
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Revamping Our Understanding of Epilepsy

Epilepsy is more than a seizure disorder; it is also a brain disorder, with seizures as its most clinically apparent sign. Additional clinical signs that affect the interictal period, particularly changes in behavior and cognition, are being increasingly recognized. Such changes are believed to share a pathophysiological pathway. In humans, for example, patients with depression are more likely to develop epilepsy and epileptic patients are more likely to develop depression. It is unknown whether this bidirectional relationship between neurobehavioral disorders and epilepsy occurs in veterinary patients.

Few studies of interictal behavior changes in dogs exist. In one study, two-thirds of dogs with idiopathic epilepsy developed a behavior change, and dogs with idiopathic epilepsy unresponsive to medication showed a greater amount of behavior changes as compared with dogs responsive to medication. The main behavior change reported in dogs with idiopathic epilepsy is anxiety. Other clinical signs have included changes in impulsivity, trainability, and spatial memory. It has therefore been proposed that canine epileptic management include reducing effects of possible behavior comorbidities in addition to controlling seizures.

One study examining the safety and tolerability of antiseizure medications in dogs found that 10% of dogs exhibited anxiety as an adverse effect when treated with primidone; this was not observed in dogs treated with phenobarbital, potassium bromide, levetiracetam, zonisamide, or felbamate. There have been conflicting results from studies evaluating the effects of imepitoin on anxiety in epileptic dogs. Selective serotonin reuptake inhibitors have been recommended as a first-line treatment for anxiety in epileptic humans, but only anecdotal evidence exists for their use in epileptic dogs.

Another potential alternative to medication for behavior modification is dietary therapy. One study has reported a significant reduction in chasing behavior and a reduction in stranger-directed fear in patients fed a diet enriched with medium-chain fatty acids; this could potentially indicate anxiolytic properties of medium-chain fatty acids.—Volk H

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References
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Hypophosphatemia

Julie Allen, BVMS, MS, MRCVS, DACVIM (SAIM), DACVP

Following are differential diagnoses, listed in order of likelihood, for patients presented with hypophosphatemia.

- **Transcellular shifts**
  - Diabetes mellitus, particularly diabetic ketoacidosis, following insulin therapy (common)
  - Respiratory alkalosis due to hyperventilation caused by hypoxia, stress, anxiety, salicylate toxicity, CNS disease, fever, heart stroke, sepsis, and/or gram-negative infections
  - Refeeding syndrome

- **Decreased absorption**
  - Vomiting/diarrhea, particularly secondary to severe malabsorptive disease
  - Anorexia
  - Vitamin D deficiency
  - Low-phosphorus diet
  - Overdose of phosphate-binding antacids
  - Steatorrhea
  - Following significant intestinal resection

- **Increased renal excretion**
  - Diabetes mellitus
  - Diuretics
  - Corticosteroids
  - Hyperadrenocorticism
  - Hypercalcemia of malignancy
  - Primary hyperparathyroidism
  - Renal tubular disorder (eg, Fanconi syndrome)
  - Hyperaldosteronism
  - Increased phosphatonin (eg, following renal transplantation [cats])

- **Miscellaneous**
  - Eclampsia
  - Recovery from hypothermia
  - Following hepatic resection

References


CONSULT THE EXPERT

FELINE COMPULSIVE DISORDER

Karen Lynn C. Sueda, DVM, DACVB
VCA West Los Angeles Animal Hospital
Los Angeles, California
Feline compulsive disorder (CD) involves abnormal, repetitive behavior that occurs without an apparent trigger when other physical or behavioral causes have been excluded. The behavior can result from frustration, anxiety, and/or stress and presents significant concerns for patient welfare and the human–animal bond.1,2
Approximately 3.5% to 7% of cats seen by veterinary behaviorists are diagnosed with CD. Feline CD encompasses a variety of behavioral presentations that can be categorized as self-directed, oral, locomotor, vocal, or visual/hallucinatory (Table, pages 34-35). Self-directed behavior (eg, overgrooming) is most common, followed by oral behavior (eg, pica).

**Background & Pathophysiology**

The pathophysiology of feline CD is likely multifactorial due to the wide variety of clinical presentations. Altered function in cortico-striatal-thalamo-cortical pathways, including the basal ganglia, has been implicated in human and animal models of CD. Varying neurotransmitter (eg, serotonin, dopamine, glutamate, acetylcholine) levels at different locations along this pathway can influence the category of CD behavior expressed. Psychopharmaceuticals to modify these neurotransmitter levels have successfully been used to treat CD in some cats.

Physical and environmental stressors have been implicated in some types of feline CD. In a study of 11 cats with psychogenic alopecia, 9 cats experienced an environmental change or stressful event (eg, separation from owner, death of an animal companion, moving to a new home) around the time of alopecia onset. Wool-sucking has also been shown to be triggered by stressful events, including being left alone for extended durations. Early weaning (<7 weeks of age) has been found to increase the risk for wool-sucking and overgrooming but has not been associated with an increased risk for pica. In another study, medical issues (eg, cardiovascular disease, neoplasia, allergies) were more prevalent in wool-sucking cats as compared with non-wool-sucking cats.

**History & Clinical Signs**

Several breed predispositions have been identified for various CD behaviors, suggesting genetic factors may play a role (Table, pages 34-35). Overgrooming and self-directed behavior are more commonly observed in Siamese, Burmese, and Oriental cats and wool-sucking appears to be more prevalent in Siamese, Birman, and crossbreed house cats. Analysis of the genealogies of wool-sucking Siamese and Birman cats has indicated a dominant mode of inheritance, with possible incomplete penetrance. Some studies have concluded that Bengal, Burmese-type, and Siamese cats may be more likely than other breeds to exhibit pica and oral behavior, although one study did not identify breed associations for these behaviors.

The mean age of onset of CD is ≈2 years, although breeds that are predisposed to CD may exhibit signs at a younger age. For example, in one study, the mean age of onset of fabric-sucking in Siamese and Birman cats was 41.6 and 67.6 weeks, respectively. In the previously mentioned study of 11 cats with psychogenic alopecia, 4 cats (2 Oriental and 2 domestic shorthair) exhibited fabricsucking prior to 1 year of age.

Overgrooming tends to be directed at the abdomen, flanks, back, thorax, and medial aspects of the thoracic limbs and thighs. However, overgrooming in these areas is not pathognomonic for psychogenic alopecia, as physical causes of overgrooming (eg, pruritus, pain) can result in the same pattern. In some cases, excoriation of the underlying skin may be present.

Pica may be directed at one or several objects, with shoelaces or threads, plastic, fabric, rubber, paper or cardboard, and wood being the most common. Cats exhibiting pica may chew on, suck on, or ingest various objects. In a study, cats that sucked on fabric were likely to also ingest fabric.

**Diagnosis**

Feline CD is a diagnosis of exclusion; numerous medical differential diagnoses (Table, pages 34-35) must be ruled out before CD can be diagnosed. In a

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CD = compulsive disorder
A trichogram exhibiting barbered hairs with sharp, broken ends can help differentiate between overgrooming and hair loss or poor regrowth.¹⁸

**Treatment & Management**

Treatment of feline CD includes educating owners, minimizing the repetitive behavior, reinforcing alternative behavior, and alleviating stress through environmental enrichment and anxiolytics.

Verbal or physical punishment (eg, yelling, swatting, scruffing) should not be used to treat CD. Because repetitive behavior often originates from stress or frustration, use of harsh verbal or physical punishment that increases the cat’s anxiety may exacerbate the disease. Moreover, cats may avoid punishment by learning to engage in the CD behavior out of the pet owner’s sight. If the cat engages in CD behavior and must be interrupted, it is best to use remote punishment not associated with the owner’s presence (eg, dropping a book to make a noise out of the cat’s sight, tossing a pillow across the cat’s line of sight to break its concentration).

Minimizing the practice of the CD behavior reduces opportunities for reinforcement of the behavior and may be necessary for the health and welfare of the cat, particularly if the behavior is self-injurious. If overgrooming or hyperesthesia results in wounds, an Elizabethan collar may be required. Similarly, cats exhibiting pica may need to be confined to a single room or cage where the environment and access to objects can be strictly controlled.

Obtaining an accurate verbal history may be difficult, as pet owners may mislabel or not have witnessed their cat’s behavior. For example, cats with psychogenic alopecia are likely to be presented for hair loss rather than overgrooming because owners may not witness overgrooming. Similarly, a pet owner may not realize that the cat exhibits pica until it vomits or foreign bodies are detected on imaging or during exploratory surgery. Some CD behavior may be difficult for pet owners to describe and are subject to misinterpretation. Skin rippling associated with feline hyperesthesia may be described as itching, twitching, or a seizure by the pet owner. When possible, owners should be encouraged to record a video of their cat’s behavior. A trichogram exhibiting barbered hairs with sharp, broken ends can help differentiate between overgrooming and hair loss or poor regrowth.¹⁸

A diagnosis of CD can be supported when physical and behavioral causes of an abnormal, repetitive behavior that interferes with a cat’s quality of life have been ruled out. To make this determination, a thorough behavior history—including but not limited to a description (ideally including a video) of the behavior, initiating factors, situations in which the behavior is likely to occur, pet owner’s response, and previous treatment attempts and their degree of success—should be obtained. Behavior history forms are available from several resources (see **Suggested Reading**, page 37).

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**A trichogram exhibiting barbered hairs with sharp, broken ends can help differentiate between overgrooming and hair loss or poor regrowth.**¹⁸

 study of 21 cats referred to a veterinary behaviorist for psychogenic alopecia, medical (ie, nonbehavioral) causes of repetitive behavior were identified in 76% of the cases¹⁷; only 2 cases were identified to have behavioral causes, and 3 exhibited a combination of psychogenic alopecia and pruritus. After presumptive medical causes have been identified and treated, the repetitive behavior may persist to the same or a lesser degree, which can indicate that the physical ailment was either not the primary inciting factor or that medical and behavioral comorbidities were present.

A diagnosis of CD can be supported when physical and behavioral causes of an abnormal, repetitive behavior that interferes with a cat’s quality of life have been ruled out. To make this determination, a thorough behavior history—including but not limited to a description (ideally including a video) of the behavior, initiating factors, situations in which the behavior is likely to occur, pet owner’s response, and previous treatment attempts and their degree of success—should be obtained. Behavior history forms are available from several resources (see **Suggested Reading**, page 37).

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### TABLE

**BREED PREDISPOSITIONS, PHYSICAL EXAMINATION FINDINGS, & MEDICAL DIFFERENTIALS FOR FELINE COMPULSIVE DISORDER**

<table>
<thead>
<tr>
<th>Category</th>
<th>Repetitive Behavior</th>
<th>Breed Predispositions</th>
</tr>
</thead>
<tbody>
<tr>
<td>SELF-DIRECTED; SELF-INJURIOUS</td>
<td>Overgrooming</td>
<td>Siamese, Burmese, Oriental, Bengal</td>
</tr>
<tr>
<td></td>
<td>Psychogenic alopecia</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hyperesthesia syndrome</td>
<td>Siamese, Burmese, Persian, Abyssinian</td>
</tr>
<tr>
<td></td>
<td>Feline behavioral ulcerative dermatitis</td>
<td>No breed predispositions have been identified.</td>
</tr>
<tr>
<td></td>
<td>Self-sucking</td>
<td>No breed predispositions have been identified.</td>
</tr>
<tr>
<td></td>
<td>Chewing feet/claws</td>
<td>No breed predispositions have been identified.</td>
</tr>
<tr>
<td></td>
<td>Feline orofacial pain syndrome</td>
<td>Burmese</td>
</tr>
<tr>
<td>ORAL</td>
<td>Pica</td>
<td>Siamese, Birman, Bengal/Burmese, Crossbreed house cat</td>
</tr>
<tr>
<td></td>
<td>Wool-sucking</td>
<td></td>
</tr>
<tr>
<td>LOCOMOTOR</td>
<td>Pacing</td>
<td>No breed predispositions have been identified.</td>
</tr>
<tr>
<td></td>
<td>Tail-chasing</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hyperesthesia syndrome</td>
<td>Siamese, Burmese, Persian, Abyssinian</td>
</tr>
<tr>
<td>VOCAL</td>
<td>Excessive vocalization</td>
<td>Siamese</td>
</tr>
<tr>
<td>VISUAL; HALLUCINATORY</td>
<td>Chasing unseen prey</td>
<td>No breed predispositions have been identified.</td>
</tr>
</tbody>
</table>

*Pain and neurologic disorders (eg, seizures) are physical differential diagnoses for all repetitive behaviors.
# Possible Concurrent Physical Examination Findings

