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Corneal Ulceration Algorithm: Diagnosis & Management
Mesenchymal Stem Cell Therapy for Orthopedic Conditions
Differentials of Increased & Decreased Creatinine

TOP 5 CAUSES OF NONBLANCHING SKIN LESIONS
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*Treats and controls roundworms, hookworms and whipworms in dogs and roundworms and hookworms in cats.

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See page 4 for product information summary.
Providing small animal practitioners and their teams with practical, relevant information on the latest topics in veterinary medicine
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What is your favorite veterinary-related expression?

“All bleeding stops eventually.”—Susan R

“Age is not a disease.”—Kayla D

“Never let the sun set on a pyometra.”—Sandi H

“When in doubt, cut it out.”—Amy C

“When you hear hoofbeats, think horses before zebra.”—Beth M

Fill in the blanks: I have been practicing for ___ years, and I still misspell _______.

“10, pruritus. Pruritis? I don’t know.”—Anna G

“2, dehiscence. I am not even sure that is spelled right.”—Sarah M

“15, intussusception. I always struggle with it.”—April S

“7, ventilation. I always want it to have a double l.”—Andrea C

“40, abscess. Abcess, absess? Lol.”—Diane F

“11, ophthalmologist! I always miss that first h.”—Taylor O

Do you use a continuous suture pattern in the abdominal wall?

70% Yes
30% No

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sensitive dogs, the signs may be more severe and may include coma and death. Dilated pupils, incoordination, panting, and generalized muscle tremors. In avermectin dogs from one another and from other pets to reduce the risk of accidental ingestion. Ingestion the product from application sites on themselves or other treated dogs, and separate treated 

ADVANCE Multi for Dogs:

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INDICATIONS:

Advantage Multi for Dogs is indicated for the prevention of heartworm disease caused by 

Advantage Multi for Cats is indicated for the prevention of heartworm disease caused by 

Advantage Multi for Cats is also indicated for the treatment of flea infestations. Advantage Multi for Cats is also indicated for the treatment of heartworm disease caused by 

Advantage Multi for Cats is indicated for the prevention of heartworm disease caused by 

Advantage Multi for Cats is indicated for the prevention of heartworm disease caused by 

NADA 141-251,141-254 Approved by FDA  V-03/2016

The most common adverse reactions observed during field studies were lethargy, behavioral changes, discomfort, hypersalivation, polydipsia and coughing and gagging. Ferrets:

Advantage Multi for Dogs is indicated for the prevention of heartworm disease in ferrets caused by 

Diagnosis:

• The most common adverse reactions observed during field studies were lethargy, behavioral changes, discomfort, hypersalivation, polydipsia and coughing and gagging. Ferrets:

Advantage Multi for Cats is indicated for the prevention of heartworm disease in ferrets caused by 

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Advantage Multi for Cats is also indicated for the treatment of flea infestations. Advantage Multi for Cats is also indicated for the treatment of heartworm disease caused by 

Advantage Multi for Cats is indicated for the prevention of heartworm disease caused by 

Advantage Multi for Cats is indicated for the prevention of heartworm disease caused by 

Made in Germany.
RENEE CARTER, DVM, DACVO, is an associate professor of ophthalmology at Louisiana State University, where she also earned her DVM and completed a rotating internship. Dr. Carter completed a residency in comparative ophthalmology at University of Wisconsin–Madison. Her primary research interests are in corneal wound healing, equine recurrent uveitis, and nanoparticle drug delivery of ocular medications.

MARY ANNA LABATO, DVM, DACVIM (SAIM), is a clinical professor and the section head of dermatology at University of Tennessee. She has a special interest in renal disease and interventional therapies.

ELIZABETH R. MAY, DVM, DACVD, is an associate professor of small animal dermatology at University of Tennessee. She earned her DVM from Texas A&M University and completed a dermatology residency at University of Tennessee. Dr. May’s main area of concentration is treatment of otitis in companion animals.

JANET PERALTA, DVM, is an internal medicine resident at Veterinary Specialty & Emergency Center in Levittown, Pennsylvania. She completed a rotating internship at Cummings School of Veterinary Medicine at Tufts University. Her special interest is in renal and respiratory disease.
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- Kill incoming heartworm larvae for the next 30 days
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Coraxis™ is not approved for the treatment of adult *D. immitis*.
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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.
TOP 5
Top 5 Causes of Nonblanching Skin Lesions
Darren Berger, DVM, DACVD

NOTICE OF CORRECTION
In the Research Note “Infrared Thermography & Aortic Thromboembolism in Cats” in the March 2019 issue of Clinician’s Brief, an incorrect temperature was listed. The Fahrenheit temperature difference of 36.3°F (2.4°C) between ipsilateral nonaffected and affected limbs should have been listed as 4.2°F (2.4°C). Clinician’s Brief regrets the error.
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1. The scrubbing action of the chew works in parallel with the delmopinol to effectively remove plaque and calculus.

Data on file.
Modern Veterinary Therapeutics Announces Medetomidine Hydrochloride

Modern Veterinary Therapeutics (modernveterinarytherapeutics.com) has announced the US launch of Medetomidine Hydrochloride (ANADA 200-610), the first FDA-approved generic medetomidine hydrochloride injection (1 mg/mL) for sedation and analgesia in dogs. This follows the earlier launch of Revertidine (ANADA 200-624), a reversal agent for medetomidine and dexmedetomidine and the first FDA-approved generic atipamezole hydrochloride injection (5 mg/mL). Call 407-852-8039 for more information.

—Press Release 5/2019

Zoetis Becomes First Human–Animal Bond Certified Company

Following creation of their joint Human–Animal Bond Certification program, the NAVC (navc.com) and the Human Animal Bond Research Institute (habri.org) have announced Zoetis (zoetis.com) as the first Human–Animal Bond Certified company. Several Zoetis employees completed the certification program and received training on the science behind the human–animal bond and how this science supports the practice of veterinary medicine. Zoetis’ support of the bond includes its K-9 Courage and Pet Effect programs.

More than 500 professionals have signed up for this certification, which offers 22 hours of RACE-approved CE credit. To learn more about the Human–Animal Bond Certification, visit navc.com/hab.

—Press Release 5/2019

Fifth Edition of FlexVet Released

Smith Veterinary Consulting & Publishing (smithvet.com) has launched the 5th edition of FlexVet: How to Be One, How to Hire One. The Comprehensive Practice Guide for Relief & Part-Time Veterinarians. The book features a wide range of resources to help practices, part-time clinicians, and relief (locum) clinicians navigate the business intricacies of flexible work. The new 2019 edition includes updates on taxes and insurance, sample contracts and letters, and current links to information online. Other topics include business plans, budgeting, marketing, and social media.

The book can be purchased online at amazon.com/dp/B07QX931BT.—Press Release 4/2019

 Companion Animal Health INsight Diagnostic Platform

Companion Animal Health (companionanimalhealth.com) has announced the INsight System, a fully integrated needle arthroscopy platform with an advanced image capture system for patient-side intra-articular diagnostic procedures. The INsight system allows for visualization of the interior of joints with small, tablet-based technology. The integrated needle scope has a retractable needle, autofocusing fiber optic camera, and light source, which enable clinicians to visually confirm diagnosis, inject regenerative medicine products, and perform follow-ups after intra-articular procedures. To learn more about the new Companion INsight System, visit companionanimalhealth.com/page/insight-system.—Press Release 4/2019
Non-seasonal pruritus is one of the more common manifestations of food allergy. The pattern of pruritus can be a clue, with food allergy commonly associated with otitis and perineal pruritus (ears and rears). Because no reliable test yet exists for diagnosing food allergy, feeding trials from six to eight weeks remain the only method of diagnosing food allergy in the dog or cat.

It is well known that chicken and beef are some of the more common allergens for food-allergic patients (Jeffers). With the increased knowledge of cross-reactions between many intact proteins (such as chicken with other poultry, beef with other ruminants or dairy), the utilization of hydrolyzed protein diets continues to grow. Because of lower price, veterinarians (and certainly clients) are tempted to use one of the plethora of OTC “novel” protein diets as a test diet. However many studies continue to show they are often contaminated with other common proteins (Raditic 2011), and even if they were pure, the concern with cross-reactivity remains. Clinical experience shows us no one single diet is always effective in a food-allergic patient. Failures with hydrolyzed protein diets occur when some of the protein remains intact, so verifying that 100% of the protein is hydrolyzed to a small enough size is essential (Olivry 2010).

For a food trial to be effective, concurrent treats and chewable medications or nutraceuticals must also be eliminated. I remind clients some people react adversely to peanut dust on an airline flight! Nearly one in three of this author’s patients with food allergy will exhibit concurrent gastrointestinal manifestations, ranging from frequent vomiting and diarrhea to more subtle signs such as flatulence or frequent (more than two) bowel movements per day. The classic or hallmark clinical sign for food allergy in the cat is pruritus, especially of the head. Others will manifest as “self-induced alopecia”, or any of the variable eosinophilic granuloma complex.

References
Jeffers JC et al. Responses of dogs with food allergies to single-ingredient dietary provocation. JAVMA 1996
Olivry T, Bizikova P. A systematic review of the evidence of reduced allergenicity and clinical benefit of food hydrolysates in dogs with cutaneous adverse food reactions. Veterinary Dermatology 2010, 21,32-41
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Central Diabetes Insipidus

Janet Peralta, DVM
Veterinary Specialty & Emergency Center
Levittown, Pennsylvania

Mary Anna Labato, DVM, DACVIM (SAIM)
Cummings School of Veterinary Medicine at Tufts University

History
A 10.5-year-old, 59.5-lb (27-kg), spayed Australian shepherd crossbreed was presented for examination for a 6-month history of persistent polyuria (PU) and polydipsia (PD) without stranguria or pollakiuria. The owner noted that large amounts of urine would leak approximately once to twice per week while the dog was asleep. Vomiting and/or diarrhea were not reported, and the patient had a normal appetite and energy level. Pollakiuria occurred once 5 months prior to presentation and was responsive to a 10-day course of amoxicillin (22 mg/kg PO q12h); urinalysis was not performed. A seasonal flea and tick preventive was the only other medication given.

Physical Examination
The dog was bright, alert, and responsive, and vital signs were within normal parameters. Dehydration was not present. Her abdomen was tense on palpation. The remainder of the physical examination was unremarkable. BCS was ideal at 5/9, and weight loss was not reported.

Diagnosis
PU/PD are nonspecific clinical signs. The potential causes for PU/PD are central diabetes insipidus (CDI), primary or secondary nephrogenic diabetes insipidus (NDI; eg, hyperadrenocorticism, hypoadrenocorticism, hyperthyroidism, liver disease, hypercalcemia, pyelonephritis), osmotic diuresis (eg, diabetes mellitus, chronic kidney disease, Fanconi syndrome, postobstructive diuresis), low renal medullary tonicity, and psychogenic polydipsia (PP).1

Based on the patient’s history of PU/PD and the results of laboratory diagnostics and imaging (Table, next page), many of the most common causes of PU/PD could be ruled out, leaving complete or partial CDI,
primary (rare) or secondary (more common) NDI, and PP as the most probable causes.

Clinical Signs
PU/PD is confirmed if water consumption is >100 mL/kg/day, urine production is >50 mL/kg/day, and random urine specific gravity (USG) is ≤1.012.² Urine from the patient’s first urination of the morning (3 AM) had a USG of 1.001. In general, a USG between 1.012 and 1.018 may indicate partial CDI. Additional testing (eg, preprandial and postprandial serum bile acid concentration) may be necessary to further exclude liver disease.

A modified water deprivation test is designed to determine whether endogenous adenosine vasopressin (AVP) is released in response to dehydration and whether the kidneys respond to this stimulus, but it can be time-consuming and is associated with risks (eg, severe dehydration, hypernatremia, death). Also, although useful in differentiating primary NDI from CDI, a modified water deprivation test may not differentiate partial CDI from PP with complete certainty. Dogs and cats with partial or complete CDI or primary NDI have an impaired ability to pass concentrated urine when dehydrated.

A desmopressin acetate trial could help determine the cause of PU/PD in this patient. Desmopressin tablets or conjunctival drops of 0.01% desmopressin human intranasal spray should be administered every 12 hours for 7 days, and the desmopressin effect should be evaluated after 5 to 7 days of treatment (required to overcome medullary washout). CDI is likely if an observable or measurable decrease in water consumption is noted and USG increases by at least 50% or exceeds 1.018.