<table>
<thead>
<tr>
<th>Category</th>
<th>Possible Concurrent Physical Examination Findings</th>
<th>Medical Differential Diagnoses*</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Alopecia</strong></td>
<td>Alopecia of the abdomen, flanks, back, thorax, and medial thoracic limbs and/or thighs</td>
<td>Dermatologic disease</td>
</tr>
<tr>
<td></td>
<td>Blunt or broken hairs on trichogram</td>
<td>Endocrine disease</td>
</tr>
<tr>
<td></td>
<td>Self-inflicted excoriation or injury</td>
<td>Pain</td>
</tr>
<tr>
<td><strong>Rippling</strong></td>
<td>Rippling or twitching skin (similar to panniculus reflex)</td>
<td>Neurologic/neuromuscular disease</td>
</tr>
<tr>
<td><strong>Tail-twitching</strong></td>
<td>Tail-twitching; patient may attack tail before running away</td>
<td>Dermatologic disease</td>
</tr>
<tr>
<td><strong>Ulcerative</strong></td>
<td>Ulcerative excoriations along dorsolateral neck secondary to scratching</td>
<td>Dermatologic disease</td>
</tr>
<tr>
<td><strong>Self-sucking</strong></td>
<td>Self-sucking, often directed at tail tip</td>
<td>Neurologic disease</td>
</tr>
<tr>
<td><strong>Short claws</strong></td>
<td>Short claws</td>
<td>Dermatologic disease</td>
</tr>
<tr>
<td><strong>Claw bed infection</strong></td>
<td></td>
<td>Neurologic disease</td>
</tr>
<tr>
<td><strong>Repetitive</strong></td>
<td>Repetitive licking, chewing, pawing at the mouth</td>
<td>Dental disease</td>
</tr>
<tr>
<td><strong>Oral ulcerations</strong></td>
<td></td>
<td>Oral pain</td>
</tr>
<tr>
<td><strong>GI disease</strong></td>
<td>GI disease</td>
<td>Polyphagia</td>
</tr>
<tr>
<td><strong>GI obstruction secondary to foreign body ingestion</strong></td>
<td></td>
<td>Iron deficiency</td>
</tr>
<tr>
<td><strong>Muscular</strong></td>
<td>Muscular, orthopedic, or neurologic repetitive stress injury</td>
<td>Endocrine disease (eg, hyperthyroidism)</td>
</tr>
<tr>
<td><strong>Orthopedic</strong></td>
<td>Difficulty maintaining weight</td>
<td>Lumbosacral or other neurologic disease</td>
</tr>
<tr>
<td><strong>Neurologic</strong></td>
<td>Self-injury from tail-biting</td>
<td>Orthopedic disease</td>
</tr>
<tr>
<td><strong>Rippling</strong></td>
<td>Rippling or twitching skin (similar to panniculus reflex)</td>
<td>Neurologic/neuromuscular disease</td>
</tr>
<tr>
<td><strong>Tail-twitching</strong></td>
<td>Tail-twitching; patient may attack tail before running away</td>
<td>Dermatologic disease</td>
</tr>
<tr>
<td><strong>Normal or reinforced behavior</strong></td>
<td></td>
<td>Endocrinopathy</td>
</tr>
<tr>
<td><strong>Endocrinopathy</strong></td>
<td></td>
<td>Neurologic disease and/or loss of hearing</td>
</tr>
<tr>
<td><strong>Feline cognitive dysfunction</strong></td>
<td></td>
<td>Ocular disease</td>
</tr>
<tr>
<td><strong>Neurologic disease</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
controlled. Although necessary, these measures may increase the cat’s stress, which may perpetuate the CD behavior.

Preventing situations that trigger the repetitive behavior or preemptively engaging the cat in another activity before the CD behavior occurs is ideal. For example, childproof locks may help prevent a cat with pica from breaking into closets to chew on clothing or shoelaces. If bouts of over-grooming coincide with environmental stressors (eg, owner’s departure), owners can engage cats in play with a new toy before leaving. Attempts to distract the cat with food, toys, or attention while it is engaged in the repetitive behavior may inadvertently reinforce the behavior.

Positive reinforcement training should be used to teach alternative behavior and create pleasurable associations with previously stressful situations. For example, for cats that exhibit CD behavior associated with the owner’s departure, a positive emotional response may be elicited if the owner’s departure is consistently paired with a treat before the cat engages in the behavior. Cats that repetitively pace or vocalize can be taught to go to a specific spot (eg, a chair) on command to await a reward (eg, treat, play time, brushing). Directing the cat to a quiet, convenient location teaches an alternative coping strategy to mitigate the CD behavior.

In most cases, owners are unaware of the specific triggers of the behavior or the behavior occurs unexpectedly or not in the owner’s presence. In such cases, the goal of treatment should be to reduce the cat’s global anxiety and frustration through environmental enrichment and anxiolytics. Feline environmental enrichment provides a means to avoid stressful situations (eg, abundance and wide distribution of resources, including hidden or elevated spaces), mental and physical stimulation (eg, foraging toys, active play; see Suggested Reading), and opportunities to engage in normal, species-typical behavior (eg, provision of scratching posts and litter boxes). In a study of cats diagnosed with feline behavioral ulcerative dermatitis (ie, nonhealing ulcerations secondary to psychogenic pruritus), implementation of an environmental enrichment plan resulted in cessation of pruritus within 2 days and complete healing over several days depending on lesion severity; none of the cats that improved relapsed during the 12- to 24-month follow-up period.19

Treatment options to decrease anxiety include pheromones (eg, feline facial and appeasing pheromones), supplements (eg, α-casozepine, L-theanine), and pharmaceuticals (eg, tricyclic antidepressants, selective serotonin reuptake inhibitors; see Suggested Reading).

The relatively few anxiolytic efficacy studies that have been conducted for feline CD have produced varying results. For example, in a retrospective study, 5 cats exhibiting psychogenic alopecia groomed less frequently and experienced hair regrowth when treated with clomipramine (1.25-2.5 mg/cat PO every 24 hours)9; 3 of the 5 cats also received environmental modification to reduce stress. However, in a different prospective, double-blind, placebo-controlled study of 25 cats with psychogenic alopecia, 11 cats treated with clomipramine (0.5 mg/kg PO every 24 hours) for 56 days did not experience a significantly decreased number of grooming bouts or hair regrowth as compared with placebo-treated cats.11 Mixed success has also been reported following treatment with

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Positive reinforcement training should be used to teach alternative behavior and create pleasurable associations with previously stressful situations.
other behavior medications (eg, amitriptyline).9,20 These studies indicate that the response to psycho- 
pharmaceutical treatment is highly variable. Furthermore, because no medications are currently 
licensed by the US FDA for the treatment of feline CD, it is important to review possible adverse 
effects and obtain informed consent from the owner prior to use.

**Prognosis**

Prognosis for reduction in the frequency or intensity of CD behavior is fair but poor for complete res- 
solution or cure. Owners should be informed that the likelihood of compliance with the treatment plan. Because treatment response depends on many factors and may be unpredictable, frequent consultation may be needed to adjust the treatment plan.

---

**References**


16. Dodman NH. Recognition, management and genetic findings in canine and feline obsessive compulsive disorders. Paper presented at: 7th Tufts’ Canine and Feline Breeding & Genetics Conference; September 11-12, 2015; Dedham, MA.


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**Suggested Reading**


As your experts in endocrinology, Dechra Veterinary Products is proud to offer **ZYCORTAL® Suspension** (desoxycorticosterone pivalate injectable suspension)

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**MINERALOCORTICOID FOR SUBCUTANEOUS USE IN DOGS ONLY**

**BRIEF SUMMARY (FOR FULL PRESCRIBING INFORMATION, SEE PACKAGE INSERT)**

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

**DESCRIPTION:** Desoxycorticosterone pivalate is a mineralocorticoid hormone. Zycortal Suspension contains 25mg/mL of desoxycorticosterone pivalate.

**INDICATION:** For use as replacement therapy for mineralocorticoid deficiency in dogs with primary hypoadrenocorticism (Addison’s disease).

**CONTRAINDICATIONS:** Do not use ZYCORTAL Suspension in dogs that have previously had a hypersensitivity reaction to desoxycorticosterone pivalate.

**WARNINGS:** Use ZYCORTAL Suspension with caution in dogs with congestive heart disease, edema, severe renal disease or primary hepatic failure. Desoxycorticosterone pivalate may cause polyuria, polydipsia, increased blood volume, edema and cardiac enlargement. Excessive weight gain may indicate fluid retention secondary to sodium retention.

**HUMAN WARNINGS:** Not for human use. Keep this and all drugs out of the reach of children. Consult a physician in case of accidental human exposure.

**PRECAUTIONS:** Any dog presenting with severe hypovolemia, dehydration, pre-renal azotemia and inadequate tissue perfusion (“Addisonian crisis”) must be rehydrated with intravenous fluid (saline) therapy before starting treatment with ZYCORTAL Suspension. The effectiveness of ZYCORTAL Suspension may be reduced if potassium sparing diuretics, such as spironolactone, are administered concurrently.

**ADVERSE REACTIONS:** The field safety analysis included evaluation of 152 dogs. The most common adverse reactions reported were polyuria, polydipsia, depression/lethargy, inappropriate urination, alopecia, decreased appetite/anorexia, panting, vomiting, diarrhea, shaking/trembling, polyphagia, urinary tract infection, urinary tract insensitivity and restlessness. Reports of anaphylaxis and anemia have been associated with a different desoxycorticosterone pivalate injectable suspension product.

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**Dechra Veterinary Products**
01AD-ZYCS0104-0219
Lymph Node Status in Canine Mast Cell Tumors
Sarah Boston, DVM, DVSc, DACVS, ACVS Founding Fellow of Surgical Oncology

Owner Perspectives on Feline Diabetic Management
Alex Gallagher, DVM, MS, DACVIM (SAIM)

Relationship Between Periodontal & Systemic Disease in Dogs
Heidi B. Lobprise, DVM, DAVDC

Conjunctival Microflora in Relation to Conjunctivitis in Guinea Pigs
Tracey K. Ritzman, DVM, DABVP (Avian), DABVP (Exotic Companion Mammal)

Tracking Body Weight in Cats
Elizabeth A. Berliner, DVM, DABVP (Shelter Medicine Practice & Canine and Feline Practice)

Preventing Parasitism in Breeding Kennels
Audrey Ruple, DVM, MS, PhD, DACVPM, MRCVS

Novel Protoparvovirus in Cats

Needle Gauge Influence on Hemostasis Measures in Cats

Long-Term Outcome in Hoarded Cats

Pregabalin in the Treatment of Neuropathic Pain
Lymph Node Status in Canine Mast Cell Tumors

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Ontario, Canada

In the Literature

FROM THE PAGE …

Identifying lymph node status in mast cell tumors (MCTs) is important for determining prognosis and whether further staging is necessary. Although palpation and cytology of regional lymph nodes are often performed, their value is limited; thus, histopathology remains the gold standard. It is generally understood that enlarged lymph nodes should be removed in all cases, but less is known regarding how to
manage lymph nodes that are normal in size or non-palpable, as well as how to definitively diagnose metastatic disease on histopathology. A recent study categorized lymph nodes as HN0 (nonmetastatic), HN1 (premetastatic), HN2 (early metastasis), or HN3 (overt metastasis), according to the degree of metastatic cell aggregates present and evaluation of lymph node architecture.4

In the current study, the authors aimed to assess the metastatic rate of nonpalpable or normal-sized regional lymph nodes in dogs with MCTs. Included in the study were 93 dogs with solitary cutaneous MCTs that were negative for distant metastasis. Regional lymph nodes that were non-palpable or normal in size were removed, and clinical characteristics, including tumor size and histologic grade, were evaluated. Of the 93 dogs, 46 were found to have histologically detectable metastatic disease. The only clinical factor significantly associated with metastatic disease was a tumor diameter >3 cm.

These study findings highlight the importance of regional lymph node removal at the time of MCT removal. Lymph node status is important for staging and potential chemotherapy decision-making and may also guide the need for further staging, as MCTs tend to metastasize to the regional lymph nodes before becoming widely metastatic.5 Removal of metastatic lymph nodes may also provide a survival advantage.6 Regional lymph node removal was a high-yield test in this study; however, further investigation is needed to determine whether sentinel lymph node mapping would be a more effective method of staging.7

Regional lymph node removal was a high-yield test in this study.

... TO YOUR PATIENTS
Key pearls to put into practice:

1. Palpation characteristics are an insensitive method for detecting metastatic disease in MCTs and many other cancers.

2. The use of the Patnaik 3-tier4 and Kiupel 2-tier9 histologic grading systems in this study highlights a problematic issue with the Patnaik system. Patnaik grade II MCTs are the most common MCT classification10; however, this study found discrepancies between the Patnaik grade II classification of some lymph nodes when they were compared with the Kiupel grading system. These discrepancies create a gray area in how to manage Patnaik grade II MCTs.

3. Removal of the regional lymph node with MCT resection may yield a high rate of metastatic disease, as seen in this study.

4. Larger MCTs (>3 cm) have a higher rate of nodal metastasis.

References
Owner Perspectives on Feline Diabetic Management

Alex Gallagher, DVM, MS, DACVIM (SAIM)
University of Florida

In the Literature

FROM THE PAGE …

Cats are commonly affected by diabetes mellitus,1,2 which can have a significant impact on pet owners due to the time commitment and costs associated with its management.3 Diabetic cats require a structured plan for feeding and insulin administration that owners must follow; aggressive monitoring and treatment are typically needed if diabetic remission is a goal of therapy.4,5 Most owners of recently diagnosed diabetic cats will be experiencing drawing up and administering injections for the first time, which can be a source of fear and anxiety. Many concerns can be alleviated, though, by providing good owner education in the clinic and resources owners can access on their own (eg, handouts, videos, websites, online support groups).

In this study,* owners were surveyed regarding their perceptions about treatment and monitoring of diabetic cats. A total of 748 questionnaires predominately from the United States (43%) and United Kingdom (36%) were submitted. As compared with prior studies in which diabetic remission rates were reportedly ≤84%,5,6 remission in this study was only reported in 18% of cats alive at the time of questionnaire completion. Fewer than 50% of owners reported their veterinarian discussing diabetic remission, use of home blood glucose monitoring, or how to recognize unstable disease. Of concern, 25% of owners reported not being taught how to draw insulin, and 27% were not taught to administer insulin. Owners also noted that websites they found on their own were the most useful resources. When owners were asked what influenced their treatment decision, the answer options “what is best for my cat” (almost 100% of

*This study was partially supported by Vet Professionals and MSD Animal Health.
respondents) and “veterinarian recommendations” (86% of respondents) were selected as the most important factors.

Approximately 70% of owners chose home blood glucose monitoring as a preferred method of monitoring; of these, 53% learned about the method online, 27% learned from their veterinarian, and the remaining 20% learned from other sources or had personal/previous experience with home blood glucose monitoring. Many owners used home blood glucose monitoring several times a day as part of a tight regulation protocol; some owners reported checking blood glucose as often as every 2 hours and ≤20 to 30 times daily. Overall, owners reportedly felt that caring for a diabetic cat had less of an effect on their daily life and relationship with their pet than they had thought it would prior to starting treatment.

… TO YOUR PATIENTS
Key pearls to put into practice:

1. At the time of diagnosis, clinicians and staff members should dedicate time to discuss all aspects of care and monitoring of diabetic cats with owners. This should include demonstrating and having owners practice proper insulin administration.

2. Owners are likely to seek information online. Clinicians should be ready to direct owners to accurate and useful websites.

3. Many owners may be interested in home glucose monitoring to help manage their diabetic cat and reduce the cost of care. This may be accomplished with blood glucose meters or continuous glucose monitors.

References

Research Note: Novel Protoparvovirus in Cats

In 2016, a novel protoparvovirus similar to human bufaviruses was identified in dogs with respiratory signs and termed canine bufavirus. Considering the ability of canine parvovirus type 2 variants to infect and cause clinical signs in cats, the authors of this study investigated whether canine bufavirus could do the same. A total of 574 archival feline nasal and oropharyngeal swabs and enteric samples from 2 universities in Italy were analyzed. Canine bufavirus DNA was identified in 9.2% of samples. DNA was most commonly identified in samples from the respiratory tract. The role of this novel virus in feline respiratory disease complex warrants further investigation.

Source
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Relationship Between Periodontal & Systemic Disease in Dogs

Heidi B. Lobprise, DVM, DAVDC
Main Street Veterinary Hospital & Dental Clinic
Flower Mound, Texas

In the Literature

FROM THE PAGE …

Periodontal disease is a common inflammatory disease in dogs. Bacteremia, bacterial metabolic products and toxins, and inflammatory mediators and immune complexes that result from periodontal disease can all have an impact on distal organ health.

This study sought to evaluate the association between periodontal disease and systemic disease, specifically renal, hepatic, and cardiac disease. Records of 136 dogs presented to a veterinary teaching hospital were retrospectively reviewed. Dogs were separated into 2 groups: those that had periodontal disease (n = 75) and those that did not have periodontal disease (n = 61). The average age of dogs in the periodontal disease group was 12.1 years, and >50% of dogs in this group weighed <22 lb (10 kg).

A significant association was found between periodontal disease and cardiac disease. Of the 75 dogs that had periodontal disease, 38 (50.67%) demonstrated cardiac signs, whereas only 2 of the 61 dogs (3.28%) that did not have periodontal disease showed these signs. Although an association between periodontal and cardiac disease was demonstrated in this study, conclusions must be tempered with the understanding that—although periodontal disease may be a risk factor for dogs predisposed to cardiac disease, particularly myxomatous mitral valve disease—a specific causal relationship cannot be proven.

No statistical correlation was found between periodontal disease and either renal or hepatic disease; however, this was determined based on clinical features rather than histopathology. Study limitations, as noted by the authors, included limited sample size, its retrospective nature, and lack of periodontal disease staging.

Evidence-based research directly connecting periodontal disease to a causal relationship with systemic disease is challenging to validate and substantiate. However, the lack of hard evidence does not negate the potential risk factor for periodontal disease, especially when the potential impact of chronic inflammation is considered.

… TO YOUR PATIENTS

Key pearls to put into practice:

1. Owners should be educated about how periodontal disease can contribute to overall health. Bacteria are present in the gingival sulcus of the teeth in a biofilm that has direct contact with the gingiva. The gingiva has a local immune response to this encroaching bacterium and its toxic products. As periodontal disease progresses, significant local effects occur and have the potential to contribute to overall systemic disease.

2. Although periodontal disease involves bacteria, routine dental prophylaxis in a healthy patient does not generally necessitate systemic antibiotic therapy.

3. Prevention of periodontal disease through regular dental care to avoid substantial local and systemic impact caused by disease is ideal. Regular dental care is particularly important for any patient with systemic disease.
**Sentinel Spectrum Chews**

**Intestinal Nematode and Cestode Treatment and Control:** Dogs may be exposed to and can become infected with roundworms, hookworms, and tapeworms throughout the year, regardless of season or climate. Clients should be advised of appropriate measures to prevent reinfection of their dog with intestinal parasites. Because the prepatent period for *E. multilocularis* may be as short as 26 days, dogs treated at the labeled monthly intervals may become reinfected and shed eggs between treatments.

**Parasite Control:** Sentinel Spectrum Chews is not a substitute for appropriate vaccines such as those used to prevent rabies, distemper, parovirus, and leptospirosis. Sentinel Spectrum Chews should be used in conjunction with a comprehensive health care program that includes appropriate vaccines.

**Sentinel Spectrum Chews**

**Composition:**

Lufenuron is a benzoylphenylurea derivative with the following chemical composition: N-[2,5-dichloro-4-(1,1,2,3,3,3,-hexafluoropropoxy)-phenyl]amino-carbonyl(2,6-difluoro-benzamido)-C-[1-(2,6-difluorophenyl)-4-isooquinolin-1-yl]-isoquinolin-4-one.

**Indications:** Sentinel Spectrum Chews are indicated for the prevention of heartworm disease caused by Dirofilaria immitis; for the prevention and control of adult roundworm (Toxocara canis, Toxascaris leonina), adult whipworm (Trichuris vulpis) and tapeworm (Dipylidium caninum, Echinococcus multilocularis, Echinococcus granulosus) infections in dogs and puppies two pounds of body weight or greater and six weeks of age and older.

**Dosage and Administration:** Sentinel Spectrum Chews should be administered orally, once monthly, at a dosage of 2.28 mg/lb (5 mg/kg) praziquantel. For heartworm prevention, give once monthly for at least 6 months after exposure to mosquitos (see EFFECTIVENESS). Sentinel Spectrum Chews are available in four strengths, 113 dogs (96.6%) accepted the product when offered from the manufacturer.

**To ensure adequate absorption, always administer Sentinel Spectrum Chews to dogs immediately after or in conjunction with a normal meal.** Sentinel Spectrum Chews may be offered to the dog by hand or added to a small amount of dog food. The chewables should be administered in a manner that encourages the dog to chew, rather than to swallow without chewing. Chewables may be broken into pieces and fed to dogs that normally swallow treats whole. Care should be taken that the dog consumes the complete dose, and treated animals should be observed for a few minutes after administration to ensure that no part of the dose is lost or rejected. If it is suspected that any of the dose has been lost, re-feeding is recommended.

**Heartworm Prevention:** Sentinel Spectrum Chews should be administered at monthly intervals beginning within one month of the dog’s first seasonal exposure to mosquitos and continuing until at least 6 months after the dog’s last seasonal exposure (see EFFECTIVENESS). Sentinel Spectrum Chews may be administered year-round without interruption. When switching from another heartworm preventative product to Sentinel Spectrum Chews, the first dose of Sentinel Spectrum Chews should be given within a month of the last dose of the former product.

**Flea Prevention and Treatment:** Treatment with Sentinel Spectrum Chews may begin at any time of the year, preferably starting one month before fleas become active and continuing monthly through the end of flea season. In areas where fleas are common year-round, monthly treatment with Sentinel Spectrum Chews should continue the entire year without interruption.

**Storage Information:** Store in a dry place at controlled room temperature, between 59° and 77°F (15-25°C).

**How Supplied:** Sentinel Spectrum Chews are available in four strengths, formulated according to the weight of the dog. Each strength is available in color-coded packages of six or twelve chewable tablets each.
IVERHART MAX® Soft Chew is a combination of three anthelmintics (ivermectin/pyrantel pamoate/praziquantel). The soft chews are available in four sizes in color-coded packages for oral administration to dogs according to their weight (see Dosage and Administration).

Indications: For use in dogs to prevent canine heartworm disease by eliminating the tissue stage of heartworm larvae (Dirofilaria immitis) for a month (30 days) after infection and for the treatment and control of roundworms (Toxocara canis, Toxascaris leonina), hookworms (Ancylostoma caninum, Uncinaria stenocephala, Ancylostoma braziliense), and tapeworms (Dipylidium caninum, Taenia pisiformis).

Dosage and Administration: IVERHART MAX Soft Chew should be administered orally at monthly intervals and the recommended minimum dose level of 6 mcg of ivermectin per kg (2.72 mcg/lb), 5 mg of pyrantel (as pamoate salt) per kg (2.27 mg/lb), and 5 mg of praziquantel per kg (2.27 mg/lb) of body weight, as follows:

<table>
<thead>
<tr>
<th>Dog Weight Pounds</th>
<th>Soft Chew per Month</th>
<th>Soft Chew Size</th>
<th>Ivermectin Content</th>
<th>Pyrantel Pamoate Content</th>
<th>Praziquantel Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.0 to 12</td>
<td>1</td>
<td>Toy</td>
<td>34 mcg</td>
<td>28.5 mg</td>
<td>28.5 mg</td>
</tr>
<tr>
<td>12.1 to 25</td>
<td>1</td>
<td>Small</td>
<td>68 mcg</td>
<td>57 mg</td>
<td>57 mg</td>
</tr>
<tr>
<td>25.1 to 50</td>
<td>1</td>
<td>Medium</td>
<td>136 mcg</td>
<td>114 mg</td>
<td>114 mg</td>
</tr>
<tr>
<td>50.1 to 100</td>
<td>1</td>
<td>Large</td>
<td>272 mcg</td>
<td>228 mg</td>
<td>228 mg</td>
</tr>
</tbody>
</table>

IVERHART MAX Soft Chew is recommended for dogs 8 weeks of age or older. For dogs over 100 lbs, use the appropriate combination of these soft chews.

Remove only one dose at a time from the packaging. Return the remaining soft chews to their box to protect from light. The soft chews can be offered to the dog by hand or added, intact, to a small amount of dog food. Care should be taken to ensure that the dog consumes the complete dose. The treated dog should be observed for a few minutes after administration to confirm that none of the dose has been lost or rejected. It is suspected that any of the dose has been lost, redosing is recommended.