Clinical Background
CDI, which can be congenital or secondary due to trauma³-⁷ or neoplasia, is caused by any condition that damages the neurohypophyseal system (eg, infection, neoplasm, trauma, vascular disease, autoimmune hypotalamitis, cysts), destruction of the antidiuretic hormone (ADH) production site in the hypothalamus, loss of major axons that carry ADH to storage sites in the posterior pituitary, or disruption of the ability to release stores of ADH. A prolonged hypoxic event (eg, cardiac arrest) can lead to development of CDI.⁴

### TABLE

<table>
<thead>
<tr>
<th>Diagnostic Test</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood pressure*</td>
<td>126/63</td>
</tr>
<tr>
<td>Mean arterial pressure*</td>
<td>67</td>
</tr>
<tr>
<td>CBC</td>
<td>Normal</td>
</tr>
<tr>
<td>Serum chemistry profile†</td>
<td></td>
</tr>
<tr>
<td>Phosphorus</td>
<td>2.4 mg/dL (range, 2.6-7.2 mg/dL)</td>
</tr>
<tr>
<td>Albumin</td>
<td>4.2 g/dL (range, 2.8-4.4 g/dL)</td>
</tr>
<tr>
<td>Alanine aminotransferase</td>
<td>56 U/L (range, 14-86 U/L)</td>
</tr>
<tr>
<td>Cholesterol</td>
<td>379 mg/dL (range, 82-354 mg/dL)</td>
</tr>
<tr>
<td>Symmetric dimethylarginine</td>
<td>11 µg/dL (range, 0-14 µg/dL)</td>
</tr>
<tr>
<td>ACTH stimulation</td>
<td></td>
</tr>
<tr>
<td>Basal cortisol</td>
<td>1.8 µg/dL (range, 1.7-7.4 µg/dL)</td>
</tr>
<tr>
<td>Post-ACTH stimulation</td>
<td>10 µg/dL (range, 6-18 µg/dL)</td>
</tr>
<tr>
<td>Bile acids (pre-/post-)</td>
<td>Normal</td>
</tr>
<tr>
<td>Urinalysis (cystocentesis)†</td>
<td></td>
</tr>
<tr>
<td>USG</td>
<td>1.001</td>
</tr>
<tr>
<td>pH</td>
<td>6.5</td>
</tr>
<tr>
<td>Squamous epithelial cells</td>
<td>0-1/hpf (range, 0-3/hpf)</td>
</tr>
<tr>
<td>USG samples</td>
<td></td>
</tr>
<tr>
<td>1.001 (3 AM)</td>
<td></td>
</tr>
<tr>
<td>1.006 (6 PM)</td>
<td></td>
</tr>
<tr>
<td>1.004 (10 AM)</td>
<td></td>
</tr>
<tr>
<td>Urine cortisol:creatinine ratio‡</td>
<td>12§</td>
</tr>
<tr>
<td>Urine culture</td>
<td>No growth</td>
</tr>
<tr>
<td>Abdominal ultrasonography‖</td>
<td></td>
</tr>
<tr>
<td>Right kidney smaller than left kidney; borderline normal in size</td>
<td></td>
</tr>
<tr>
<td>Bladder contained a large volume of urine; patient urinated 45 minutes prior to examination</td>
<td></td>
</tr>
<tr>
<td>Bladder wall thickness was normal*</td>
<td></td>
</tr>
<tr>
<td>No masses or calculi</td>
<td></td>
</tr>
</tbody>
</table>

*Measured using Doppler. Normal systolic blood pressure is <140 mm Hg.
†All other results were normal.
‡Taken from an at-home sample
§Cushing’s disease is highly unlikely in dogs with urine cortisol:creatinine ratio ≤13.
‖All other structures in the abdomen were within normal limits.
¶Normal thickness of a moderately distended bladder is 1.4 mm.
CDI must be suspected if there is any history of trauma. MRI or CT is recommended if neurologic signs are present and if there is suspicion of intracranial neoplasia.

NDI can be familial, which is rare, or acquired (ie, secondary to several diseases) and can lead to decreased action of AVP in the kidney. Desmopressin supplementation cannot effectively manage NDI due to lack of response of AVP receptors in the kidney or lack of AVP receptor numbers. The prognosis of primary NDI is guarded-to-poor because of limited therapeutic options.

**Treatment**

Treatment may not be necessary if the patient has unlimited access to water and PU/PD is not distressing to the owner.²

Desmopressin, a synthetic AVP analogue, can be given for partial or complete CDI; prognosis depends on the underlying cause of CDI. Desmopressin is a potent V₂-receptor agonist and has minimal effects in V₁ receptors if no hypertension is observed. The 0.01% human intranasal solution (dogs, 1-4 drops [≈1.5-5 μg/drop] q8-24h; cats, 1 drop q12h) should be administered in the conjunctival sac or nose. The injectable formulation of desmopressin (administered intravenously over 15-30 minutes and repeated as needed) in dogs and cats has a short-term effect and is best used in cases of diabetes insipidus as a diagnostic tool. Tablets can also be given (dogs, 100 μg PO q12-24h; cats, 25-50 μg PO q8-12h). Therapeutic response is variable.

Dose and frequency should be titrated to effect for each patient. Response to treatment is rapid, and PU returns quickly if treatment is discontinued.⁸ Desmopressin is generally safe, and complications are uncommon.¹ The most common complications are hyponatremia and failure to decrease water intake. If the patient develops hyponatremia, desmopressin should be discontinued, then only given as needed. Close monitoring of electrolytes and USG is needed at the beginning of treatment until the appropriate individual dose is achieved.

In this patient, phenylpropanolamine (1 mg/kg PO q12h) was tried without success to manage the urinary incontinence episodes. The patient was then started on an initial trial therapy of desmopressin tablets (0.2 mg PO q12h). The tablet dosage was later increased (0.3 mg PO q12h), after which USG was concentrated at 1.022 and clinical signs resolved.

The patient did not return for a follow-up examination within the next year. At an eventual return visit, she had a USG of 1.003, but the owner chose not to resume treatment.

**Conclusion**

Diabetes insipidus is an important differential for PU/PD, and, although not a very common condition, it must be considered when managing a dog or cat presented with PU/PD. Other causes of PU/PD should be excluded before diagnosis of diabetes insipidus is pursued. ■

---

**References**


**Sentinel® Spectrum Chews**

**Description:** Sentinel® Spectrum Chews are available in four strengths in color-coded packages for oral administration to dogs and puppies according to body weight. Each chewable flavored tablet is formulated to provide a minimum of 0.23 mg/pound (0.5 mg/kg) of milbemycin oxime, 4.55 mg/pound (10 mg/kg) of lufenuron, and 2.28 mg/pound (5 mg/kg) of praziquantel.

**Milbemycin Oxime**

Milbemycin oxime is a macrocyclic antibiotic. It is a benzothiazolylurea derivative with the chemical name 12-(Cyclohexylcarbonyl)-1,2,3,6,7,11b-hexahydro-4H-pyrazino[2,1-a]pyrimidin-4-one.

**Praziquantel**

Praziquantel is an isoquinolone anthelmintic with the chemical name (C32H45NO7, MW 555.71) and 20% A3 (C31H43NO7, MW 541.68).

**Lufenuron**

Lufenuron is a pyrrole-3-carboxylic acid and is a highly selective monosubstituted benzene. It is used in conjunction with other drugs to control or prevent flea infestations in dogs and puppies for two pounds of body weight or greater and six weeks of age and older.

**Dosing and Administration:** Sentinel Spectrum® Chews should be administered via the oral route. The minimum dose is 0.23 mg/pound (0.5 mg/kg) of milbemycin oxime, 4.55 mg/pound (10 mg/kg) of lufenuron, and 2.28 mg/pound (5 mg/kg) of praziquantel. For heartworm prevention, Sentinel Spectrum Chews should be administered once every six months to control flea infestations for up to 24 months. Sentinel Spectrum Chews are indicated for the treatment and control of fleas in dogs and puppies weighing two pounds of body weight or greater and six weeks of age and older. Sentinel Spectrum Chews may be administered to the dog by hand or added to a small amount of dog food. The chewable tablets should be administered in a manner that encourages the dog to chew, rather than to swallow without chewing. Chews 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 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, redosing is recommended. Sentinel Spectrum Chews Chews may be offered to the dog by hand or added to a small amount of dog food. The chewable tablets should be administered in a manner that encourages the dog to chew, rather than to swallow without chewing. Chews 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 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, redosing is recommended.

**Intestinal Nematode and Cestode Treatment and Control:** Sentinel Spectrum Chews are indicated for the treatment and control of enteric nematodes (Hookworm, Ancylostoma caninum, Trichuris vulpis), and adult tapeworm (Dipylidium caninum, Taenia pisiformis, and two field studies were conducted to conduct replicate eradication of lufenuron tablets in breeding dogs. In one of the laboratory studies, in which lufenuron was administered to Beagles dogs were divided into three groups, one control group and two Sentinel Spectrum Chews before, on the day of, or shortly after whelping, resulted in no effects on the puppies. Some nursing puppies, at 2.4, and 6 weeks of age, administered oral doses of 9.6 mg/kg milbemycin oxime (3.8X the maximum exposure dose of Sentinel Spectrum Chews) exhibited tremors, vocalization, and ataxia. These effects were all transient and puppies returned to normal within 24 to 48 hours. No effects were observed in puppies administered 0.5 mg/kg milbemycin oxime (minimum label dose).

**Lufenuron**

Lufenuron is a ten-month study, doses of lufenuron up to 2X the maximum exposure dose of Sentinel Spectrum Chews (10 mg/kg) caused no overt toxicity. A single dose of 200 mg/kg had no marked effect on adult dogs, but caused decreased activity and reduced appetite in eight-week-old puppies. Lufenuron tablets were evaluated with concurrent administration of lufenuron tablets containing carbarsulf, permethrin, chlorpyriphos, and cythioate. No toxicity resulted from these combinations. Lufenuron tablets did not cause cholinesterase inhibition nor did they enhance cholinesterase inhibition caused by exposure to organophosphates.

**Two laboratory and two well-controlled field studies were conducted to evaluate replicative safety of lufenuron tablets in breeding dogs. In one of the laboratory studies, in which lufenuron was administered to Beagles dogs were divided into three groups, one control group and two Sentinel Spectrum Chews before, on the day of, or shortly after whelping, resulted in no effects on the puppies. Some nursing puppies, at 2.4, and 6 weeks of age, administered oral doses of 9.6 mg/kg milbemycin oxime (3.8X the maximum exposure dose of Sentinel Spectrum Chews) exhibited tremors, vocalization, and ataxia. These effects were all transient and puppies returned to normal within 24 to 48 hours. No effects were observed in puppies administered 0.5 mg/kg milbemycin oxime (minimum label dose).

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**Two laboratory and two well-controlled field studies were conducted to evaluate replicative safety of lufenuron tablets in breeding dogs. In one of the laboratory studies, in which lufenuron was administered to Beagles dogs were divided into three groups, one control group and two Sentinel Spectrum Chews before, on the day of, or shortly after whelping, resulted in no effects on the puppies. Some nursing puppies, at 2.4, and 6 weeks of age, administered oral doses of 9.6 mg/kg milbemycin oxime (3.8X the maximum exposure dose of Sentinel Spectrum Chews) exhibited tremors, vocalization, and ataxia. These effects were all transient and puppies returned to normal within 24 to 48 hours. No effects were observed in puppies administered 0.5 mg/kg milbemycin oxime (minimum label dose).

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IVERHART MAX®

Soft Chew
(ivermectin/pyrantel pamoate/praziquantel)

For oral 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: 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 (Dirotaria immitis) for a month (30 days) after infection and the treatment and control of roundworms (Toxocara canis, Toxascaris leonina), hookworms (Ancylostoma caninum, Uncinia stenocephala, Ancylostoma braziliense), and tapeworms (Dipylidium caninum, Taenia platiurus) infections in dogs was demonstrated in well-controlled laboratory studies.

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 kilogram (0.72 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 Large</td>
<td>272 mcg</td>
<td>228 mg</td>
<td>228 mg</td>
<td></td>
</tr>
</tbody>
</table>

IVERHART MAX Soft Chew is recommended for dogs 5 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 chew(s) to their box to protect from light. The soft chew 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. If 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 on or 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 the 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 overweight animals and dogs weighing less than 10 lbs (see Animal Safety). The 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 Dirotaria 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 microfilaria 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, limpesis, 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 hyperesthesia.

To report suspected adverse events, for technical assistance, or to obtain a copy of the Safety Data Sheet (SDS), contact Virbac at 1-800-338-3930 or visit our website 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/AnimalVeterinary/SafetyHealth.