IVERHART MAX Soft Chew should be given at monthly intervals during the period of the year when mosquitoes (vectors), potentially carrying infective heartworm larvae, are active. The initial dose must be given within a month (30 days) after the dog’s first exposure to mosquitoes. The final dose must be given within a month (30 days) after the dog’s last exposure to mosquitoes.

When replacing another heartworm preventative product in a heartworm disease prevention program, the first dose of IVERHART MAX Soft Chew must be given within a month (30 days) of the last dose of the former medication. A heartworm test should be performed prior to switching heartworm preventative products.

If the interval between doses exceeds a month (30 days), the effectiveness of ivermectin can be reduced. Therefore, for optimal performance, the soft chew must be given once a month or on about the same day of the month. If treatment is delayed, whether by a few days or many, immediate treatment with IVERHART MAX Soft Chew and the recommended dosing regimen will minimize the opportunity for development of adult heartworms.

Warnings: For use in dogs only. Keep this and all drugs out of reach of children and pets. In safety studies with ivermectin/pyrantel pamoate/praziquantel tablets, testicular hypoplasia was observed in some dogs receiving 3 and 5 times the maximum recommended dose monthly for 6 months (see Animal Safety).

In case of ingestion by humans, clients should be advised to contact a physician immediately. Physicians may contact a Poison Control Center for advice concerning cases of ingestion by humans.

Precautions: Use with caution in sick, debilitated, or underweight animals and dogs weighing less than 10 lbs (see Animal Safety). The safe use of this drug has not been evaluated in pregnant or lactating bitches.

All dogs should be tested for existing heartworm infection before starting treatment with IVERHART MAX Soft Chew, which is not effective against adult Dirofilaria immitis. Infected dogs should be treated to remove adult heartworms and microfilariae before initiating a heartworm prevention program.

While some microfilariae may be killed by the ivermectin in IVERHART MAX Soft Chew at the recommended dose level, IVERHART MAX Soft Chew is not effective for microfilariae clearance. A mild hypersensitivity-type reaction, presumably due to dead or dying microfilariae and particularly involving a transient diarrhea, has been observed in clinical trials with ivermectin alone after treatment of some dogs that have circulating microfilariae.

Adverse Reactions: In a field study with IVERHART MAX Soft Chew, self-limiting adverse reactions, including vomiting, diarrhea, lethargy, difficulty swallowing, excessive salivation, increased water consumption, and coughing were reported. Self-limiting adverse reactions, including lethargy, limpness, salivation, shaking, diarrhea, decreased appetite, licking lips, and belching were reported between 20 minutes and 72 hours following treatment in a field study with ivermectin/pyrantel pamoate/praziquantel tablets.

In field studies with ivermectin/pyrantel pamoate tablets, vomiting or diarrhea within 24 hours of dosing was rarely observed (1.1% of administered doses). The following adverse reactions have been reported in dogs following the use of ivermectin products: depression/lethargy, vomiting, anorexia, diarrhea, mydriasis, ataxia, staggering, convulsions, and hypersalivation.

Precautions: To report suspected adverse events, for technical assistance, or to obtain a copy of the Safety Data Sheet (SDS), contact Virbac AH, Inc. at 1-800-338-3659 or visit virbac.com. For additional information about adverse drug experience reporting for animal drugs, contact the FDA at 1-888-FDA-VETS or online at http://www.fda.gov/AnimalVets/SafetyHealth.

Effectiveness: Prevention of the tissue larval stage of heartworm (Dirofilaria immitis) and the elimination of the adult stage of hookworm (Ancylostoma caninum, Uncinaria stenocephala, Ancylostoma braziliense), roundworms (Toxocara canis, Toxascaris leonina), and tapeworms (Dipylidium caninum, Taenia pisiformis) infections in dogs was demonstrated in well-controlled laboratory studies.

Palatability: In a field study of 132 dogs, IVERHART MAX Soft Chew was offered once monthly for 3 months. The dogs voluntarily consumed 86.3% of the doses from the owner’s hand or from a bowl within 5 minutes, 13.0% accepted the dose when it was offered in food or administered by placing onto the back of the dog’s tongue (gelling), and 0.7% of the doses were unable to be administered.

Animal Safety: Studies with ivermectin indicate that certain dogs of the Collie breed are more sensitive to the effects of ivermectin administered at elevated dose levels (more than 16 times the target dose level of 6 mcg/kg) than dogs of other breeds. At elevated doses, sensitive dogs showed more adverse reactions, which included mydriasis, depression, ataxia, tremors, drooling, paresis, recumbency, excitability, stupor, coma, and death. No signs of toxicity were seen at 10 times the recommended dose (27.2 mcg/lb) in sensitive Collies. Data from these studies support the safety of ivermectin products in dogs, including Collies, when used at the labeled recommended dose.

Because ivermectin and praziquantel are approximately 30% more bioavailable in the IVERHART MAX Soft Chew than in the ivermectin/pyrantel pamoate/praziquantel tablets used in the following target animal safety studies, the margin of safety is narrower than reported in these studies. The potential for adverse reactions may be greater in individual dogs administered IVERHART MAX Soft Chew than ivermectin/pyrantel pamoate/praziquantel tablets.

In a target animal safety study using ivermectin/pyrantel pamoate/praziquantel tablets, doses were administered to 8-week-old Beagle puppies at one, three, and five times the maximum recommended dose of 12.5 mcg/kg ivermectin, 10.47 mcg/kg pyrantel, and 10.47 mcg/kg praziquantel. The dogs were treated every 30 days for 6 months. Vomiting within 6 hours of dosing and soft or watery feces within 24 hours of dosing were observed. Other observations during the study were: ano-genital swelling, lethargy, head movements, shallow, audible or difficult breathing, and salivation. One dog in the 5X group had tremors and decreased activity. All of these signs were transient. No treatment was required.

In a laboratory safety study using ivermectin/pyrantel pamoate/praziquantel tablets, 12-week-old Beagle puppies receiving 3 and 5 times the recommended dose once weekly for 13 weeks demonstrated a dose-related decrease in testicular maturation compared to controls. In this study, all treated puppies had significantly higher cholesterol levels compared to untreated controls.

In a reproductive safety study, adult males were treated at 37.5 mcg/kg ivermectin, 31.4 mg/kg pyrantel, and 31.4 mg/kg praziquantel every 14 days during two full spermatogenic cycles (112 days). The quality of semen and reproductive health were not affected by treatment. Treatment-related vomiting and soft feces were reported during this study.

In a study of the effectiveness of ivermectin/pyrantel pamoate/praziquantel tablets for the treatment of Toxocara canis, one 8.1 lb, 72-day-old puppy died 6 days after administration of the label dose. This puppy and many other puppies in the study had high worm burdens and were reported to have diarrhea, sometimes bloody, frequently before and after treatment. Dehydration and signs of anemia (pale mucous membranes) were the only abnormal gross necropsy finding observed. No definitive cause was determined. In a 90-day field study using ivermectin/pyrantel pamoate/praziquantel tablets, the most serious adverse reactions (lethargy, limpness, and salivation) were seen in dogs weighing less than 10 lbs (see Precautions).

Storage Information: Store at 20°C to 25°C (68°F to 77°F), excursions permitted between 15°C and 30°C (59°F to 86°F).

How Supplied: IVERHART MAX Soft Chew is available in four dosage strengths (see Dosage and Administration) for dogs of different weights. Each strength comes in a package of 6 soft chews.

NADA 141-441, Approved by FDA.

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Conjunctival Microflora in Relation to Conjunctivitis in Guinea Pigs

Tracey K. Ritzman, DVM, DABVP (Avian), DABVP (Exotic Companion Mammal)
Cascade Hospital for Animals
Grand Rapids, Michigan

In the Literature

FROM THE PAGE …

Anecdotal information suggests that guinea pigs have a high prevalence of ocular issues. Guinea pigs have prominent eyes, with eyelids open at birth, relatively small third eyelids, and low tear production, which can all predispose them to conditions that affect conjunctival and corneal health.

In this study, 9 clinically normal guinea pigs and 11 guinea pigs that had clinical conjunctivitis were examined and tested to evaluate their conjunctival microflora. Conjunctival swabs were obtained from both eyes of each guinea pig for bacterial culture and susceptibility testing. Culture results revealed bacterial growth in 77% of the clinically normal guinea pig eyes and in 72% of guinea pig eyes with clinical evidence of conjunctivitis.

In the clinically normal guinea pigs, the most common bacterial isolates were *Staphyloccoccus* spp, *Bacillus* spp, and *Streptococcus* spp, all of which have been reported as part of the normal microflora of guinea pig conjunctiva. Bacteria isolated from guinea pigs with signs of conjunctivitis consisted primarily of *Staphyloccoccus* spp, *Moraxella* spp, *Clostridium* spp, *Listeria* spp, and *Streptococcus* spp. Most of the isolated bacteria were sensitive to common antibiotics used in guinea pigs (eg, enrofloxacin, doxycycline, vancomycin). No significant difference between groups was found in the number of isolated *Staphyloccoccus* spp and *Streptococcus* spp. One limitation of this study was the use of a general bacterial susceptibility panel; use of an ophthalmologic susceptibility panel would have been preferable.

... TO YOUR PATIENTS
Key pearls to put into practice:

1. A sterile microswab sample of the cornea and mucosal surface of the lower conjunctival fornix for culture and susceptibility testing is sufficient for determining the bacterial flora of a guinea pig with conjunctivitis.

2. When bacterial culture and susceptibility testing is requested for a guinea pig, the clinician should request an ophthalmologic susceptibility panel from the laboratory rather than a general antimicrobial susceptibility panel.

3. Bacterial growth from a conjunctival swab in a guinea pig does not automatically equate to a diagnosis of bacterial conjunctivitis. Healthy guinea pigs without clinical signs of conjunctivitis also have the potential for positive bacterial cultures.

4. Although pathogenic bacterial infection is a common cause of conjunctivitis in guinea pigs, infectious agents are not the only cause; vitamin C deficiency can also result in conjunctivitis in these patients. The clinician should consider all potential etiologies when diagnosing a patient.
Heartworm infection is on the rise and many dogs are going unprotected.

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Important Safety Information

**SENTINEL® SPECTRUM® Chews** (milbemycin oxime/lufenuron/praziquantel) are well tolerated. All dogs should be tested for heartworm disease before starting a preventive protocol. Mild hypersensitivity reactions have been noted in some dogs carrying a high number of circulating microfilariae. For complete prescribing information, contact Virbac at 1-800-338-3659, or us.virbac.com.

Important Safety Information

**IVERHART MAX® Soft Chew** (ivermectin/pyrantel pamoate/praziquantel) is well tolerated. All dogs should be tested for heartworm disease before starting a preventive protocol. Following the use of IVERHART MAX, gastrointestinal and neurological side effects have been reported. For complete prescribing information, contact Virbac at 1-800-338-3659, or us.virbac.com.

For complete product information, please see pages 46 and 47.

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Tracking Body Weight in Cats

Elizabeth A. Berliner, DVM, DABVP (Shelter Medicine Practice & Canine and Feline Practice)
Cornell University

In the Literature

FROM THE PAGE …

Feline obesity is of growing concern and mirrors similar trends in humans and other pet species.1,2 A 2006 US study reported 35.1% of cats older than 1 year to be overweight or obese, with obesity occurring most frequently between the ages of 5 and 11 years.3 Obesity in cats has been identified as a risk factor for arthritis, urinary tract disease, skin disease, diabetes mellitus, neoplasia, and hepatic lipidosis.3-5

This retrospective study* analyzed a dataset of 19,015,888 adult cat records from clinics in the United States and Canada between 1981 and 2016 and represented 52,945,410 recorded body weight (BW) measurements. The objective of the study was to characterize BW changes over a pet’s lifespan and investigate associations between BW and breed, sex, and spay/neuter status.

When data from 1995 were compared with data from 2005, peak BW occurred between 6 and 10 years of age in neutered Siamese, Persian, Himalayan, and Maine Coon cats, then declined. When data for short-, medium-, and longhair domestic cats were evaluated, small but significant increases in mean BW were noted in spayed and neutered cats as compared with intact cats. Confounding factors (eg, diet, lifestyle, health status) were not considered in the analysis but could play a role in BW alteration over time. In addition, because this study focused on BW measurements and not body fat or BCS, conclusions could not be made regarding the prevalence of obesity in this population. Of note, 52% of cats had their BW measured only once, which suggests that BW was not routinely recorded at visits or that regular visits were not occurring. The high number of missing BW measurements suggests that this important component of feline health monitoring is routinely being missed in the clinic.