Effectiveness: Prevention of the tissue larval stage of heartworm (Dirotaria immitis) and the elimination of the adult stage of hookworm (Ancylostoma caninum, Uncinia stenocephala, Ancylostoma braziliense), roundworm (Toxocara canis, Toxascaris leonina), and tapeworm (Dipylidium caninum, Taenia platiurus) 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 (pilling), 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, pariasis, exacerbation, 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 label 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 mg/kg pyrantel, and 10.47 mg/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. 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 was 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, limpesis, 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.

Manufactured by:
Virbac AH, Inc.
Fort Worth, TX 76137 USA
Phone: 1-800-338-3930
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9/17.
Heartworm infection is on the rise and many dogs are going unprotected. Give your clients the bacon-flavored parasite protection they need, with:

- **SENTINEL® SPECTRUM® Chews** (milbemycin oxime/lufenuron/praziquantel)
- **IVERHART MAX® Soft Chew** (ivermectin/pyrantel pamoate/praziquantel)

To order both tasty options for your clinic, contact your Virbac representative at 1-844-4-VIRBAC (1-844-484-7222).

**Important Safety Information for SENTINEL® SPECTRUM® Chews (milbemycin oxime/lufenuron/praziquantel):** Dogs should be tested for heartworm infection prior to use. Mild hypersensitivity reactions have been noted in some dogs carrying a high number of circulating microfilariae. Treatment with fewer than 6 monthly doses after the last exposure to mosquitoes may not provide complete heartworm prevention. For complete product information, refer to the product insert. To obtain a product insert, contact Veterinary Technical Product Support at 1-800-338-3659, or visit us.virbac.com.

**Important Safety Information for IVERHART MAX® Soft Chew (ivermectin/pyrantel pamoate/praziquantel):** All dogs should be tested for existing heartworm infection before starting treatment with IVERHART MAX Soft Chew. Use with caution in sick, debilitated, or underweight dogs weighing less than 10 lb. Gastrointestinal and neurological signs, such as convulsions, have been reported following the use of ivermectin products. For complete product information, refer to the product insert. To obtain a product insert, contact Veterinary Technical Product Support at 1-800-338-3659, or visit us.virbac.com.

For complete product information, please see pages 16 and 17.

**DIAGNOSIS**
**COMPLEX ULCER**

- Evaluate for underlying cause of ulceration

**TREATMENT**
- Based on cytology results (pending culture):
  - Rods: Consider aminoglycoside or fluoroquinolone as first-line topical medication
  - Cocci: Consider triple antibiotic as first-line medication
  - Ulcer with infiltrate: Infection should be assumed, even if no bacteria or fungal organisms noted on cytology
- Evaluate previous and/or current medications when choosing topical therapy
- Change drug class if conditions worsen on current medical therapy
- Frequency (eg, 4-12 times daily) of topical medications depends on severity
- Topical serum or plasma drops recommended to treat melting corneal ulcers (eg, corneal malacia) until edges of ulcer become sharply defined
- Elizabethan collar
- Atropine (1-2 times daily), if not contraindicated
- ± oral NSAIDs, if not contraindicated
- Recheck frequently (eg, every 1-3 days)

**DIFFERENTIALS**
- KCS
- Trauma

**DIAGNOSIS**
**Lagophthalmos**

**TREATMENT**
- Temporary tarsorrhaphy to limit exposure, if needed
- Long-lasting topical lubricating ointments or gels
- Topical broad-spectrum antibiotic
- Treatment of underlying disease process
- Weekly rechecks until patient is healed

---

KCS = keratoconjunctivitis sicca
STT = Schirmer tear test
DIFFERENTIALS
- Nasal fold trichiasis secondary to conformation
- Medial canthal entropion secondary to conformation
- Foreign body behind third eyelid
- Eyelid mass

DIFFERENTIALS
- Ectopic cilia
- Distichia
- Entropion
- Eyelid mass

TREATMENT
- Surgical correction of eyelid and/or conformational abnormality
- Removal of foreign body or mass, if indicated
- Lubricating broad-spectrum topical antibiotic
- Elizabethan collar
- Recheck after 1 week

Nasal ulceration
Dorsal, ventral, or lateral ulceration

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Fiberglass kennels and cages from Mason Company are quieter, softer, warmer, attractive and more durable than cold metal.

Quiet Cottages™ and Heated Recovery Cages are the stacked caged system of the future.
- Molded, solid-surface fiberglass cage bodies have contemporary look and feel.
- Available with individual built-in drains to ensure sanitary conditions.
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- One piece fiberglass floor with 6” sides eliminates leaks.
- Individual drains to prevent cross contamination.
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Pericardial Disease in the Dog

Pericardial effusion can impair cardiac function by limiting normal cardiac filling and compressing the heart, resulting in cardiac tamponade. Acquired pericardial effusion is common in dogs and is most often idiopathic or caused by cardiovascular-related neoplasia. Transudates rarely cause clinical signs, with the exception of heart base tumors, which can obstruct lymphatic drainage, resulting in large, compressive effusion. Exudates are caused by infective or noninfective (eg, penetrating foreign body) pericarditis and are not common. Hemorrhagic effusion is most common and often occurs in older dogs with heart or heart base tumors and/or pericardial neoplasia. Idiopathic pericardial hemorrhage is the most prominent cause of pericardial hemorrhage in dogs younger than 6 years.

In cardiac tamponade, intrapericardial fluid pressure results in cardiac compression with subsequent low cardiac output and congestive heart failure. The development of cardiac tamponade depends on the rate—not simply the volume—of pericardial fluid accumulation. Acute and severe hypotension in cardiac tamponade can result in syncope and sudden death. Chronic cardiac tamponade, in which compensatory mechanisms lead to elevated venous pressure behind the heart, can result in congestive heart failure (primarily right-sided). Acute clinical signs include low blood pressure and jugular distension, with variable physical findings. Signs of chronic effusion include elevated jugular venous pressure, muffled heart sounds, ascites, and pulsus paradoxus. ECG may reveal decreased amplitude QRS complexes, electrical alternans, and/or ST segment elevation. Radiography typically demonstrates a globular-shaped heart. Echocardiography is highly sensitive for detection of pericardial effusion.

Pericardiocentesis is the treatment of choice for initial stabilization, as intrapericardial pressure typically drops dramatically once half the fluid volume has been drained. Drainage may be curative for idiopathic pericardial hemorrhage, but patients must be monitored for development of constrictive pericardial disease. Recurrent effusion or cases related to neoplasia require repeat drainage or surgery (eg, subtotal pericardiectomy). Prognosis is typically favorable for patients with idiopathic pericardial hemorrhage but is guarded in those with infective pericarditis and generally unfavorable in those with heart or heart base tumors.—Bonagura JD
Ready. Aim. Claro.

Fight canine otitis externa with one big dose of love. Claro® (florfenicol, terbinafine, mometasone furoate) Otic Solution is the only FDA-approved, single-dose treatment administered by you with guaranteed compliance and no at-home treatments.

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.

SPREAD THE LOVE IN YOUR CLINIC.

USE CLARO® FOR YOUR MOST COMMON OTITIS CASES.

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See page 25 for product information summary.
“Hands-Off” Neurology

Two parts of the neurologic examination—posture and gait analysis—do not require touching the patient. Initial distant posture assessment involves evaluating whether patients are standing, sitting, or lying down and whether they are able to right themselves and stand. Sitting sternally with both rear legs tucked under or extended straight forward is often noted in patients experiencing severe weakness or paralysis of the rear limbs, whereas a patient affected in all 4 limbs may require help to sit sternally. Head tilt may indicate unilateral vestibular disease, whereas a head turned to one side may indicate a forebrain lesion. Posture also provides information regarding pain (eg, an animal with cervical pain holding the head close to the ground with the back arched). Some postural presentations for certain regional spinal abnormalities are pathognomonic. For example, Schiff-Sherrington posture is seen in patients with sudden onset of a severe lesion of the thoracolumbar spinal cord.

Gait analysis is key to distinguishing neurologic from orthopedic conditions, as neurologic problems typically cause weakness and ataxia, whereas orthopedic problems cause lameness. There are 3 subtypes of ataxia:

- Proprioceptive ataxia is caused by lesions of the proprioceptive pathways of the brainstem or spinal cord and manifests as incoordination and inconsistent stride lengths.
- Cerebellar ataxia is characterized by hypermetria of the limbs, truncal sway, wide-based stance, and head tremors.
- Vestibular ataxia is caused by central or unilateral peripheral vestibular system disturbances and is recognized as falling, drifting, or rolling to one side. —Moore S

Antimicrobial Use in the Emergency Patient

Emergency patients with infectious disease may be stable and treated as outpatients, have sepsis and require hospitalization, or be critically ill with severe sepsis or septic shock. The presence or absence of critical illness affects the choice and route of antimicrobial administration. If the patient requires antimicrobials, considerations must be made regarding the patient, micro-organism, and antimicrobials. Potential adverse effects on the host may preclude an antimicrobial choice. The suspected organism and its intrinsic resistance to antimicrobials, whether the selected antimicrobials are bacteriostatic or bactericidal, and the ability of the antimicrobials to penetrate the affected tissue should all be considered.

In septic patients, culture and susceptibility testing are warranted; however, in patients with severe sepsis or septic shock, antimicrobial therapy should be initiated as soon as possible if obtaining a culture is expected to be delayed more than 45 minutes. Longer delays in initiating therapy in patients with severe sepsis or septic shock have been associated with increased rates of acute kidney injury, organ dysfunction, and length of hospital stay. Escalation therapy (ie, choosing a narrow-spectrum antibiotic and potentially switching when culture and susceptibility testing results are received) is standard when treating outpatients or hospitalized stable septic patients. De-escalation therapy (ie, choosing a broad-spectrum antibiotic then modifying based on culture and susceptibility results) may be considered for patients with severe sepsis or septic shock and has not been shown to promote multidrug resistance. There is little evidence regarding the appropriate duration of antimicrobial treatment; sepsis guidelines in humans have suggested a typical course of 7 to 10 days’ duration.—Epstein S

Potential adverse effects on the host may preclude an antimicrobial choice.
Otitis externa (OE), defined as inflammation of the external ear canal, is a common disease in dogs. Patients may exhibit a range of clinical signs, including head shaking, scratching, pain, and otic exudate. The PSPP (primary, secondary, perpetuating, and predisposing factors) system classifies OE as either primary, or secondary (Table). Primary causes create disease in the normal ear without any other cause or factor. In primary OE, the environment of the ear is changed, allowing secondary infection to occur. Secondary OE occurs when secondary causes create disease in an abnormal ear; these causes are generally easy to eliminate. Predisposing and perpetuating factors change the structure or function of the ear canal, thereby contributing or promoting OE (Table).1-4

Recent research has added to the understanding of these common pathogens and may aid in the management of canine OE patients.

Otic Microbiota & Mycobiota in Canine Otitis Externa

Jennifer L. Schori, VMD, MS

Otitis externa (OE), defined as inflammation of the external ear canal, is a common disease in dogs. Patients may exhibit a range of clinical signs, including head shaking, scratching, pain, and otic exudate.

Established methods for microorganism identification include culture and cytology. However, more advanced techniques are making further characterization of microbiomes possible.

Microbiota in Dogs With vs Without Otitis Externa

A recent study of canine OE used metagenomic techniques to evaluate the microbiota of canine ear canals in healthy versus atopic dogs without clinical signs of OE.40 Results confirmed those of an earlier study that found a more diverse population of bacteria present in the canine ear canal than had been previously noted with bacterial culture techniques.41 In addition, significant differences between healthy and allergic dogs were noted in the taxonomic distribution of bacterial groups found in ear canals.

In total, 15 bacterial groups were differentially represented between the 2 sets of dogs. Of these, 13 were overrepresented.

Expanding Knowledge of Canine Otic Microbiota & Mycobiota

The canine microbiome is composed of commensal bacteria (ie, microbiota) and fungal organisms (ie, mycobiota). Numerous studies relating to the human microbiome have been published and have observed several associating changes in the microbiome with a number of skin diseases.5-8 Although few such studies exist in dogs, a recent paper evaluating the canine skin microbiome found that dogs with allergic skin disease had a lower microbiome species richness as compared with healthy dogs.9 Further studies have investigated the microbiota and mycobiota of canine ears with and without OE.

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Recent research has added to the understanding of these common pathogens and may aid in the management of canine OE patients.
in the atopic dogs and included bacterial groups from the genera *Staphylococcus* and *Ralstonia* (previously classified in the genus *Pseudomonas*). In healthy dogs, 2 groups were overrepresented, including from the genus *Escherichia*. The authors proposed that this shift in bacterial population may play a role in the increased propensity for atopic dogs to develop OE.