*This study was supported by the IDEXX Chair in Emerging Technologies and Bond-Centered Animal Care.
... TO YOUR PATIENTS

Key pearls to put into practice:

1. Monitoring BW is an important component of feline healthcare. Tracking changes in BW over time can help guide clinicians and owners in risk assessment for disease and in developing personalized care plans for cats.

2. BW is an objective measurement that can be useful in tracking the health status of an individual cat. As compared with BW, BCS is more closely correlated with representing body fat but requires staff to be trained on how to obtain BCS measurements to be reliable.\(^6,7\)

3. Communicating with owners about their cat’s BW is an important but sometimes difficult aspect of an annual examination. A positive attitude and patient-directed speech (ie, directly addressing the cat in an empathetic and amusing manner) have been demonstrated to aid in successful clinician–owner interactions regarding weight gain in cats.\(^8\)

References


Research Note:

Needle Gauge Influence on Hemostasis Measures in Cats

Diagnostic measures of hemostasis include platelet count, prothrombin time (PT), activated partial thromboplastin time (aPTT), fibrinogen, and fibrinogen degradation products. During venipuncture in humans, the shear force exerted by a needle smaller in diameter has been shown to affect platelet count but not PT or aPTT. As compared with human platelets, feline platelets have greater aggregability in response to shear stress. This prospective, observational, randomized clinical study evaluated whether needle size (22-g vs 25-g) affected routine coagulation variables in cats. Blood was sampled from the left and right jugular veins of 20 healthy, client-owned cats. Results showed no difference between the needle sizes in aPTT, platelet count, fibrinogen degradation products, or fibrinogen. PT was significantly higher when blood was drawn with the smaller diameter needle, but the degree of elevation was considered to have little clinical impact. The authors concluded that jugular venipuncture with either a 22-g or 25-g needle did not introduce any clinically meaningful difference in routine coagulation variables or platelet counts in cats.

Source

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Our smart cabinet for controlled substances

1: Protecting your people

First and foremost, uncontrolled inventory poses a risk to your staff. I never thought about it much growing up, but the reality is that my Dad was always an arm’s reach from a locker full of narcotics, some of which are deadly by design. And when I say ‘locker’ it’s a little bit of a misnomer. Like most practices, there were certainly times when that lockbox wasn’t locked.

These days, the risk to staff from controlled substances is much more real. Levels of addiction in America have never been higher, as over 130 people die every single day from opioid related drug overdoses.1 Some of these deaths occur within the veterinary community, as ready access to these drugs is sometimes a gateway to addiction, or the inverse: addiction becomes the reason to seek employment at an animal hospital. According to a recent survey, 12% of veterinarians are aware of opioid abuse or diversion by a staff member, so this isn’t something that leaders of practices are in the dark about.2

Tragically, veterinarians are also 2-4 times as likely as the general population to take their own life.3 The causes for this trend are complicated, but ready access to narcotics provides a means for those who find themselves in a bad place.

Automated dispensing does not solve the opioid & suicide epidemics any more than seat belts solve car accidents. Neither is a 100% solution, but at the same time, not using them is needlessly dangerous. Smart cabinets significantly reduce staff risk in three important ways:

- Each drug gets its own double-locked container
- Fingerprint access - no keys
- The option to require a second person's fingerprint to access schedule II drugs

We see CUBEX smart cabinets as mandatory elements of a practice-wide effort to improve staff safety.

2. Protecting Your Practice

Veterinarians are generally shielded from legal consequences of professional wrongdoing because, as heartless as it sounds, pets are considered property, and liability for harming a pet is usually the value of the property – a few thousand dollars at most. Employees, however, are people, and that’s a whole other ballgame.

In the event of an incident of employee self-harm (overdose or suicide), it’s possible that the little plastic tacklebox or open lockbox that is so commonly used to store loaded syringes ahead of surgeries could be characterized as gross negligence or willful, reckless conduct. If the informal standard operating procedure of the practice (‘this is how we do things here’) provided a reliable, open-access source of narcotics, a wrongful death suit brought by the family of the deceased could potentially carry damages into the millions of dollars.

With all of that added attention comes an increased risk of involvement from the DEA or state regulatory authorities. Federal fines start at over $14,000 per infraction, and there’s almost never just one. More dangerous, however, is the risk to the registrant’s DEA and medical license. As seen in a recent case in Colorado, a veterinarian can be forced to surrender their means to earn a living as part of a settlement to resolve the mishandling of controlled substances.4

At our practice, smart drug cabinets show us exactly who had access to which controlled substances and when. There are no keys to be stolen or shared, since it’s a biometric, fingerprint-driven system, and records are kept automatically. When combined with other elements of a narcotics safety program, like cameras, regular background checks, drug testing, and most importantly, a formalized standard operating procedure, proper use of smart drug cabinets can help to protect your practice and your medical license from accusations of negligence and reckless
TREND OF THE 2020s

conduct, potentially shielding you from a career-altering lawsuit.

3. Protecting Your Profit

When I take the legal hat off and put the business management hat on, I look at the top and bottom line of the P&L. Inventory controlled by smart cabinets helps in both places.

Top line – missed revenue, missed profit.

Think of how easy it is in your practice for the staff to grab medications when asked, then forget to put those charges on the client invoice. It happens daily! Your staff is focused on patient care first, and sometimes things just get busy.

• AAHA found that 17% of charges are missed when tracked manually
• Industry consultant Mark Opperman looked at 300 practices and saw over $64,000 in missed revenue per doctor, per year, $7,000 per year ($23 per day) from just injectables alone.5

Service codes are often recommended as a remedy for missed medication charges and we certainly make use of this approach at Pathway, but it still doesn’t create a physical control on the inventory. A smart cabinet that’s integrated with your practice management system will automatically bill the client whenever a medication or other item is dispensed, and closing that loophole has massive implications for your P&L and your balance sheet.

Bottom line – too much cost, at the expense of profit.

When you’re tracking inventory manually, you never really know how much you have, and as a result you carry more than necessary so you don’t run out. Prior to automating our inventory in 2010, we had back stock all over the place. It occupied space that we now use to generate revenue: exams, lab diagnostics and imaging. Inventory automation with smart cabinets allowed us to dramatically reduce the amount of inventory we carry thanks to the fully automated, high-density storage of our CUBEX system. The difference between what that space earned us as storage (essentially nothing) and what it earns us now is tens of thousands of dollars a year.

Smart cabinets are also very effective at reducing waste and overuse. When there’s a big pile of supplies sitting in the open, human nature is to grab more than we need. Putting those items behind a door, with a recorded quantity, makes everyone more conscious of waste, with the added bonus of preventing pilferage. All of this reduces COGS (cost of goods sold).

COGS is an often quoted but frequently misunderstood part of the P&L. When the time for transition finally comes, your EBITDA (Earnings Before Interest, Taxes, Depreciation and Amortization) will be center stage because your practice’s sale price will largely be determined by your EBITDA multiplied by a number (your ‘multiple’). That multiple recently has generally been between five and ten.

If revenue remains constant, COGS and EBITDA become inversely correlated. Every dollar of COGS reduction usually goes right onto your EBITDA, meaning that $10,000 in reduced annual COGS translates into $50,000-$150,000 in your pocket when the practice is sold. Having just gone through this process, I can say the reduced COGS from CUBEX had a very positive impact on our transition from a financial perspective.

The last word

Smart inventory cabinets will be one of the biggest trends of the 2020s in veterinary hospital management. They’ve been standard of care in human health for decades, and are finally making serious inroads into our industry thanks to improving technology, falling prices, and increased attention from manufacturers. If you’ve considered these in years past but put them on the wish list or the back burner, it may be time to re-consider; it’s a whole new decade and automated inventory is more important and affordable than ever.

About the author

My father, Dr. Mark Magazu, founded Saint Francis Veterinary Center back in 1986, so I was raised in a veterinary practice. We’ve come a long way from that first tiny clinic, ultimately becoming the only three-time Finalist for AAHA Accredited Practice of the Year for North America, winning first place in 2019.

When I was considering careers, I went my own way and studied economics, public policy, management and the law rather than veterinary medicine – and still I found my way back to the family business.

Our recent ownership transition to Pathway Vet Alliance has furthered this continued pursuit of innovation designed to increase efficiency and profitability, giving me a unique perspective on how technologies like Cubex are shaping our industry in the wake of increased consolidation and other market trends.
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Contact your veterinarian immediately if the dog ingests more tablets than prescribed in a 24 hour period. Do not give PROIN Chewable Tablets or PROIN ER™ tablets.

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The safe use of PROIN and PROIN ER in dogs used for breeding purposes, during pregnancy or in lactating bitches, has not been evaluated. Contact your veterinarian if you notice unusual behavior, loss of appetite, the incontinence is worsened or becomes, or any other unusual signs. See prescribing information for complete list of warnings, precautions or visit www.pmppharmacal.com.

PROINER-0219-36
Preventing Parasitism in Breeding Kennels

Audrey Ruple, DVM, MS, PhD, DACVPM, MRCVS
Purdue University

In the Literature

The 2 major risk factors associated with parasitism were the dominant surface the dogs were housed on and the age of the dog.

Dog kennels can present challenges to parasite-control programs due in part to dogs of all life stages being housed in close proximity. For instance, reactivation of some parasitic infections (eg, *Toxocara canis, Ancylostoma caninum*) can occur during whelping, and puppies can be a source of infection for uninfected dogs in the same location. Although detrimental to any dog, parasitic infection can be particularly problematic for athletic dogs, as acute infection with some species can lead to anemia, and chronic infection can result in growth retardation and failure to thrive.
This study evaluated the impact of parasitism on greyhounds in Australian breeding kennels. Previous studies have reported parasite prevalence in greyhound kennels in other countries to be ≈40% to 46%.1,7 Parasite prevalence has also been determined in other dog populations in Australia, including other breeds in breeding kennels, in which the parasite prevalence was estimated to be ≈33%.8 However, no information about parasite prevalence or risk factors for infection had yet been determined for greyhounds in breeding kennels in Australia.

In this study, fecal samples were collected from 721 greyhounds in breeding kennels across 5 Australian states, and questionnaires were supplied to each dog owner/trainer. Two parasitic tests were applied to each fecal sample (ie, wet malachite-stained smear, zinc sulphate centrifugation flotation), and ova/cysts were identified at the level of genus and/or species when possible. A subset of samples positive for *A caninum*, *Giardia* spp, *Taenia* spp, and/or *Neospora/Hammondia* spp underwent molecular characterization to determine which species were present. Risk factor analysis was performed using modeling techniques that accounted for the effects of individual kennels.

Total parasite prevalence was determined to be 60.3%, which is higher than what has been reported in greyhounds in breeding kennels in other countries. The parasite genera reported most frequently were *Sarcocystis*, hookworm (ie, *Ancylostoma, Uncinaria stenocephala*), *Giardia*, and *Toxocara*. The 2 major risk factors associated with parasitism were the dominant surface the dogs were housed on and the age of the dog; geographic region was also a risk factor. Dogs housed on concrete had a lower proportion of parasitism than did dogs housed on grass or sand, and adult dogs had a lower prevalence of parasitism than did juvenile dogs. The geographic region in which the kennel was located influenced the prevalence of the different parasite genera.

Key pearls to put into practice:

1. Kennel flooring in breeding facilities may impact overall parasite prevalence; thus, choosing surfaces that can be more easily cleaned and disinfected may help decrease parasite load.

2. Restricting access of juvenile dogs to adult housing areas may help prevent the spread of parasites in the kennel environment.

3. Recognizing which parasite species are prevalent in the geographic region in which the kennel is located may help inform best practices when designing a parasite-control program.

References

6. Traversa D. Are we paying too much attention to cardiopulmonary nematodes and neglecting old-fashioned worms like *Trichuris vulpis*? Parasit Vectors. 2011;4:32.
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Research Note:
**Long-Term Outcome in Hoarded Cats**

Animal hoarders pathologically accumulate more animals than they can properly care for. This study compared long-term outcomes for 371 cats that were surrendered to a high-quality private shelter from 14 hoarding environments. Various illnesses related to overcrowding, including upper respiratory infection, skin disease (e.g., inflammation, alopecia, wounds), fleas, ear mites, and gingivitis, were common. Upper respiratory infection was significantly more prevalent in cats from institutional hoarding environments (i.e., organizations advertising themselves as rescues or shelters). In 11 of the 14 hoarded groups, ≥90% of the cats were eventually adopted. The authors attributed this high success rate to manageable group sizes and managed intake, generous funding, and collaboration with community members.

**Source**

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Research Note:
**Pregabalin in the Treatment of Neuropathic Pain**

This double-masked, randomized, crossover, placebo-controlled clinical trial evaluated the use of pregabalin in 8 dogs that had neuropathic pain associated with Chiari-like malformations and syringomyelia. Each dog underwent a placebo and a pregabalin treatment phase. Using a numerical scale, owners reported improved daily pain scores when dogs were treated with pregabalin. Pregabalin also significantly improved quantitative sensory testing, including mechanical hyperalgesia, cold hyperalgesia at 32°F (0°C), and cold allodynia at 59°F (15°C). In addition to its efficacy, pregabalin was well tolerated and noncumulative and had few adverse effects other than mild sedation.

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Episodic Shaking & Facial Twitching in a Terrier

Mark T. Troxel, DVM, DACVIM (Neurology)
Massachusetts Veterinary Referral Hospital
Woburn, Massachusetts

Max, a 2-year-old, 17.2-lb (7.8-kg), neutered male cairn terrier, was presented to an emergency clinic for neurologic evaluation following a recent onset of episodic shaking and facial twitching.

Initial Presentation
The owner reported that Max was twitching and convulsing while lying awake in his bed the day before presentation. He was shaky the rest of the day and tentative in gait, and he had a similar but more severe episode of shaking the same night ≈2 to 3 minutes in duration. There was no reported salivation, vocalization, or elimination during the episode. Max had no known history of head trauma, toxin exposure, or travel and was up to date on vaccinations. Lead exposure was considered unlikely.

Max was evaluated ≈4 hours after the second episode by an emergency clinician, who suspected that Max was experiencing seizures. Physical and neurologic examinations were normal. CBC, serum chemistry profile, and urinalysis were unremarkable. Bile acid testing revealed normal preprandial bile acids (3.27 µg/mL; range, 0-4.9 µg/mL) and mildly elevated postprandial bile acids (15.89 µg/mL; range, 0-10.21 µg/mL), which were attributed to possible microvascular dysplasia, but other disorders (eg, portosystemic shunt) could not be excluded.

Max was prescribed phenobarbital (2 mg/kg PO every 12 hours) as a maintenance anticonvulsant and 2 doses of rectal diazepam (1 mg/kg per dose) for emergency seizure control and was discharged and referred to a neurologist. He was presented to the neurology service 2 days later with generalized tremors that had not responded to diazepam.
**Neurologic Examination**

On presentation to the neurology service, Max was alert and responsive. Neurologic examination revealed whole-body, small-amplitude, high-frequency tremors that were most apparent when Max was moving or being examined (see Video). The tremors were substantially reduced when Max was sitting or lying down and stopped when he was completely at rest or asleep. The tremors resumed when he awoke and/or became active. Gait analysis revealed dysmetria (ie, hypermetric thoracic limbs) and vestibular ataxia (eg, veering, drifting, occasional stumbling). No resting nystagmus was observed, but opsoclonus (ie, pendular nystagmus with no fast phase) was observed when he was placed on his back.

Postural reactions, patellar reflexes, and withdrawal reflexes were normal.

Clinical signs were localized to the cerebellum, and vestibular signs were thought to be due to involvement of vestibular components of the cerebellum (ie, flocculonodular lobe, fastigial nucleus, caudal cerebellar peduncle). The initial convulsions reported by the owner may have been a milder version of the tremors the dog later displayed.

**Diagnosis**

The primary differential diagnoses were steroid-responsive tremor syndrome (SRTS) and toxicosis (eg, mycotoxicosis). Other differential diagnoses included encephalitis, brain malformation, and neurodegenerative disorders (see Related Article). Toxicity was considered less likely, as there was no known exposure to mold in the house and the patient was confined to a fenced-in yard when outside.

Routine MRI of the brain was within normal limits. CSF analysis showed normal protein content (15.7 mg/dL; range, <25 mg/dL) and a mildly elevated nucleated cell count (6 cells/µL; range, <3-5 cells/µL). Cytologic examination of a concentrated CSF sample revealed mononuclear pleocytosis composed of mostly small, mature lymphocytes (66%), with fewer reactive macrophages (26%) and non-degenerate neutrophils (8%). CSF bacterial culture was negative. Serologic testing for *Borrelia burgdorferi*, *Anaplasma phagocytophilum*, *Ehrlichia canis*, and *Rickettsia rickettsii* was negative. PCR testing of CSF for *Anaplasma* spp, *Bartonella* spp, *Blastomyces dermatitidis*, *B burgdorferi*, canine distemper virus, *Coccidiodes* spp, *Cryptococcus* spp, *Ehrlichia* spp, *Histoplasma capsulatum*, *Neospora caninum*, *R rickettsii*, *Toxoplasma gondii*, and West Nile virus was also negative.

Based on the lack of toxin exposure combined with the results of diagnostic testing, SRTS was strongly suspected.
TREATMENT AT A GLANCE

Corticosteroids (eg, prednisone [1-2 mg/kg PO every 12 hours for 2 weeks, followed by gradual tapering to the lowest effective dose]) are most commonly prescribed. Many patients can be weaned off steroids in 6 to 8 months. Recurrence/relapse is more likely if tapering occurs too quickly.

Some patients may benefit from 1 week of benzodiazepine treatment (eg, diazepam [0.5 mg/kg PO every 12 hours]) for mild sedation and skeletal muscle relaxation.

Other immunosuppressants (eg, azathioprine, cyclosporine) may be needed if prednisone is contraindicated or severe adverse effects are observed.

The most common causes of acquired, small-amplitude, high-frequency, action-related tremors are SRTS and toxicity, particularly mycotoxicosis.1

Steroid-Responsive Tremor Syndrome
SRTS is reported most commonly in small-breed dogs typically younger than 5 years.1-3 SRTS was originally described—and appeared to be more common in—small white dogs (eg, bichon frises, Maltese terriers, West Highland white terriers), leading to the term little white shaker syndrome.2,5,6 This term is no longer recommended, as more than half of affected dogs are not white and any breed can be affected.1,7,8 Other terms for this condition include shaker dog syndrome, corticosteroid-responsive tremors, and acquired action-related repetitive myoclonus.2

Although its cause is unknown, SRTS is suspected to be an autoimmune disorder due to its response to corticosteroid administration. Gross histologic examination of brain tissue is often normal,5 but histologic findings in some dogs have shown mild, diffuse meningoencephalitis characterized by mild perivascular cuffing with lymphocytic infiltrates.2

Common Causes of Tremors
Tremors are involuntary, somewhat rhythmic, oscillating muscle contractions and relaxations of ≥1 body part.1-3 Tremors are common but incompletely characterized in veterinary medicine.

The terminology used to define tremor syndromes is under debate, and classification schemes are continually evolving. Veterinary classification schemes typically divide tremors into the following broad categories: physiologic or pathologic, congenital or acquired, and resting or action related.2,4 Tremor syndromes can fall into multiple categories; for example, tremors caused by hypomyelination/dysmyelination in young springer spaniels, Samoyeds, chow chows, and other breeds are both congenital and action related.2

DIAGNOSIS:
PRESUMPTIVE STEROID-RESPONSIVE TREMOR SYNDROME

Treatment & Outcome
Max received immunosuppressive doses of prednisone (7.5 mg [1 mg/kg] PO every 12 hours) and diazepam (0.5 mg/kg PO every 12 hours for 1 week; see Treatment at a Glance).

At the 2-week follow-up visit, Max’s owner reported that the tremors had stopped within 2 to 3 days of discharge and gait had returned to normal during the first week of treatment. Neurologic examination was within normal limits. The prednisone dose was reduced to 5 mg PO every 12 hours for 1 month, then to 5 mg PO every 24 hours for 2 months, and finally to 5 mg PO every 48 hours for 2 months.

Max was presented for a recheck examination 6 months after the 2-week follow-up. The owner had discontinued prednisone 2 weeks prior. Because there was no sign of relapse during the treatment period or after the owner discontinued treatment, prednisone was not restarted. Max was still normal ≈3 months after the 6-month recheck.
Most patients with SRTS are presented for evaluation of tremors and incoordination. Owners may misconstrue the tremors as fear, anxiety, or shivering. As seen in Max, patients with SRTS exhibit small-amplitude, high-frequency, whole-body tremors when moving1-3,9; these tremors typically resolve when resting or asleep. Affected dogs also frequently display signs of ocular tremors (ie, opsomclusion), cerebellar or vestibular ataxia, head tilt, absent menace, weakness, and, potentially, seizures.2,3 Clinical signs of SRTS are indistinguishable from those of tremors due to mycotoxicosis.2,3

A presumptive diagnosis of SRTS can be made based on signalment, clinical signs, neurologic examination findings, and exclusion of other potential causes. MRI results are usually normal in SRTS patients, but evidence of mild meningoencephalitis may be apparent.1,7,9 CSF in SRTS patients typically contains normal to mildly elevated protein content and has a nucleated WBC count.1,5,7-9 CSF differential cytology most often reveals lymphocytic pleocytosis.

SRTS is generally responsive to corticosteroids. Immunosuppressive doses of corticosteroids (eg, prednisone [1-2 mg/kg PO every 12 hours for 2 weeks]) often resolve tremors within a few days.1,5-9 Once the tremors resolve, the dose should be slowly tapered to the lowest effective dose over several months as for other autoimmune disorders. Anecdotally, clinical signs are more likely to recur if treatment is tapered and discontinued before 6 months. Some patients may need to remain on low-dose treatment (eg, prednisone [0.25-0.5 mg/kg PO every 48 hours]) long-term to prevent recurrence. In rare cases, other immunosuppressive medications may be required, typically to reduce the adverse effects of corticosteroids. Affected dogs may also benefit from a short course of diazepam (0.5 mg/kg PO every 8 hours for 1 week).1,5,9 Prognosis is excellent if disease is treated early and aggressively. Many patients can be successfully weaned off corticosteroids entirely.

**Toxicosis**

Toxicosis is the second most common cause of small-amplitude, high-frequency tremors in dogs. Although many toxins have been reported to cause tremors in dogs, mycotoxins are the most commonly reported toxic cause of generalized tremors (see **Related Article**, page 64).10-15 Mycotoxins are produced by *Penicillium* spp, *Aspergillus* spp, and *Claviceps* spp.10 The most commonly implicated mycotoxins, penitrem A and roquefortine, are produced by *P crustosum* and *P roqueforti*, respectively, although *P crustosum* can produce both toxins concurrently.10 Common sources of mycotoxins include garbage, compost, contaminated feed/grain, and moldy foods, particularly dairy products, bread, and nuts.10-15

Clinical signs include generalized tremors, seizures, and muscle tremors.10-15 As with SRTS, tremors caused by mycotoxins tend to be of low amplitude and high frequency (ie, small, fast tremors) and occur when the patient is moving but tend to resolve at rest.10-15 Diagnosis is typically based on compatible clinical signs and exposure risk. Measurement of penitrem A or roquefortine in biologic samples (eg, GI contents) can be performed to confirm diagnosis, but testing is generally not necessary, as tremors tend to resolve within a few days.10-15 Treatment is largely sup-
portive with GI decontamination, IV fluids, oxygen and ventilatory support, methocarbamol, and, if indicated, anticonvulsants.\textsuperscript{12-15} Prognosis for full recovery is excellent, particularly when treated early and aggressively. Clinical signs often resolve within 1 to 4 days of treatment, although long-term signs (eg, lasting 2-3 months) have been reported.\textsuperscript{12-15}

**Conclusion**

Generalized tremors are a relatively common neurologic disorder. Affected patients may have severe clinical signs. Fortunately, the most common causes in dogs, SRTS and mycotoxicosis, have a very good prognosis if treated early and effectively.

**References**

45TH WORLD SMALL ANIMAL VETERINARY ASSOCIATION CONGRESS AND 26TH FECAVA EUROCONGRESS

23–26 September, 2020
Warsaw, Poland

Super Early Bird Deadline: 26 February 2020
Tremors

Mark T. Troxel, DVM, DACVIM (Neurology)
Massachusetts Veterinary Referral Hospital
Woburn, Massachusetts

Following are differential diagnoses* for dogs presented with tremors (ie, repetitive myoclonus).