Mycobiota in Dogs With vs Without Otitis Externa

Studies evaluating the mycobiota of dogs with and without allergic disease and/or OE have paralleled microbiota studies. In one study, metagenomic techniques were used to compare the cutaneous mycobiota of healthy dogs and dogs with allergic skin disease and no clinical signs. As with microbiota, the skin of allergic dogs was found to have decreased fungal richness; decreased fungal diversity was also noted in the ears of these dogs.

Earlier culture-based studies have documented the presence of *M pachydermatis*, *Aspergillus* spp, *Penicillium* spp, and *Candida* spp in canine ears, with *M pachydermatis* predominating in dogs with allergic skin disease and/or otitis. Recent analysis using metagenomic techniques for identification, however, has identified a richer fungal community than that documented by culture, including fungi from 10 different phyla. As in studies of skin microbiota, the richness and diversity of external ear canal mycobiota was decreased in dogs with OE as compared with healthy dogs. This study also identified a significantly higher abundance of *M pachydermatis* in affected ears.

**Conclusion**

Ongoing studies have revealed the microbiome of the canine external ear canal to be far more diverse than previously thought. Advanced identification techniques have allowed for more detailed characterization of the microbiota and mycobiota present in healthy dogs as compared with allergic dogs with and without OE. Further research may help determine the significance of these changes, how they relate to development of clinical disease, and whether changes in management of these patients might modify outcomes.

**PSPP Classification System**

**Primary Causes**
- Allergy
- Autoimmune disorders (eg, pemphigus)
- Endocrine disorders
- Epithelialization disorders
- Foreign bodies
- Glandular disorders
- Immune-mediated causes (eg, drug reactions)
- Fungal (eg, aspergillosis), viral (eg, canine distemper), or parasitic infection

**Secondary Causes**
- Bacterial and/or fungal infection (particularly *Staphylococcus intermedius*, *Streptococcus* spp, *Pseudomonas aeruginosa*, *Escherichia coli*, and *Proteus mirabilis* bacteria and the yeast *Malassezia pachydermatis*)
- Medication reaction
- Overcleaning
- Yeast overgrowth

**Predisposing Factors**
- Ear conformation
- Excessive moisture
- Obstruction of ear canal (eg, polyp)
- Primary otitis media
- Systemic disease
- Treatment effects (eg, alteration of microflora, trauma from cleaning)

**Perpetuating Factors**
- Ear epithelium changes (eg, epithelial cell migration failure)
- Changes to ear canal (eg, edema, stenosis, proliferation)
- Tympanic membrane changes (eg, dilation, rupture)
- Glandular (eg, sebaceous hyperplasia)
- Periarticular fibrosis
- Middle ear disorders (eg, otitis media)

**References**

Intravenous lipid emulsions (ILEs) are part of the standard of care for intoxication in human medicine and have become common for treating specific intoxications in small animal medicine. The mechanism by which they improve clinical signs of toxicity remains unknown. One theory is that lipids increase cardiac performance, possibly by acting as an energy source for myocardial mitochondria or by increasing intracellular calcium in cardiac myocytes. A second theory is that ILEs act as a “lipid sink” that draws lipid-soluble intoxicants into the bloodstream, where they are sequestered and ultimately cleared; this is likely the mechanism by which ILEs work for lipophilic drug intoxication (eg, amlodipine, carprofen, diazepam, digoxin, itraconazole, ivermectin, lidocaine, ketoprofen, naproxen, trazadone, vinblastine).

There is no clinical evidence on the short-term safety of ILE boluses. Although potential adverse effects include decreased neutrophil function, pancreatitis, fat emboli, phlebitis, and hypersensitivity reactions, there have been no reports of negative outcomes related to ILE therapy for intoxication.

Optimal dosing of ILE is unknown. Reports vary widely, but the most commonly cited dose is a 1.5-mL/kg bolus (typically over 1-2 minutes), followed by a 30- to 60-minute infusion (0.25 mL/kg/min). Human studies citing treatment with a 1.5-mL/kg bolus followed by 0.25-0.5 mL/kg/min may serve as a possible dosage regimen pending further studies in veterinary species.—Epstein S

Although potential adverse effects include decreased neutrophil function, pancreatitis, fat emboli, phlebitis, and hypersensitivity reactions, there have been no reports of negative outcome related to ILE therapy for intoxication.
Increased & Decreased Creatinine

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

Following are differential diagnoses, listed in order of likelihood, for patients presented with increased or decreased creatinine.

Increased Creatinine

Of note, any increase in creatinine should be interpreted in conjunction with urine specific gravity.

- Renal disease
- Dehydration
- Postrenal obstruction or leakage
- Breed predisposition
  - Sighthounds (eg, greyhounds [due to increased muscle mass])
  - Birman cats
  - Siberian and, to a lesser extent, Siamese and Somali cats

Decreased Creatinine

- Decreased muscle mass due to starvation or cachexia
- Increased glomerular filtration rate
  (eg, overhydration, portosystemic shunts, any cause of severe polyuria/polydipsia, pregnancy)

References


The great tasting nutrition of w/d® Multi-Benefit is a four-hit wonder formulated:

1. To help minimize blood glucose fluctuation, which may reduce insulin dosage
2. To address fiber-responsive GI conditions such as colitis, diarrhea or constipation
3. Low in fat and calories to help lower lipid levels and avoid weight gain
4. With S+OXSHIELD™ to promote a urinary environment that reduces the risk of developing struvite and calcium oxalate crystals

RECOMMEND w/d® MULTI-BENEFIT A FOUR-HIT WONDER FOR FOUR CONDITIONS
Top 5 Causes of Nonblanching Skin Lesions

Darren Berger, DVM, DACVD
Iowa State University

Patchy, erythemic-to-violaceous skin lesions are commonly encountered in veterinary patients. Diascopy is a quick and efficient test that can help determine whether lesions are the result of vasodilation secondary to inflammation or associated with a more clinically concerning process.

In diascopy, a clear glass slide is placed over an erythemic lesion and pressure is applied while care is taken not to injure the patient or break the slide. A positive diascopy result occurs when the applied pressure results in blanching of the skin (Figure 1), as seen in cases of erythema secondary to simple vascular vasodilation. A negative diascopy result occurs when the applied pressure does not result in skin blanching.

Following are 5 of the author’s more common causes of skin lesions that will not blanch.

1. Cutaneous Adverse Drug Reactions
Cutaneous adverse drug reactions can result from administration of medications. Commonly implicated substances include antimicrobials (eg, β lactams, sulfonamides), NSAIDs (Figure 2), and antiparasitics. Drug reactions can appear as any dermatologic condition, with lesions being focal-to-generalized. Typical lesion patterns include urticarial angioedema, maculopapular eruptions, vesiculobullous reactions, nodules,

TOP 5 CAUSES OF NONBLANCHING SKIN LESIONS

1. Cutaneous Adverse Drug Reactions
2. Petechiae & Ecchymoses from Coagulation Disturbances
3. Epitheliotropic T-Cell Lymphoma
4. Cutaneous Vasculitis
5. Erythema Multiforme
exfoliative erythroderma, purpuric lesions, pemphigus-like lesions, erythema multiforme, vasculitis, and toxic epidermal necrolysis. Clinical signs typically occur within 1 to 3 weeks of initiating administration of the offending drug but can also arise more quickly (eg, within days), after a single treatment, after years of use, or days after the medication has been stopped.

Because cutaneous adverse drug reactions can overlap with many dermatologic conditions, diagnosis is primarily based on suspicion from patient history, physical examination, and the elimination of other differentials. No particular clinical pathology or histopathology results can specifically indicate a cutaneous adverse drug reaction. Definitive diagnosis typically requires drug provocation testing (ie, readministration of the suspected offending agent), but this is considered unethical in many cases due to the severity and potentially fatal nature of disease.

Treatment consists of supportive care, immunomodulatory therapy (eg, glucocorticoids, cyclosporine), discontinuation of all possible offending drugs or nutraceuticals, and avoidance of chemically related drugs. In rare refractory cases, other immunomodulatory therapies such as intravenous immunoglobulin may be effective.

Petechiae & Ecchymoses from Coagulation Disturbances

Petechiae and ecchymoses are erythemic-to-violaceous macular discolorations of the skin or mucosal surface. They occur secondary to blood vessel bleeding that may coalesce to affect a large surface area (Figure 3). These lesions are often seen with quantitative and/or qualitative hemostatic disorders, the most common of which is thrombocytopenia.

Diagnosis of these conditions involves a thorough patient history, CBC with blood smear review, coagulation profile, platelet function tests, bone marrow aspiration, infectious disease testing, and, if necessary, genetic testing.
Epitheliotropic T-Cell Lymphoma

Epitheliotropic T-cell lymphoma is an uncommon disease of older animals in which neoplastic cells infiltrate the epidermal structures. The exact etiology is unknown, but an association with atopy has been proposed. Epitheliotropic T-cell lymphoma has various clinical presentations, including generalized exfoliative erythroderma (Figure 4), erosive-to-ulcerative plaque, cutaneous nodules, mucocutaneous lesions, and/or disease confined to the oral mucosa. Pruritus is common and, in the author’s experience, often leads to a misdiagnosis of allergic hypersensitivity. Patients with disease confined to the mucocutaneous junctions or oral mucosa are commonly misdiagnosed with autoimmune disease.

Diagnosis is confirmed via biopsy with histopathology, which demonstrates the characteristic epitheliotropism of the neoplastic cells and differentiates this condition from nonepitheliotropic cutaneous lymphoma. Prognosis is poor, with a reported median survival time of 6 months following diagnosis.

Several therapeutic protocols have been proposed in the treatment of epitheliotropic T-cell lymphoma in dogs, but oral administration of lomustine is most commonly used.

Cutaneous Vasculitis

Vasculitis is an uncommon disorder characterized by an aberrant immune response that results in blood vessel damage. It is considered to be a reaction pattern with numerous potential triggers. Possible inciting causes include medications, vaccinations, infectious disease, parasites, adverse reactions to food, familial disease, metabolic derangements, neoplasia, and idiopathic forms. Cutaneous lesions are usually well-demarcated and consist of edema,
purpura, alopecia, erosions, focal punctate ulcers, crusting, necrosis, and/or eschar formation (Figure 5). Although lesions may occur anywhere, the extremities, tips of the ears, oral mucosa, and tail are more commonly affected. Patients may also display systemic signs, which should correlate with disease severity.

Diagnosis is based on clinical suspicion and compatible skin biopsy results. Newer lesions show the best diagnostic yield of biopsy specimens, as chronic lesions may only reveal ischemic changes. Following a confirmed diagnosis, the patient should be evaluated for specific etiologies via blood work, urinalysis, tick-borne disease testing, imaging studies, coagulation profiles, and immunologic assays. In cases in which diagnostic testing fails to identify a probable cause, a diet elimination trial should be considered, as a retrospective study previously identified food allergy as the underlying etiology in a subset of cutaneous vasculitis cases.

Therapy should focus on removal or treatment of the underlying cause and immunomodulation. Prognosis is highly variable and dependent on the underlying cause, lesion extent, and degree of systemic involvement.

**Erythema Multiforme**

Erythema multiforme is an uncommon condition that, in veterinary medicine, is inappropriately synonymous with a drug reaction. Similar to vasculitis, numerous potential inciting causes (eg, medications, cutaneous adverse food reactions, bacterial infection, viral infection, vaccinations, neoplasia, idiopathic forms) have been associated with erythema multiforme. Disease varies from mild to severe based on systemic clinical signs. Common lesions include erythematous macules, papules, and plaque with central clearing that creates serpiginous-to-annular areas that eventually become necrotic, crusted, or hyperpigmented (Figure 6). Lesions commonly involve the ventrum, concave aspects of the ears, footpads, and/or mucocutaneous junctions.

Diagnosis should be made via biopsy with histopathology, which should demonstrate indicative microscopic changes. After diagnosis is confirmed, blood work, urinalysis, infectious disease testing, and advanced imaging should be pursued to evaluate for underlying disease.

Initial treatment should consist of removing potential offending agents (eg, discontinuing medications, treating infections, avoiding suspect dietary antigens) and providing supportive care. Mild cases may resolve spontaneously, but immunosuppressive therapy is required in most cases and may be needed lifelong in chronic relapsing or idiopathic cases. Prognosis ranges from good to poor and is mostly dependent on the identification of the underlying cause and severity of systemic disease.

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**POLL**

**Which of the following causes of nonblanching skin lesions have you seen in practice? Check all that apply.**

A. Cutaneous adverse drug reaction  
B. Petechiae and/or ecchymoses from coagulation disorders  
C. Epitheliotropic T-cell lymphoma  
D. Cutaneous vasculitis  
E. Erythema multiforme  
F. I have not seen any nonblanching skin lesions.

Scan the QR code to submit your answer and see the other responses! The poll is located at the bottom of the article.

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.
NexGard® (afoxolaner) Chewables

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

Description:
NexGard® (afoxolaner) is available in four sizes of beef-flavored, soft chewables for oral administration to dogs and puppies according to their weight. Each chewable is formulated to provide a minimum afoxolaner dosage of 1.14 mg/lb (2.5 mg/kg). Afoxolaner has the chemical composition 1-Naphthaleneacarbamide, 4-(3-chloro-5-trifluoromethyl)-phenyl)-4-(4,5-dihydro-5-(trifluoromethyl)-3-isoxazolyl)-N-[2-oxo-2-[(2,2,2-trifluoroethyl)amino]ethyl].

Indications:
NexGard kills adult fleas and is indicated for the treatment and prevention of flea infestations (Chelexophthalmus felis), and the treatment and control of Black-legged tick (Ixodes scapularis), American Dog tick (Dermacentor variabilis), Lone Star tick (Amblyomma americanum), and Brown dog tick (Rhipicephalus sanguineus) infestations in dogs and puppies 8 weeks of age or older, weighing 4 to 240 lbs. NexGard is also indicated for the prevention of flea-borne Borrelia infections as a direct result of killing Ixodes scapularis vector ticks.

Dosage and Administration:
NexGard is given orally once a month, at the minimum dosage of 1.14 mg/lb (2.5 mg/kg).

Dosing Schedule:

<table>
<thead>
<tr>
<th>Body Weight</th>
<th>Afoxolaner Per Chewable (mg)</th>
<th>Chewables Administered</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 to 10 lbs</td>
<td>11.3</td>
<td>One</td>
</tr>
<tr>
<td>10.1 to 24 lbs</td>
<td>26.3</td>
<td>One</td>
</tr>
<tr>
<td>24.1 to 60 lbs</td>
<td>68.3</td>
<td>One</td>
</tr>
<tr>
<td>60.1 to 121 lbs</td>
<td>138</td>
<td>One</td>
</tr>
<tr>
<td>Over 121 lbs</td>
<td>Administer the appropriate combination of chewables</td>
<td></td>
</tr>
</tbody>
</table>

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

Flea Treatment and Prevention:
Treatment with NexGard may begin at any time of the year. In areas where fleas are common year-round, monthly treatment with NexGard should continue the entire year without interruption.

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

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

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

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

Precautions:
Afoxolaner is a member of the isoxazolene class. This class has been associated with neurologic adverse reactions including tremors, ataxia, and seizures. Seizures have been reported in dogs receiving isoxazolene class drugs, even in dogs without a history of seizures. Use with caution in dogs with a history of seizures or neurologic disorders (see Adverse Reactions and Post-Approval Experience).

The safe use of NexGard in breeding, pregnant or lactating dogs has not been evaluated.

Adverse Reactions:
In a well-controlled US field study, which included a total of 333 households and 815 treated dogs (415 administered afoxolaner, 200 administered active control), no serious adverse reactions were observed with NexGard.

Over the 90-day study period, all observations of potential adverse reactions were recorded. The most frequent reactions reported at an incidence of >1% within any of the three months of observations are presented in the following table. The most frequently reported adverse reaction was vomiting. The occurrence of vomiting was generally self-limiting and of short duration and tended to decrease with subsequent doses in both groups. Five treated dogs experienced anorexia during the study, and two of those dogs experienced an anorexia with the first dose but not subsequent doses.

Table 1: Dogs With Adverse Reactions.

<table>
<thead>
<tr>
<th>Treatment Group</th>
<th>Afoxolaner N (%) (n=415)</th>
<th>Oral active control N (%) (n=200)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vomiting (with and without blood)</td>
<td>17 (4.1)</td>
<td>25 (12.5)</td>
</tr>
<tr>
<td>Dry/Itchy Skin</td>
<td>13 (3.1)</td>
<td>2 (1.0)</td>
</tr>
<tr>
<td>Diarrhea (with and without blood)</td>
<td>13 (3.1)</td>
<td>7 (3.5)</td>
</tr>
<tr>
<td>Lethargy</td>
<td>7 (1.7)</td>
<td>4 (2.0)</td>
</tr>
<tr>
<td>Anorexia</td>
<td>5 (1.2)</td>
<td>9 (4.5)</td>
</tr>
</tbody>
</table>

Number of dogs in the afoxolaner treatment group with the identified abnormality.

In the US field study, one dog with a history of seizures experienced a seizure on the same day after receiving the first dose and on the same day after receiving the second dose of NexGard. This dog experienced a third seizure one week after receiving the third dose. The dog remained enrolled and completed the study. Another dog with a history of seizures had a seizure 19 days after the third dose of NexGard. The dog remained enrolled and completed the study. A third dog with a history of seizures received NexGard and experienced no seizures throughout the study.

Post-Approval Experience (July 2018):
The following adverse events are based on post-approval adverse drug experience reporting. Not all adverse events are reported to FDA/CVM. It is not always possible to reliably estimate the adverse event frequency or establish a causal relationship to product exposure using these data. The following adverse events reported for dogs are listed in decreasing order of reporting frequency for NexGard.

Vomiting, ptosis, lethargy, diarrhea (with and without blood), anorexia, seizure, hyperactivity/ restlessness, panting, erythema, ataxia, dermatitis (including rash, papules), allergic reactions (including hives, swelling), and tremors.

Contact Information:
For a copy of the Safety Data Sheet (SDS) or to report suspected adverse drug events, contact Merial at 1-888-637-4251 or www.nexgardfordogs.com.

For additional information about adverse drug experience reporting for animal drugs, contact FDA at 1-888-FDA-VETS or online at http://www.fda.gov/AnimalVeterinary/SafetyHealth.

Mode of Action:
Afoxolaner is a member of the isoxazolene family, shown to bind at a binding site to inhibit insect and arachnid ligand-gated chloride channels, in particular those gated by the neurotransmitter gamma-aminobutyric acid (GABA), thereby blocking pre- and post-synaptic transfer of chloride ions across cell membranes. Prolonged afoxolaner-induced hyperexcitation results in uncontrolled activity of the central nervous system and death of insects and arachnids. The selectivity of afoxolaner between insects and arachnids and mammals may be inferred by the differential sensitivity of the insects and arachnids’ GABA receptors versus mammalian GABA receptors.

Effectiveness:
In a well-controlled laboratory study, NexGard began to kill fleas four hours after initial administration and demonstrated >93% effectiveness at eight hours. In a separate well-controlled laboratory study, NexGard demonstrated 100% effectiveness against adult fleas 24 hours post-infection for 35 days, and was >93% effective at 12 hours post-infection through Day 21, and on Day 35. On Day 28, NexGard was 81.1% effective 12 hours post-infection.

Dogs in both the treated and control groups that were infested with fleas on Day -1 generated flea eggs at 12- and 24-hours post-treatment (0-11 eggs and 1-17 eggs in the NexGard treated dogs, and 4-90 eggs and 0-118 eggs in the control dogs, at 12- and 24-hours, respectively). At subsequent evaluations post-infection, fleas from dogs in the treated group were essentially unable to produce any eggs (0-1 eggs) while fleas from dogs in the control group continued to produce eggs (1-141 eggs). In a 90-day US field study conducted in households with existing flea infestations of varying severity, the effectiveness of NexGard against fleas on the Day 30, 60 and 90 visits compared with baseline was 98.0%, 99.7%, and 99.9%, respectively.

Collectively, the data from the three studies (two laboratory and one field) demonstrate that NexGard kills fleas before they can lay eggs, thus preventing subsequent flea infestations after the start of treatment of existing flea infestations.

In well-controlled laboratory studies, NexGard demonstrated >93% effectiveness against Dermacentor variabilis, >94% effectiveness against Ixodes scapularis, and >90% effectiveness against Rhipicephalus sanguineus, 48 hours post-infestation for 35 days. At 72 hours post-infection, NexGard demonstrated >97% effectiveness against Amblyomma americanum for 30 days. In two separate, well-controlled laboratory studies, NexGard was effective at preventing Borrelia burgdorferi infections after dogs were infested with Ixodes scapularis vector ticks 28 days post-treatment.

Animal Safety:
In a margin of safety study, NexGard was administered orally to 8 to 9-week-old Beagle puppies at 1, 3, and 5 times the maximum exposure dose (6.3 mg/kg) for three treatments every 28 days, followed by three treatments every 14 days, for a total of six treatments. Dogs in the control group were sham-dosed. There were no clinically-relevant effects related to treatment on physical examination, body weight, food consumption, clinical pathology (hematology, clinical chemistries, or coagulation tests), gross pathology, histopathology or organ weights. Vomiting occurred throughout the study, with a similar incidence in the treated and control groups, including one dog in the 5x group that vomited four hours after treatment.

In a well-controlled field study, NexGard was used concomitantly with other medications, such as vaccines, anthelminths, antibiotics (including topicalis), steroids, NSAIDS, anesthetics, and anthistamines. No adverse reactions were observed from the concomitant use of NexGard with other medications.

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

Hov Supplied:
NexGard is available in four sizes of beef-flavored soft chewables: 11.3, 28.3, 68, and 138 mg afoxolaner. Each chewable size is available in color-coded packages of 1, 3 or 6 beef-flavored chewables.

NADA 141-406, Approved by FDA
Marketed by: Frontline Vet Labs™, a Division of Merial, Inc.
Duluth, GA 30096-4604 USA
Made in Brazil.
©2018 Merial. All rights reserved.
IMPORTANT SAFETY INFORMATION: NexGard® is for use in dogs only. The most frequently reported adverse reactions include vomiting, pruritus, lethargy, diarrhea and lack of appetite. The safe use of NexGard® in pregnant, breeding, or lactating dogs has not been evaluated. Use with caution in dogs with a history of seizures or neurologic disorders. For more information, see the full prescribing information or visit www.NexGardClinic.com.

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1Data on file.

Powerful protection can also be gentle:

✓ Safe for puppies as young as 8 weeks of age weighing 4 lbs or more
✓ Over 140 million doses of afoxolaner have been prescribed1
✓ And it’s the only flea and tick control product indicated for the prevention of Borrelia burgdorferi infections as a direct result of killing Ixodes scapularis vector ticks

Prescribe peace of mind.

What one little chew can do
Explaining to owners that an indoor lifestyle is no guarantee their cats won’t become infected with heartworms is essential.

Making the Case for Heartworm Prevention in Cats

While they are harder to diagnose than dogs, cats get heartworm disease, too

Q. You’re a big believer in heartworm prevention in cats. What has driven that belief?
A. I saw my first feline heartworm case more than 25 years ago. The cat had died suddenly, so I performed a necropsy and found two adult heartworms in the heart. Back then, there were no preventives for cats, and veterinarians and owners were largely unaware of the problem. Today, awareness is higher and we have several products to choose from, which makes compliance easier. But we still have a long way to go.

Q. Heartworm screening is more challenging in cats than dogs. What is your approach?
A. Heartworm testing in cats has limitations, especially for routine screening. Some wellness panels only include antigen tests, which detect adult female worms; however, cats often have male-only and immature heartworms that can’t be detected on antigen tests. If a feline patient presents with unexplained cough or vomiting, we run both antibody and antigen tests. Antibody tests can detect current or recent infections of both male and female heartworms. The limitation is that it can’t determine if a cat is currently infected and the sensitivity of the test is nowhere near as accurate as an antigen test. Other diagnostic strategies include thoracic radiography, which is helpful in assessing the severity and progression of pulmonary disease, and ultrasonography, which can help confirm the presence of adult worms.

Q. How do you talk to cat owners about heartworm disease?
A. I stress that cats should not be treated as second-class citizens and emphasize that a lack of approved treatments makes prevention essential. We also educate owners about heartworm associated respiratory disease (HARD), which can be caused by infections from either immature or adult worms. Comparing HARD to asthma or COPD in people is an easy way to help owners understand how serious and long-lasting the condition can be. If owners are more motivated about issues like flea control than heartworm prevention, recommending a broad-spectrum product can be a good way to ensure patients are protected from internal as well as external parasites.