- Primary neurologic disease
  - Steroid-responsive tremor syndrome (ie, little white shaker syndrome)
  - Cerebellar disorders
    - Congenital action-related tremors (eg, hypomyelination/dysmyelination)
    - Cerebellitis (infectious, immune-mediated)
    - Neoplasia
  - Idiopathic episodic tremors (eg, idiopathic head tremors, benign postural tremors [geriatric dogs])
- Toxic exposure
  - Tremorgenic mycotoxins (penitrem A and roquefortine)
  - Metronidazole intoxication (more commonly causes central vestibular dysfunction rather than tremors)
  - Other less common toxins
    - Amphetamines/pseudoephedrine
    - Bromethalin
    - Carbamates
    - Cocaine
    - Ethylene glycol
    - Heavy metals (eg, lead, aluminum)
    - Ivermectin
    - Macadamia nuts
    - Marijuana
    - Methylxanthines (eg, caffeine, theobromine, theophylline)
    - Organophosphates
    - Paintballs
    - Strychnine
- Endocrine/metabolic disease
  - Hepatic encephalopathy
  - Hypocalcemia/eclampsia
  - Hypoglycemia
- Infectious disease
  - Canine distemper virus
  - Rabies
- Iatrogenic disease
  - Blood transfusion reactions
- For More
  - Basophilia
  - Decreased Total Thyroxine
  - Eosinophilia
  - Epistaxis
  - Hyperkalemia
  - Hyperphosphatemia
  - Hypoaalbuminemia
  - Hypocholesterolemia
  - Hypoglycemia
  - Hypokalemia
  - Increased & Decreased Blood Urea Nitrogen
  - Increased & Decreased Creatinine
  - Increased Total Thyroxine
  - Neutropenia
  - Panting
  - Regurgitation

References

*These differential diagnoses are listed in no particular order, as there is no published literature to accurately describe frequency/incidence to the author’s knowledge.
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Brief Summary: Before using SEMINTRA, please consult the product insert, a summary of which follows:

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

Description: SEMINTRA (telmisartan oral solution) is a clear, colorless to yellowish viscous solution containing 10 mg/mL telmisartan.

Indication and Usage: SEMINTRA is indicated for the control of systemic hypertension in cats. The initial dose of SEMINTRA is 1.5 mg/kg (0.68 mg/lb) orally twice daily for 14 days, followed by 2 mg/kg (0.91 mg/lb) orally once daily. The dose may be reduced by 0.5 mg/kg (0.23 mg/lb) increments to a minimum of 0.5 mg/kg (0.23 mg/lb) orally once daily to manage SEMINTRA-induced hypotension. SEMINTRA can be administered directly into the mouth, or next to or on top of a small amount of food. Do not mix into food.

SEMINTRA should be administered using the dosing syringe provided in the package. The dosing syringe fits onto the bottle top and has 0.1 mL incremental marks. The dose should be rounded to the nearest 0.1 mL. After administration close the bottle tightly with the cap. Rinse the dosing syringe with water and let air dry.

If the cat vomits within 30 minutes of dosing, the cat may be re-dosed.

Information for Cat Owners: Adverse reactions can occur with use of SEMINTRA. The most common adverse reactions reported during the field studies included vomiting, diarrhea, lethargy, weight loss, anemia, and dehydration.

Contraindications: Do not use in cats with a hypersensitivity to telmisartan.


SEMINTRA is an angiotensin II antagonist/angiotensin receptor blocker (ARB). Pregnant women should avoid contact with SEMINTRA because of substances that act on the renin-angiotensin-aldosterone system (RAAS) such as angiotensin receptor blockers (ARBs) can cause fetal and neonatal morbidity and death during pregnancy in humans.

Precautions: SEMINTRA can cause mild anemia or non-regenerative anemia. Cats should be monitored for anemia when initiating treatment with SEMINTRA. SEMINTRA may cause inappetence and weight loss in some cats. Some cats should be monitored for weight loss when initiating treatment with SEMINTRA. Use with caution in cats with a history of vomiting, inappetence, or weight loss.

SEMINTRA has not been evaluated in cats with systolic blood pressure >200 mmHg.

The safe use of SEMINTRA in cats with hepatic disease has not been evaluated. SEMINTRA is metabolized by the liver.

The safe use of SEMINTRA has not been evaluated in cats less than 9 months of age, or in cats that are pregnant, lactating, or intended for breeding.

See Human Warnings.

The use of other anti-hypertensive medications has not been evaluated.

Adverse Reactions: The safety of SEMINTRA was evaluated in a 28-day field study in 192 cats. Adverse reactions that occurred included vomiting 46 (24.0%), diarrhea 18 (9.4%), lethargy 13 (6.8%), weight loss 13 (6.8%), decreased appetite/inappetence 13 (6.8%), non-regenerative anemia 11 (5.7%), dehiscence 10 (5.2%), retinal lesions (target organ damage) 7 (3.6%)

The long-term safety of SEMINTRA was evaluated in an open-label, 5-month field effectiveness and safety study in 107 cats that received at least one dose of SEMINTRA. Adverse reactions that occurred in this study were weight loss 37 (34.6%), vomiting 32 (29.9%), dehydration 16 (16.8%), non-regenerative anemia 17 (15.8%), anorexia 13 (11.8%), anemia 12 (11.2%), retinal lesions (target organ damage) 6 (5.6%)

Nine cats died or were euthanized during the study. Three cats had progressive chronic kidney disease that may have been affected by telmisartan treatment, concurrent disease, or inadequate control of hypertension. The other six cats died of causes unrelated to treatment (e.g. neoplasia).

To report suspected adverse drug events, for technical assistance, or to obtain a copy of the Safety Data Sheet (SDS), contact Boehringer Ingelheim Vetmedica, Inc. 1-800-866-6388-2288. For additional information about adverse drug experience reporting for animal drugs, contact FDA at 1-888-FDA-VETS or at http://www.fda.gov/AnimalVeterinary/SafetyHealth.

Effectiveness: Effectiveness was demonstrated in a 28-day multi-center, controlled, randomized and masked field study in client-owned cats with hypertension, and in an open-label 5-month field study.

28-Day Field Study
In a 28-day study, 288 cats with hypertension (systolic blood pressure [SBP] 160-200 mmHg) were enrolled in the study and randomized to treatment with SEMINTRA (telmisartan oral solution) (n=192) or vehicle control (n=96). The study population included cats with hypertension associated with chronic kidney disease or controlled hyperthyroidism, or idiopathic hypertension. The per protocol population for effectiveness was 141 SEMINTRA treated cats and 79 control cats. SEMINTRA was administered orally at 1.5 mg/kg twice daily for 14 days, then 2 mg/kg once daily until study end; the vehicle control was administered at a mL/kg volume equivalent to SEMINTRA. The two primary variables for effectiveness were comparison of the SEMINTRA and control group mean SBP (mSBP) from baseline to Day 14, and a decrease in mSBP >20 mmHg in the SEMINTRA group from baseline to Day 28. Cats with SBP >100 mmHg at Days 14 or 28 were rescued and removed from the study. There was a statistically significant difference between the mSBP for the SEMINTRA group compared to the control group at Day 14 (p<0.0001). At Day 14 the SEMINTRA group mSBP decreased by 23.2 mmHg, and the control group mSBP decreased by 7.3 mmHg. At Day 28, the SEMINTRA group mSBP decreased by 23.9 mmHg compared to baseline.

5-Month Field Study
One hundred-seven cats from the SEMINTRA group that had successfully completed the 28-day study were enrolled in a 5-month open-label study. At the beginning of the 5-month study most cats were untreated hypertensive cats and randomized to treatment with SEMINTRA (telmisartan oral solution) (n=107) or vehicle control (n=96). The study population included cats with hypertension associated with chronic kidney disease or controlled hyperthyroidism. The per protocol population for effectiveness was 107 SEMINTRA treated cats and 79 control cats. SEMINTRA was administered orally at 1.5 mg/kg twice daily for 14 days, then 2 mg/kg once daily until study end; the vehicle control was administered at a mL/kg volume equivalent to SEMINTRA. The two primary variables for effectiveness were comparison of the SEMINTRA and control group mean SBP (mSBP) from baseline to Day 14, and a decrease in mSBP >20 mmHg in the SEMINTRA group from baseline to Day 28. Cats with SBP >100 mmHg at Days 14 or 28 were rescued and removed from the study. There was a statistically significant difference between the mSBP for the SEMINTRA group compared to the control group at Day 14 (p<0.0001). At Day 14 the SEMINTRA group mSBP was reduced by 23.2 mmHg, and the control group mSBP increased by 7.3 mmHg. At Day 28, the SEMINTRA group mSBP decreased by 23.9 mmHg compared to baseline.

Acknowledgments: The publisher does not assume responsibility for any errors or omissions.
1. **CASE IN POINT PAGE 11**

In cases of cryptococcosis, ____________ is the initial antifungal agent of choice due to its good tissue penetration in the brain, eyes, and urinary tract and its relatively low cost.

A. Metronidazole  
B. Itraconazole  
C. Fluconazole  
D. Miconazole

2. **CASE ROUTES PAGE 17**

____________ therapy is the most effective medical treatment for primary angle closure glaucoma in dogs.

A. Topical carbonic anhydrase inhibitor  
B. Prostaglandin analog  
C. β-blocker  
D. Systemic hyperosmotic

3. **CONSULT THE EXPERT PAGE 30**

Which of the following presentations of feline compulsive disorder is most common?

A. Self-directed  
B. Oral  
C. Vocal  
D. Visual/hallucinatory

4. **CASE IN POINT PAGE 63**

Whole-body tremors experienced by patients with steroid-responsive tremor syndrome typically resolve while the patient is ____________.

A. Eating  
B. Resting/sleeping  
C. Engaging in activity  
D. Being touched/groomed

**Answer Key:** 1: C 2: B 3: A 4: B
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For more information, please see full prescribing information.


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- Biomechanics and theoretical foundation of the MMP procedure
- Ability to perform the MMP procedure

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- Clinical experience and publications

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- Treatment selection in patella luxation
- The concept of RidgeStop™
- Ability and confidence to carry out the RidgeStop™ procedure

Course Agenda

- Overview of patella luxation pathophysiology
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Bruce Nwadike
DVM, DipACVS, MRCVS
Dr. Bruce Nwadike is a board-certified veterinary surgeon with a special interest in orthopedics, surgical oncology, general and reconstructive surgery. He has co-owned and operated a private referral practice in southern Maryland since 2002 after relocating from NC where he was a faculty surgeon at the North Carolina State University College of Veterinary Medicine. He has published clinical and original research articles in peer-reviewed journals and also served for 6 years on the editorial review board for the Veterinary Surgery journal.

Robert L. Bergman
DVM, MS, Diplomate ACVIM (Neurology)
Dr. Bergman received his DVM from the University of Georgia. Following internship, he pursued a residency in neurology and neurosurgery at the Virginia-Maryland Regional College of Veterinary Medicine. Concurrently, he completed a Master’s Degree at Virginia Tech with a focus on neuroscience and cerebrospinal fluid analysis. He became a diplomate of ACVIM specialty of neurology in 2001. Dr. Bergman recently served 5 years and was chair of the ACVIM Neurology Certification Exam Committee. While busy in private practice, he enjoys teaching neurosurgery to residents and those interested in the advancement of veterinary neurosurgery. He has a particular interest in spinal fusion, spinal trauma and neuro-oncology.

Dr. Karl Kraus
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Dr. Kraus is Chief of Small Animal Surgery at Lloyd Veterinary Medical Center at Iowa State University and diplomate of the American College of Veterinary Surgeons. He graduated from Kansas State University in 1985, completed residency training at University of Missouri-Columbia in 1989 and was professor of surgery at Tufts University from 1989 to 2007. He also held a joint appointment at Harvard University where he helped develop neurosurgical procedures on humans at Brigham and Women’s Hospital from 1989 to 1998. His major areas of interest include fracture repair, external fixation, ACL repair, spinal stabilisation, and neurosurgery.

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BVMS, CertSAS, DipECVS, MRCVS
RCVS Recognised and European Specialist in Small Animal Surgery
After graduating from Glasgow University in 2001, Scott spent six years in general practice before moving to Croft Veterinary Hospital in Northumberland in 2007 where he completed an ECVS residency in Small Animal Surgery in 2012. Scott became a European Veterinary Specialist in Small Animal Surgery in 2013 and an RCVS Recognised Specialist in 2014. He spent two years at both North Downs Specialist Referrals and then Willows Referral Services. He is a co-founder and director of frank. Pet Surgeons. Scott is actively involved in clinical research and teaching and he recently became an Associate Tutor at Chester University.