Q. How do you make the threat of heartworms feel real to cat owners—especially if they have indoor cats?
A. An indoor lifestyle protects cats from a number of threats, but it’s no guarantee against heartworms. I explain that mosquitoes readily enter houses through screens, open doors, attic soffits and bathroom exhaust vents, and may hover near doorways and garages, waiting to gain entry. I want owners to understand that while they can’t always prevent mosquitoes from biting their cats, they can readily prevent heartworms by administering preventives year-round.
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Esophageal Perforation from Foreign Body

Jonathan Miller, DVM, MS, DACVS
Oradell Animal Hospital
Paramus, New Jersey

In the Literature

FROM THE PAGE …

Esophageal foreign bodies (EFBs) can occur in dogs that have ingested a bone, fishhook, dog treat, or other object. These foreign bodies should be addressed quickly to avoid complications (eg, esophagitis, aspiration pneumonia, stricture, perforation). Treatment typically involves endoscopic removal or dislodging of the EFB to redirect it into the stomach for either digestion or surgical removal.

Brief Summary: Before using please consult the product insert, a summary of which follows.

ANAIDA 200-599, Approved by FDA

Carprieve® (carprofen) Chewable Tablets
Non-steroidal anti-inflammatory drug
For oral use in dogs only

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

INDICATIONS: Carprieve is indicated for the relief of pain and inflammation associated with osteoarthritis and for the control of postoperative pain associated with soft tissue and orthopedic surgeries in dogs.

CONTRAINDICATIONS: Carprieve should not be used in dogs exhibiting previous hypersensitivity to carprofen.


All dogs should undergo a thorough history and physical examination before initiation of NSAID therapy. Appropriate laboratory tests to establish hematological and serum biochemical baseline data prior to, and periodically during, administration of any NSAID should be considered. Owners should be advised to observe for signs of potential drug toxicity.

PRECAUTIONS: As a class, cyclooxygenase inhibitory NSAIDs may be associated with gastrointestinal, renal, and hepatic toxicity. The most frequently reported effects have been gastrointestinal signs. Events involving suspected renal, hematologic, neurologic, dermatologic, and hepatic effects have also been reported.

Patients at greatest risk for renal toxicity are those that are dehydrated, on concomitant diuretic therapy, or those with renal, cardiovascular, and/or hepatic dysfunction. Concurrent administration of potentially nephrotoxic drugs should be approached cautiously, with appropriate monitoring. Concomitant use of carprofen with other anti-inflammatory drugs, such as other NSAIDs or corticosteroids, should be avoided because of the potential increase of adverse reactions, including gastrointestinal ulcerations and/or perforations.

Carprieve is not recommended for use in dogs with bleeding disorders (e.g., Von Willebrand disease), as safety has not been established in dogs with these disorders. The safe use of Carprieve in animals less than 6 weeks of age, pregnant dogs, dogs used for breeding purposes, or in lactating bitches has not been established.

Due to the liver flavoring contained in Carprieve chewable tablets, store out of the reach of dogs and in a secured area.

INFORMATION FOR DOG OWNERS: Carprieve, like other drugs of its class, is not free from adverse reactions. Owners should be advised of the potential for adverse reactions and be informed of the clinical signs associated with drug intolerance. Adverse reactions may include decreased appetite, vomiting, diarrhea, dark or tarry stools, increased water consumption, increased urination, pale gums due to anemia, yellowing of gums, skin or whites of the eye due to jaundice, lethargy, incoordination, seizure, or behavioral changes.

Serious adverse reactions associated with this drug class can occur without warning and in rare situations result in death (see Adverse Reactions). Owners should be advised to discontinue Carprieve therapy and contact their veterinarian immediately if signs of intolerance are observed.

ADVERSE REACTIONS: During investigational studies for the capsule formulation with twice daily administration of 1 mg/lb, no clinically significant adverse reactions were reported. Some clinical signs were observed during clinical field studies (n=201) which were similar for carprofen caplet- and placebo-treated dogs. Incidences of the following were observed in both groups: vomiting (9%), diarrhea (4%), changes in appetite (2%), lethargy (1%), behavioral changes (1%), and constipation (0%). The product vehicle served as control. There were no serious adverse events reported during clinical field studies with once daily administration of 2 mg/lb. The following categories of abnormal health observations were reported. The product vehicle served as control.

Percentage of Dogs with Abnormal Health Observations Reported in Clinical Field Studies (2 mg/lb once daily)

<table>
<thead>
<tr>
<th>Observation</th>
<th>Carprofen (n=121)</th>
<th>Placebo (n=130)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inappetence</td>
<td>1.3</td>
<td>0.1</td>
</tr>
<tr>
<td>Vomiting</td>
<td>1.3</td>
<td>0.8</td>
</tr>
<tr>
<td>Diarrhea/Soft stool</td>
<td>0.8</td>
<td>0.6</td>
</tr>
<tr>
<td>Behav change</td>
<td>0.8</td>
<td>0.8</td>
</tr>
<tr>
<td>Rash</td>
<td>0.8</td>
<td>0.8</td>
</tr>
<tr>
<td>SAP increase</td>
<td>0.8</td>
<td>0.6</td>
</tr>
<tr>
<td>ALT increase</td>
<td>4.5</td>
<td>4.6</td>
</tr>
<tr>
<td>AST increase</td>
<td>2.3</td>
<td>0.8</td>
</tr>
<tr>
<td>BUN increase</td>
<td>3.1</td>
<td>1.5</td>
</tr>
<tr>
<td>Ketonuria</td>
<td>16.3</td>
<td>12.1</td>
</tr>
</tbody>
</table>

Clinical pathology parameters listed represent reports of increases from pre-treatment values; medical judgment is necessary to determine clinical relevance. During investigational studies of surgical pain for the caplet formulation, no clinically significant adverse reactions were reported. The product vehicle served as control.

Percentage of Dogs with Abnormal Health Observations Reported in Surgical Pain Field Studies with Capsules (2 mg/lb once daily)

<table>
<thead>
<tr>
<th>Observation*</th>
<th>Carprofen (n=148)</th>
<th>Placebo (n=148)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vomiting</td>
<td>18.1</td>
<td>12.4</td>
</tr>
<tr>
<td>Diarrhea/Soft stool</td>
<td>8.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Occur disease</td>
<td>2.7</td>
<td>0.0</td>
</tr>
<tr>
<td>Inappetence</td>
<td>1.4</td>
<td>0.0</td>
</tr>
<tr>
<td>Diarrhea/Soft stool</td>
<td>0.7</td>
<td>1.3</td>
</tr>
<tr>
<td>Dysuria</td>
<td>0.7</td>
<td>0.0</td>
</tr>
<tr>
<td>Asthma</td>
<td>0.7</td>
<td>0.0</td>
</tr>
<tr>
<td>Oral/Peridontal disease</td>
<td>0.7</td>
<td>1.3</td>
</tr>
<tr>
<td>Urinary tract disease</td>
<td>1.4</td>
<td>1.3</td>
</tr>
<tr>
<td>Wound drainage</td>
<td>1.4</td>
<td>1.3</td>
</tr>
</tbody>
</table>

* A single dog may have experienced more than one occurrence of an event.

During investigational studies for the chewable tablet formulation, gastrointestinal signs were observed in some dogs. These signs included vomiting and soft stools.

Post-Approval Experience:
Although not all adverse reactions are reported, the following adverse reactions are based on voluntary post-approval adverse drug experience reporting by owners and veterinarians. The categories of adverse reactions are listed in decreasing order of frequency by body system.

Gastrointestinal: Vomiting, diarrhea, constipation, inappetence, melena, hematomeningeal, gastrointestinal ulceration, gastrointestinal bleeding, pancreatitis.
Hepatic: Hepatopathy, vomiting, jaundice, acute hepatic necrosis, hepatic enzyme elevation, abnormal liver function tests, hepatic steatosis, bilirubinuria, hyperbilirubinemia.
Approximately one fourth of hepatic reports were in Labrador Retrievers. Neurologic: Ataxia, paraesthesia, paralysis, vestibular signs, disorientation. Urinary: Hematuria, polyuria, polydipsia, urinary incontinence, urinary tract infection, azotemia, acute renal failure, bladder abnormalities including acute tubular necrosis, renal tubular acidosis, glucosuria.

Behavioral: Sedation, lethargy, hyperactivity, restlessness, aggressiveness.
Hematologic: Immune-mediated hemolytic anemia, immune-mediated thrombocytopenia, hemolytic uremic syndrome, splenomegaly.
Dermatologic: Pruritus, increased shedding, alopecia, pyogranulomatous dermal/mucous membrane (foot pads), necrotising pancreatitis/vasculitis, ventral eczematous. Immunologic or hypersensitivity: Facial swelling, hives, anaphylaxis.

In rare situations, death has been associated with some of the adverse reactions listed above.

To report a suspected adverse reaction call 1-866-581-5777.

DOSAGE AND ADMINISTRATION: Always provide Client Information Sheet with prescription. Carefully consider the potential benefits and risk of Carprieve and other treatment options before deciding to use Carprieve. Use the lowest effective dose for the shortest duration consistent with individual response. The recommended dosage for oral administration to dogs is 2 mg/lb of body weight daily. The total daily dose may be administered as 2 mg/lb of body weight once daily or divided and administered as 1 mg/lb twice daily. For the control of postoperative pain, administer approximately 2 hours before the procedure.

See product insert for complete dosing and administration information.

STORAGE: Store 25 mg and 75 mg Carprieve chewable tablets at 59-86°F (15-30°C). Store 100 mg Carprieve chewable tablets at controlled room temperature, 68°F (20°C). Store in tightly closed bottles.

HOW SUPPLIED: Carprieve chewable tablets are scored, and contain 25 mg, 75 mg, or 100 mg of carprofen per tablet. Each tablet size is packaged in bottles containing 30, 60, or 180 tablets.

Made in the UK.

Manufactured by Norbrook Laboratories Limited, Newry, BT35 6PU, Co. Down, Northern Ireland
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17 March 2017
Records spanning a 9-year period from 2 veterinary schools were retrospectively evaluated for this study. EFBs were identified in 125 dogs. Data from their records were assessed to determine the likelihood of esophageal perforation and to characterize clinical findings, treatment, and outcomes of dogs with EFB.

The most common EFBs detected were bones (44%) and fishhooks (30%). Perforation was diagnosed in 15 (12%) dogs; of these, 10 had a fishhook EFB and 5 had a bone EFB. Overall, dogs with fishhooks were 6.1 times more likely to perforate as compared with dogs with other types of EFB. No association between body weight and perforation was identified.

Endoscopic removal was successful in 90.9% of cases, including 95% of dogs with no perforation. Overall, 6 dogs with perforation of the esophagus required surgical intervention (ie, thoracotomy, exploration of the cervical region); 5 of these had a fishhook EFB.

---

**... TO YOUR PATIENTS**

Key pearls to put into practice:

1. Radiography followed by endoscopic examination should be a part of the diagnostic investigation in patients with suspected EFBs.
2. Owners of dogs with fishhook and bone foreign bodies should be warned of the potential for perforation and need for surgery.
3. Timely identification of a foreign body may lead to higher treatment success rates.

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Nutrient Deficiencies During Weight Loss in Dogs

Martha G. Cline, DVM, DACVN
Red Bank Veterinary Hospital
Tinton Falls, New Jersey

In the Literature

FROM THE PAGE …

In this study, a survey investigating nutrition recommendations for weight loss in dogs was distributed to general practice veterinarians. Of the 178 responses, reducing the patient’s caloric intake (eg, reducing amount fed, reducing/eliminating treats, changing to lower calorie adult maintenance diet) was recommended approximately 55% to 80% of the time. Although more common for patients with a BCS of 6-7/9 as compared with those with a BCS of 8-9/9, this recommendation was still made more than 50% of the time for all overweight or obese patients. Clinicians were more likely to recommend a therapeutic weight loss diet for patients with a BCS of 8-9/9.

To evaluate if nutrient adequacy was met in patients under caloric restriction, feeding guidelines from the labels of each diet used were analyzed for a hypothetical 44.1-lb (20-kg) dog with an ideal body weight of 33.1 lb (15 kg). The nutrients consumed per day for this hypothetical dog were calculated for each level of restriction and compared with recommended allowances. The authors found that nutrient deficiencies increased in number with progressive levels of caloric restriction of up to 60% of calculated maintenance energy requirements for current and ideal body weight. Nutrient deficiencies were more common in dogs fed over-the-counter (OTC) adult maintenance diets as compared with those fed OTC weight management diets. Although all the diets investigated met the Association of American Feed Control Officials recommendations for canine adult maintenance, diets sold OTC are typically not formulated to avoid nutrient deficiency during caloric restriction resulting in weight loss.

The diets investigated had low levels of many essential nutrients; choline was most commonly identified. The biologic functions of choline, a vitamin-like substance, include neurotransmission, hepatic lipid storage and transport, coagulation, and cell signaling. In a previous study, plasma choline concentrations decreased in obese dogs fed a therapeutic weight loss diet, but clinical signs associated with deficiency were not observed. Limitations of this study included its theoretical nature and lack of available research investigating the nutrient requirements of dogs undergoing weight loss. The authors highlighted the need for future studies investigating the nutritional status and health consequences of potential nutrient deficiencies in dogs undergoing weight loss.

FROM PAGE TO PATIENT

… TO YOUR PATIENTS
Key pearls to put into practice:

1. When making dietary recommendations, clinicians should be mindful that caloric restriction to achieve weight loss with an OTC adult maintenance or OTC weight management diet may result in nutrient deficiencies.

2. Clinicians should perform calculations to estimate a patient’s current caloric intake before initiating weight loss and making weight loss recommendations.

3. Referral to or consultation with a board-certified veterinary nutritionist should be considered to address potential nutrient deficiencies for patients requiring significant caloric restriction to achieve weight loss.

Reference
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Canine Anxiety Management: 
Finding Solutions to Fit Both Patients and Owners

Q Canine anxiety is a common problem. How can veterinarians and staff members build patient screening into their day-to-day practice?
A The point of screening for fear and anxiety is to identify departures from what's considered normal. “Normal” can vary a great deal from breed to breed and from animal to animal. If triggers cause behaviors that are outside what is normal for the dog, identifying those triggers is key. It can be as simple as asking the owner to fill out a questionnaire or having the technician ask some basic questions about the dog’s behavior.

Q What factors could affect success when managing dogs with anxiety?
A I tell veterinarians who refer to me to do so as early as possible to give me the best chance of success, and the same is true if veterinarians are treating these dogs in their own clinics. Just as you wouldn’t wait to fix a broken leg, when a dog exhibits aggression or destructive behavior, it’s important to intervene as soon as possible to prevent the pattern from becoming established.

This doesn't mean that dogs with severe anxiety or a long history of fear-based behavior can't be helped. We can achieve significant improvement, but it may require using a combination of several therapeutic modalities, including behavior modification, medication and supplements.

When assessing a case and how to approach it, I ask myself these questions:
• **How severe is the problem?** Is the safety of the owner or other people at risk? Is the patient at risk of being euthanized or relinquished because of the behavior disorder? Is the behavior predictable?
• **What kind of investment is the owner willing to make in behavior modification?** Can the owner afford the time and money to work with a trainer every two weeks for the next two months, or do we need to lean more heavily on medication and/or supplements?
• **Are the owner’s expectations realistic based on therapeutic options or do they need to be reset?** Owners sometimes have a vision of what they want their pet to be able to do. I recently worked with an owner whose aggressive dog had a history of biting. While the owner didn’t have children herself, she wanted her dog to be able to interact with kids when she took him on walks. We were able to make great strides in managing the dog’s aggression, but I told the owner she had to let go of that particular goal because her dog’s behavior was too unpredictable. It wasn’t necessary for the dog to like kids, he simply needed to avoid them.

• **Does the owner feel strongly about specific modalities?** I have clients who are strongly opposed to giving their dogs anxiolytic medications because they don't like the idea of “drugging” them. It’s important to be aware of concerns such as these when formulating a treatment plan.

Q How should veterinarians use a product like Purina® Pro Plan® Veterinary Supplements Calming Care Probiotic Supplement?
A If the dog has a chronic, complex case of anxiety, chances are that multiple forms of intervention will be needed. I recently worked with a noise-phobic dog that was on two medications for anxiety. Typically, she would get stressed with every storm, refuse to go outside and later develop diarrhea. Neither medication was being given at the maximum dosage because we had concerns about side effects. Rather than raise the dose, we added Calming Care and it was like the cherry on the sundae. We saw improvements in anxious behavior overall.

If veterinarians are going to use Calming Care as a first-line treatment, I recommend trying it for mild cases of fear, anxiety and stress. An acclimation period of 45 days should indicate what kind of response they will see.
How Changing the Gut Microbiota Can Modify Behavior

Over the past several decades, veterinarians have learned that feeding certain probiotic strains to patients in order to alter the composition of their gut microbiota can produce benefits such as modulation of the immune system and improvement in gut health. As other probiotic strains are studied, we’ve learned that changing the gut microbiota can have benefits that extend well beyond improving GI health. The probiotic Bifidobacterium longum BL999 has been shown to have an anxiolytic effect on dogs exhibiting anxiety and thus can serve as a useful tool in management plans for these patients.1,2

Connecting gut health and behavior

Understanding the potential of B. longum BL999 (the active ingredient in Purina® Pro Plan® Veterinary Supplements Calming Care) to influence dogs with anxious behavior requires understanding how the gut and the brain communicate with each other via the gut-brain axis. The connection between anxious behavior and the gut microbiota was established in a study at McMaster University, when gut bacteria from laboratory mice exhibiting anxiety behavior were transferred to germ-free, non-anxious mice via fecal transplantation. The result: the previously non-anxious mice began demonstrating anxious behavior.3

Potential pathway to anxiolytic effect

While multiple mechanisms may play a role in relaying the influence of both the resident and exogenous microflora, recent studies suggest a role for the vagus nerve as a pathway of bidirectional communication between the gut and brain.4 It is theorized that B. longum BL999 may produce a metabolite in the gut. This metabolite acts as a neurotransmitter that activates the enteric nervous system and in turn activates the vagus nerve, which has a direct connection to the brain.5

Clinical effect in canine patients

The end result is that, from both a behavioral and physiological standpoint, B. longum BL999 can have an anxiolytic effect on dogs exhibiting anxious behaviors. In a blinded, placebo-controlled, crossover study of 24 Labrador Retrievers exhibiting anxious behavior, dogs supplemented with B. longum BL999 showed statistically significant improvement in displaying day-to-day anxious behavior, as well as reduced salivary cortisol concentrations, decreases in heart rates and increases in heart rate variability compared to non-supplemented controls.1

The benefits of probiotics extend beyond promoting gut health, and it is important to note that different probiotic strains have different benefits and effects on the body. Thanks to pathways that link the brain and gut, researchers are discovering new ways to help manage patients with conditions like anxiety.

Expanding Options to Address Anxious Behaviors

Managing dogs with anxiety is complex and always requires a multimodal approach, which could include behavior modification, anxiolytic medications and/or supplements. And while canine anxiety is something my clients are highly motivated to manage in their pets, many are reluctant to medicate their dogs because of potential side effects such as lethargy and personality changes. “It’s great the anxiety has improved,” they say, “but this isn’t my dog.”

Here are some steps I take and modalities I use to manage my canine patients exhibiting anxious behavioral(s).

STEP 1: Identify anxiety triggers

The first goal with any anxious patient is to pinpoint possible triggers and try to either eliminate or moderate them. I ask clients when the anxious behaviors began, then we review everything that changed at that time, whether it was a move, a family member coming or going from the home or even a medical procedure for someone in the household. Depending on the patient’s situation, I might then ask to keep a journal of behaviors for a period of time to help identify a cause. Pacing, panting and crying are three of the most common signs of generalized anxiety reported by my clients.

STEP 2: Determine a plan of action

If no obvious stressors are identified or if we are unable to completely eliminate those that we can identify, I often recommend behavior modification in conjunction with another therapeutic modality, such as a six-week trial of Purina® Pro Plan® Veterinary Supplements Calming Care Canine probiotic. Calming Care has been a welcome addition to our clinic’s repertoire of options. I recommend it for dogs with generalized anxiety as well as for patients with more specific issues like separation anxiety.

STEP 3: Evaluate results

As with any other chronic condition, anxious behaviors in dogs should be re-evaluated on a regular basis. A number of my clients who administer Calming Care have noted improvements in their dogs’ anxious behavior(s). They often tell me that Calming Care has taken the edge off their dogs’ symptoms and reduced the anxiety to a manageable level. The dogs are more comfortable and able to rest—and that can be life-changing.

Calming Care presents a research-backed alternative

Few proven therapeutic modalities are available for managing dogs with anxiety. As a result, many clients resort to products with no efficacy studies to back up their claims. Calming Care has provided our clinic with a non-drug alternative for management of dogs displaying anxious behaviors that is backed by research. That’s something my clients appreciate. And for those dogs that require anxiolytic medications, the good news is that Calming Care can be an effective add-on to their multimodal therapeutic plan. This has opened the door to having a new and different conversation with owners of anxious dogs because it allows me to present an additional option that may be appealing to my clients.

Key Takeaways

- Dogs with chronic anxiety may need multiple forms of intervention, including behavior modification, medication and/or probiotic supplementation.
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References:

5. Sauthier T, Anderson RE, Schiffrin EJ, von der Weid T. Enterococcus faecium Sugen1411: A potential antidepressant for chronic enteric nervous system and, in turn, the vagus nerve and the brain communicate with each other via the gut-brain axis. The connection between anxious behavior and the gut microbiota was established in a study at McMaster University, when gut bacteria from laboratory mice exhibiting anxiety behavior were transferred to germ-free, non-anxious mice via fecal transplantation. The result: the previously non-anxious mice began demonstrating anxious behavior.3

The vagus nerve is theorized to be the pathway for the anxiolytic effects of Bifidobacterium longum BL999.
How Changing the Gut Microbiota Can Modify Behavior

Raj Naik, DVM
Veterinary Communications
Manager
Nestlé Purina PetCare

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Dustin Babler, DVM
Animal Hospital of Woodstock
Woodstock, Illinois

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Laryngeal & Intratesticular Lidocaine for Feline Anesthetic Techniques

Rebecca Johnson, DVM, PhD, DACVAA
University of Wisconsin–Madison

In the Literature

Use of lidocaine as part of a multimodal analgesic plan in cats is increasing in popularity. For example, topical administration of lidocaine to the larynx is recommended to desensitize laryngeal tissue and facilitate tracheal intubation (Figure 1). Similarly, intratesticular administration of lidocaine in cats is used to reduce hemodynamic changes associated with surgical neutering (Figure 2). Although these techniques...
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are commonly performed, plasma lidocaine concentrations following these procedures are not always considered, even though lidocaine is systemically absorbed and could approach levels associated with toxicity with excessive concentrations or doses. The maximum recommended lidocaine dose in cats is up to 6 mg/kg, with significant toxicity seen at higher intravenous doses (≈11-22 mg/kg).\textsuperscript{3,5}

This study of 14 cats examined these commonly practiced local anesthetic techniques in a 2-part experiment. In the first part, half of the cats (group L2) were randomly assigned to receive 0.1 mL of 2\% lidocaine topically administered on the larynx (≈0.6 mg/kg); the remaining cats (group L10) received 0.1 mL of 10\% lidocaine topically administered on the larynx (2.8 mg/kg). Plasma lidocaine concentrations were then measured and found to be significantly higher in the L10 group as compared with the L2 group (median maximum plasma lidocaine concentrations, 93.6 ng/mL vs 34.1 ng/mL, respectively).

In the second part of the experiment, cats were randomized to receive topical lidocaine as described for the first part. All cats then received intratesticular administration of 2\% lidocaine (0.1 mL) prior to neuter. The concurrent use of topical lidocaine (2\% or 10\%) with intratesticular administration of 0.1 mL/kg of 2\% lidocaine resulted in a maximum total lidocaine dose of approximately 2.54 mg/kg and 4.76 mg/kg, respectively, neither of which exceeds the recommended dose for cats.\textsuperscript{3,4}

In addition, the maximum plasma concentrations increased in a dose-dependent manner and were significantly higher than for topical administration alone, although plasma concentrations remained significantly lower than those required to produce seizures in cats.\textsuperscript{4} The time to reach maximum plasma concentrations did not differ among treatments.

It is important to note that factors other than dose and route (eg, patient age, concurrent anesthetics, hypotension, hypothermia) can alter pharmacokinetics and plasma lidocaine concentrations. However, this study suggests that, in adult cats (≈8.8 lb [≈4 kg]) undergoing surgical neutering, 2\% topical lidocaine administered concurrently with intratesticular 2\% lidocaine (0.1 mL/kg) results in plasma concentrations unlikely to approach those associated with systemic toxicity. Thus, these techniques can provide useful adjunctive analgesia when neutering cats.