Peter Early
Clinical Professor, Neurology and Neurosurgery,
DVM, ACVIM
Dr. Early is graduate of the University of Florida, College of Veterinary Medicine. He spent two years at Cornell University, where he first completed a small animal rotating internship, followed by a second year as a staff veterinarian. He completed a Neurology/Neurosurgery residency at North Carolina State University and is a Diplomate of the American College of Veterinary Internal Medicine. He presently serves as a Clinical Associate Professor in Neurology and Neurosurgery at NCSU and provides regular locum work at multiple university and specialty hospitals throughout the country. Dr. Early’s special interests include neurosurgery, specifically decompression and stabilization techniques.
Cancellation Policy: Bookings with any Orthomed-run course are non-refundable but bookings can be transferable with any other Orthomed-run course within twelve months of cancellation.
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* Denotes Wet-lab  ** These courses must be booked direct with Improve International
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Reducing Feline Stress While Treating Chronic Disease

Cats often need to receive oral medication and have multiple practice visits, both of which can be stressful for the cats and their owners. The following discussion focuses on ways to reduce stress during veterinary visits and medication administration to cats.

Dr. Stark: How can veterinarians embrace the uniqueness of cats and their owners to make practice visits less stressful?

Dr. Rodan: As solitary hunters and survivors, cats have strong protective mechanisms, such as scent-marking their territory. That works very well for cats, but we as humans don’t understand it. Things that we can understand are that they withdraw or hide and will become aggressive if we don’t recognize the earlier signs.

Cat owners are also unique. They are more likely to be college-educated, more open-minded, and more agreeable—all of which make them outstanding clients. They want us to educate them. They want to know why they should bring their cat in if their cat seems healthy. What subtle signs should they look for at home between appointments? How are they going to prevent stress for their cat and for themselves before, during, and following the appointment? We have a great opportunity to make the visit a good experience for them and for us. When we do that, we are improving the cat’s health and welfare, we are improving our client loyalty, and we are protecting ourselves. We increase our safety working with cats.

There are 5 steps to addressing the
challenge to the cat owner and the cat surrounding the veterinary appointment. The first step is to encourage owners to implement carrier training to make cats more comfortable during the visit and when receiving medication. For clinicians, the appointment may seem like 20 to 30 minutes, but for the patient and client, it can seem like hours. Putting these cats on long-term medication can cause long-term stress and may impact the human–animal bond. Carrier training works well for these owners and for the cats. Cats are smart, and carrier training is easy. All this information is available from the American Association of Feline Practitioners (AAFP) at catvets.com; clinicians can share it on your practice website and share the link with owners when they schedule their appointments or educate them in the exam room.

Step 2 is changing mindset, which is probably the most challenging thing to do. We may think of a cat as being “bad” or “evil.” However, as practitioners, we know that cats are only fearful, painful, or otherwise stressed—they are never bad. Having this mindset, and adjusting our vocabulary, will make a huge difference, not only for clinicians, but for the entire veterinary team. Knowing a cat is fearful can prompt us to find proper solutions to address it. Knowing it is painful, we can give it analgesics and reassess.

Step 3 is adjusting the environment. Making the practice cat-friendly is critical. The Cat Friendly Practice program developed by the AAFP is a really important program. It is free, and it’s good for companion animal, mixed-animal, and feline practices. It is a mentored program, which helps ensure all team members are educated.

Step 4 is providing hiding options instead of tight restraint. We now know that tight restraint increases the chance of a cat’s aggression. Studies show that cats that are tightly restrained, scruffed, or restrained with clipnosis are more difficult to work with than cats that are gently restrained.1,2 This also doubles the appointment time. Loosely restraining cats and allowing them to hide will help increase efficiency and get those cats back home faster.

We have a great opportunity to make the visit a good experience for them and for us.

—Dr. Rodan

Loosely restraining cats and allowing them to hide will help increase efficiency and get those cats back home faster.

—Dr. Rodan
home faster. Also, if you train a cat to a carrier, that cat can hide in the carrier while you are doing most of the exam and even some of the procedures, especially if the bottom half of a hard-sided carrier or a soft-sided carrier has a large opening. Coming from the side or behind allows a cat to still feel hidden.

The last step is sedating before it’s too late. I like to start with preventing problems. Cats known to be fearful or that have chronic anxiety and those that have had a previous negative veterinary experience should be prescribed an anxiolytic medication (eg, gabapentin) to be given at home prior to veterinary visits. The capsules can be opened and the contents mixed into a small amount of canned food to reduce anxiety. Also, if a cat is struggling, instead of getting more people to handle that cat, sedate it. Let the owners know it will make it easier for their cat and facilitate future visits. The AAFP’s Feline Anesthesia Guidelines (see Additional Resources, page 6) are a great resource.

Dr. Bourgeois: What often gets overlooked is that fear-free practice really starts at home. We need to educate our clients better, such as teaching them how a carrier can be a safe place and not a fearful place, because we can do a lot of our dermatologic exams with the patient in the carrier, and that’s been a game changer for a lot of our feline patients.

Dr. Stark: Why aren’t more veterinarians taking steps to destress visits, and what can be done to encourage them to make their practice more cat-friendly?

Dr. Lund: Habit is a big driver. Many veterinarians still believe that tight restraint is safer. I think that they believe that it is better for their team when these cats are held tightly, and they don’t necessarily see that the opposite occurs. Education can be helpful there; the AAFP has lots of information on this topic that can really help an office through how to manage visits (see Additional Resources, page 6). There’s really very little that I do that is more impactful than the way I restrain a cat during an examination. Gentle and respectful restraint sends a very powerful message to our clients that we do respect their cat and we pay attention
to their comfort and their emotional well-being. That builds trust, and trust is key in veterinary medicine. It helps facilitate the exam and encourages owners to return with their cat.

Dr. Diesel: I think a lot of veterinarians still have difficulty reading feline behavior. We know what an aggressive dog looks like, and we know how to handle aggressive dogs. But cats are trickier, and I think many veterinarians struggle when trying to read the behavior of a cat. It’s not something that has been readily taught in the veterinary curriculum. We’re starting to see changes, but there’s a long history of it being appropriate to scruff cats. We now know that this can heighten the stressful experience for the animal and make examinations more difficult. So I think it’s overcoming a lot of these hurdles and previously thought knowledge to find better ways to handle our feline patients and make the visit a lot easier for ourselves and our clients.

Dr. DeBoer: It really comes down to education. How many of us during veterinary school had somebody train us or tell us how to handle cats in a fear-free manner? I would guess almost no one. So it’s a matter of educating ourselves. It’s a matter of us doing a better job in the veterinary schools. It’s a matter of educating our veterinary nurses, client services representatives, and practice owners about appropriate things to do.

Dr. Stark: What do veterinarians need to see, hear, or know to be inspired to take these simple actions?

Dr. Diesel: Showing that it’s a lot easier to perform an examination on a cat that is more gently handled. Using things like towels and what I call the “kitty burrito technique,” where you swaddle them up a little more readily, allowing them to have areas to hide. We are able to get to the parts of the body that we need to examine a lot more effectively without them feeling threatened or stressed during the process. In addition, using E-collars as a way to protect ourselves from being bitten, along with the towel can again provide a safe option for the veterinary team while making the cat feel less confined and less stressed by being forcefully held down and scruffed or stretched during the examination process. Demonstrating
these techniques to both veterinarians and veterinary nurses would show that the fear-free handling techniques can be really excellent and provide a lot better experience for everybody involved.

Dr. Stark: Is there a source for general practitioners to reference for implementing these techniques on their own?

Dr. Rodan: The AAFP’s Cat Friendly Practice program has excellent information on making the environment and the handling more friendly. Also, the AAFP’s Feline-Friendly Handling webinar was updated in 2018 and is a great resource.

Dr. Bourgeois: Our clinic became Fear Free certified within the past year. Although there is a cost to become certified, it’s well worth it, and the program has a lot of free resources available on its website (see Additional Resources, page 6). Another often overlooked resource is Fear Free Happy Homes (see Additional Resources, page 6), which provides printable client and staff handouts to educate on how to properly handle cats. It’s important to have these resources available to clients to reduce their fear of veterinary visits.

Dr. Stark: Zoetis recently performed some market research to gauge cat owners’ experience with giving oral medication. Many owners reported challenges, which often lead to missed doses and owner and patient frustration. Does this response match the feedback you’ve heard from owners?

Dr. DeBoer: Owner distress when trying to medicate a cat is probably a universal experience. It leads to a discussion about what happens when there are missed doses. How many times have you heard, “I pilled my cat and then I found the pill the next day under the sofa because he had thrown it up.”

Dr. Rodan: I think the problem is that we end up with compliance problems that lead to treatment failures, and then owners think the medication doesn’t work and they don’t want to come back because the veterinarian didn’t do a good job, and it goes on and on from there.

Having the veterinary nurse teach owners how to give the medication can be really helpful.

—Dr. Rodan
Habit is a big driver. Many veterinarians still believe that tight restraint is safer.

—Dr. Lund

Dr. Lund: I think part of the preference by owners for over-the-counter treatments is because they really don’t want to come to the practice because it’s not a positive experience. We need to flip that around and somehow make going to the practice less of a chore and more of a positive experience for both the owner and the cat. Even though we may not have a lot of materials right now that we can use, there is an enormous opportunity here to do good.

Dr. DeBoer: That brings up another very important point, which is owners losing confidence in their veterinarian. If every time they visit a practice they are given another pill that they have to jam down their cat’s throat that doesn’t work because they are not able to give it often enough, they are not going to return. They are going to go to somebody else—hopefully not somebody who is going to give the cat a long-acting steroid injection. That sometimes is the case, and that’s not a good situation for the cat. So, this loss of confidence in the veterinarian and the whole diagnostic process is also an issue.

Dr. Bourgeois: I always give owners tricks for giving oral medication. I also ask them to call me if they can’t give it, because I hate when they come back for a recheck (if they even come back, because they might be so frustrated they don’t want to come see me again) and say they haven’t been giving the medication for the last 2 weeks because the cat hated it. I would rather them call me with an update so I can give them more tips. I’ve had owners shocked when I showed them how to give an appropriate medication if the cat won’t take it in a treat or wet food, because they were doing it wrong or approaching it in a bad way, in regards to coming from different angles.

Dr. Rodan: Cats are creatures of habit; they like routine and they like familiarity. It helps to start giving them soft treats at home, even when they are kittens, so that by the time they need medication, you can put it in the treat. If the owners didn’t try treats early on, they can try giving

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ADDITIONAL RESOURCES

- **American Association of Feline Practitioners**
  - Educational videos: catvets.com/education/online/videos
  - Cat Friendly Practice Program: catvets.com/cfp/veterinary-professionals
  - Online CE webinars (Feline-Friendly Handling, 5 Cat-Friendly Concepts to Integrate in Your Practice): catvets.com/education/online/webinars/
  - Ten Solutions to Increase Cat Visits: catvets.com/public/PDFs/Education/Solutions/solutionsbrochure.pdf

- **Fear Free**
  - Resources for veterinary professionals: fearfreepets.com
  - Resources for pet owners: fearfreehappyhomes.com

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Reducing Feline Stress While Treating Chronic Disease
different treats to see if any work. Cats are smart; if you start them on something or if you train them to come and sit and get a treat and then sneak in the medication with that, that will make a big difference.

Another issue is cats that have multiple medical conditions and need different medications. Clinicians can try prescribing medications that only need to be given once daily or less frequently and sending home small gel capsules containing all medications to administer at one time. For cats that will not take any type of treat, owners should be taught to approach the cat calmly from the side or behind to administer medication. This should be followed with a reward (eg, positive attention).

Veterinary nurses are critical to client education about medication administration. If owners continue to have difficulty medicating their cat, they could consider hiring a cat sitter or veterinary nurse to administer medication at home; many owners appreciate this service, regardless of expense. Other alternatives are to have a veterinary nurse or cat sitter go to the house daily and give the medication so that the owner’s bond with the cat is not compromised.

**LIFELINE: A NEW RESOURCE**

Treating cats is an important opportunity to provide excellent veterinary care and to build the small animal practice.

After using some simple solutions to make their practice more welcoming to cats, 79% of practices reported increased revenue, increased satisfaction, new feline patients, and more patient visits.*

In addition to creating products to facilitate convenient and complete care for cats such as Revolution PLUS, Simbadol, Convenia, and more, Zoetis has also created its Lifeline initiative, which provides focused, easy-to-use resources for veterinary professionals and cat owners.

Clinicians can use these resources to educate themselves and their team and clients on topics such as:
- 4 reasons feline veterinary care is vital
- 4 behaviors cat owners should monitor regularly
- 5 ways to decrease stress during veterinary visits

More information can be found at dvm lifeline.com and cat lifeline.com.


**References**

As a veterinarian, you are a cat owner’s lifeline to a long and healthy life for their beloved family member. At Zoetis Petcare, our mission is to support you along the way, by understanding the unique needs of cats and providing advanced resources, medicines, and diagnostics. Together, these tools and your expertise can create a more cat-compassionate practice. To learn more visit DVMLifeline.com.