... TO YOUR PATIENTS

Key pearls to put into practice:

1. A previous study has shown topical 2\% lidocaine to be as effective as 10\% lidocaine for facilitating intubation in cats.\textsuperscript{1} Thus, 2\% lidocaine, which is associated with lower maximum plasma concentrations, is recommended, and the volume should be adjusted accordingly in smaller patients (eg, young kittens).

2. Use of topical lidocaine alone or in combination with intratesticular lidocaine can result in dose-dependent increases in maximal plasma lidocaine concentrations.

3. For routine surgical neutering in adult cats, the recommended doses of 2\% lidocaine are 0.1 mL (≈0.6 mg/kg) administered topically on the larynx and 0.1 mL/kg administered intratesticularly. Doses should be appropriately adjusted for smaller patients.

4. Although time to reach peak plasma concentrations does not significantly differ between topical application alone or in combination with intratesticular administration, plasma concentrations may be affected by other patient factors and should be considered on an individual patient basis.

References


Flavored chews for dogs.

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

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

Indications: Bravecto kills adult fleas and is indicated for the treatment and prevention of flea infestations (Ctenocephalides felis) and the treatment and control of tick infestations (Ixodes scapularis and Amblyomma americanum). Bravecto is also indicated for the treatment and control of Amblyomma americanum (lone star tick) infestations for 12 weeks in dogs aged 6 months of age and older, and weighing 2.6 pounds or greater.

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

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

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

Adverse Reactions: In a well-controlled U.S. field study, which included 224 dogs (224 dogs were administered Bravecto every 12 weeks and 70 dogs were administered an oral active control every 4 weeks and were provided with a tick collar); there were no serious adverse reactions. All potential adverse reactions were recorded in dogs treated with Bravecto over a 126-day period and in dogs treated with the active control over an 84-day period. The most frequently reported adverse reaction in dogs in the Bravecto and active control groups was vomiting.

Percentage of Dogs with Adverse Reactions in the Field Study

<table>
<thead>
<tr>
<th>Adverse Reaction (AR)</th>
<th>Bravecto Group: Percentage of Dogs with the AR During the 84-Day Study (n=224 dogs)</th>
<th>Active Control Group: Percentage of Dogs with the AR During the 84-Day Study (n=70 dogs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vomiting</td>
<td>2.7%</td>
<td>17.1%</td>
</tr>
<tr>
<td>Decreased Appetite</td>
<td>0.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Diarrhea</td>
<td>1.1%</td>
<td>2.9%</td>
</tr>
<tr>
<td>Lethargy</td>
<td>0.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Polydipsia</td>
<td>0.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Alopecia</td>
<td>1.1%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Lesions</td>
<td>0.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Scabs/Ulcerated Lesions</td>
<td>0.0%</td>
<td>0.0%</td>
</tr>
</tbody>
</table>

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

For technical assistance or to report a suspected adverse drug reaction, contact Merck Animal Health at 1-800-224-5318. Additional information can be found at www.fda.gov. 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/animalforexperience/SafetyHealth.

How Supplied: Bravecto is available in five strengths (112, 250, 500, 1000, and 1400 mg fluralaner per chew). Each chew is packaged individually into aluminum foil blister packs sealed with a peelable paper backed foil stock. Product may be packaged in 1, 2, or 4 chews per package.

<table>
<thead>
<tr>
<th>Adverse Reaction (AR)</th>
<th>Bravecto Group: Percent of Cats with the AR During the 105-Day Study (n=224 cats)</th>
<th>Control Group: Percent of Cats with the AR During the 84-Day Study (n=87 cats)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vomiting</td>
<td>5.9%</td>
<td>13.6%</td>
</tr>
<tr>
<td>Diarrhea</td>
<td>5.4%</td>
<td>11.5%</td>
</tr>
<tr>
<td>Lethargy</td>
<td>1.1%</td>
<td>1.1%</td>
</tr>
<tr>
<td>Decreased Appetite</td>
<td>0.0%</td>
<td>0.0%</td>
</tr>
<tr>
<td>Alopecia</td>
<td>4.9%</td>
<td>4.9%</td>
</tr>
<tr>
<td>Lesions</td>
<td>1.1%</td>
<td>1.1%</td>
</tr>
<tr>
<td>Scabs/Ulcerated Lesions</td>
<td>2.2%</td>
<td>3.4%</td>
</tr>
</tbody>
</table>

In a European field study, two cats from the same household experienced tremors, lethargy, and anorexia within one day of administration. The signs resolved in both cats within 48-72 hours.

In an European field study, there were three reports of facial dermatitis in humans after dose contact with the application site which occurred within 4 days of application.

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

How Supplied: Bravecto is available in five strengths for use in dogs (112, 250, 500, 1000, and 1400 mg fluralaner per tube). Each tube is packaged individually in a pouch. Product may be supplied in 1 or 2 tubes per carton.

<table>
<thead>
<tr>
<th>Adverse Reaction (AR)</th>
<th>Bravecto Group: Percent of Cats with the AR During the 105-Day Study (n=224 cats)</th>
<th>Control Group: Percent of Cats with the AR During the 84-Day Study (n=87 cats)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vomiting</td>
<td>9.5%</td>
<td>10.5%</td>
</tr>
<tr>
<td>Pruritus</td>
<td>5.4%</td>
<td>5.4%</td>
</tr>
<tr>
<td>Diarrhea</td>
<td>4.9%</td>
<td>4.9%</td>
</tr>
<tr>
<td>Alopecia</td>
<td>4.9%</td>
<td>4.9%</td>
</tr>
<tr>
<td>Lesions</td>
<td>3.1%</td>
<td>2.3%</td>
</tr>
<tr>
<td>Scabs/Ulcerated Lesions</td>
<td>2.2%</td>
<td>3.4%</td>
</tr>
</tbody>
</table>
Pet owners already have a lot to remember. Give them one less thing to forget.

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*BRAVECTO kills fleas and prevents flea infestations for 12 weeks. BRAVECTO Chew and BRAVECTO Topical Solution for Dogs kill ticks (black-legged tick, American dog tick, and brown dog tick) for 12 weeks and also kill lone star ticks for 8 weeks. BRAVECTO Topical Solution for Cats kills ticks (black-legged tick) for 12 weeks and American dog ticks for 8 weeks.

IMPORTANT SAFETY INFORMATION: BRAVECTO has not been shown to be effective for 12-weeks’ duration in puppies or kittens less than 6 months of age. BRAVECTO Chew: The most common adverse reactions recorded in clinical trials were vomiting, decreased appetite, diarrhea, lethargy, polydipsia, and flatulence. BRAVECTO is not effective against lone star ticks beyond 8 weeks of dosing. BRAVECTO Topical Solution for Dogs: The most common adverse reactions recorded in clinical trials were vomiting, decreased appetite, diarrhea, polydipsia, and flatulence. BRAVECTO is not effective against lone star ticks beyond 8 weeks of dosing. For topical use only. Avoid oral ingestion. Use caution in dogs with a history of seizures. Seizures have been reported in dogs receiving fluralaner, even in dogs without a history of seizures. BRAVECTO Topical Solution for Cats: The most common adverse reactions recorded in clinical trials were vomiting, itching, diarrhea, hair loss, decreased appetite, lethargy, and scabs/ulcerated lesions. BRAVECTO is not effective against American dog ticks beyond 8 weeks of dosing. For topical use only. Avoid oral ingestion. The safety of BRAVECTO has not been established in breeding, pregnant and lactating cats. Use with caution in cats with a history of neurologic abnormalities. Neurologic abnormalities have been reported in cats receiving BRAVECTO, even in cats without a history of neurologic abnormalities. See full Prescribing Information on page 44.

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Superficial Bacterial Folliculitis

William Oldenhoff, DVM, DACVD
Leader Animal Specialty Hospital
Cooper City, Florida

In the Literature

FROM THE PAGE …

In this study, samples for bacterial culture were obtained from 14 dogs with superficial bacterial folliculitis. Samples were obtained from 4 to 6 skin lesions per dog and from the gingiva and perineum, both of which are carriage sites for Staphylococcus pseudintermedius. Skin lesions sampled included pustules, papules, crusts, and epidermal collarettes.

S pseudintermedius isolates were subjected to pulsed-field gel electrophoresis and antimicrobial susceptibility testing to assess the genetic diversity of the isolates. Pustules and papules were associated mostly with pure cultures of S pseudintermedius, whereas crusts and collarettes were often associated with multiple bacterial species, likely due to contamination from the environment or surrounding skin. Extensive S pseudintermedius strain diversity was observed, with multiple distinct strains isolated from 6 of 14 dogs. Up to 4 strains with varying antimicrobial resistance profiles were detected in one dog. Most dogs (12/14) carried the strain associated with infection on either the perineum or gingiva; this supports the view that dogs are typically infected with their own strains of S pseudintermedius rather than as a result of transmission from another animal.

… TO YOUR PATIENTS

Key pearls to put into practice:

1. Pustules and papules are recommended as the first choice for culture testing, as there is less chance for contamination from strains of S pseudintermedius that are not involved in the infection. Papules and pustules should both be sampled by gently incising the lesion with the tip of a sterile needle, then cultured.

2. Laboratories usually select a single bacterial colony of the predominant species growing on the agar plate for susceptibility testing. This may cause strains involved in the infection to be missed, which may result in treatment failure. It is recommended that laboratories evaluate their methodology for antimicrobial susceptibility testing.

3. Responsible antimicrobial stewardship is critical. Clinicians should culture animals with superficial bacterial folliculitis if initial empiric treatment fails. Topical therapy is also important, as many superficial skin infections can be resolved using only topical chlorhexidine products.
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Owner Perceptions of the Treatment of Feline Behavior Problems

Leslie Sinn, DVM, DACVB
Behavior Solutions
Leesburg, Virginia

In the Literature

FROM THE PAGE …
In this survey, researchers queried cat owners about the prevalence and type of behavior problems in their cat. Owner knowledge of and attitudes toward the treatment of behavior problems were also investigated.

Of the 448 responses, 1092 behavior problems were reported. Most respondents (97.8%) reported that their cat had at least one behavior problem. The most common problems in order of prevalence were anxiety or fear (eg, of stranger, carrier, or travel), destructive behavior (eg, scratching furniture), house soiling (ie, urination and/or defecation outside the litter box), excessive vocalization, aggression toward humans and/or animals, and excessive/repetitive grooming resulting in hair loss and/or injury.

Most respondents (93.5%) believed anxiety/emotional problems could result in behavior problems in cats, but nearly half (49.8%) were unaware of the availability of psychotherapeutic medications for the treatment of behavior issues in cats. Responses to being asked if they would consider giving psychoactive medications or supplements to their cat were mixed; 57.4% replied with maybe, 21.4% with yes, and 21.2% with no. The primary reported barriers to medical treatment were concerns about negative side effects (73.3%), excessive sedation (63.9%), and potential for

Continues on page 50
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addiction (39.9%). Important factors respondents noted would impact their
decision to medicate included proven effectiveness (89.7%), ease of administra-
tion (84.8%), veterinarian recommendation (81.5%), and cost (77%). In addition,
only 3.3% of owners indicated that their veterinarian recommended they seek
behavioral help for their cat. These data suggest that there are missed opportu-
nities by veterinarians to positively affect the well-being of cats.

**... TO YOUR PATIENTS**

**Key pearls to put into practice:**

1. **Veterinarians should understand that behavior problems in cats are per-
vasive and most frequently involve fear-based behaviors, destructive
scratching, and house soiling.**

2. **Behavior issues affect the quality of life of cats and their owners and should
be clinically addressed like any other medical condition. Owners should be
asked if they have concerns about their cat’s behavior. A preappointment
screening sheet may help identify areas of concern. Because the behavior
problems identified in the present study are common, appropriate litera-
ture should be available for owner education to enhance veterinary team
efficiency (see **Suggested Reading**).**

3. **Common barriers to treatment and compliance should be acknowledged.
All owner concerns should be addressed by clearly discussing efficacy
and side effects associated with prescribed treatments. A veterinarian’s
recommendations can be influential and positively impact an owner’s
decision to treat. Owners should be referred to a veterinary behaviorist
if their veterinarian does not have the time or is disinclined toward or
uncomfortable giving behavioral recommendations (see **Suggested
Reading**).**

**Suggested Reading**


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**IMPORTANT SAFETY INFORMATION:** ENTYCE® (capromorelin oral solution) is for use in dogs only. Do not use in breeding, pregnant or lactating dogs. Use with caution in dogs with hepatic dysfunction or renal insufficiency. Adverse reactions in dogs may include diarrhea, vomiting, polydipsia, and hypersalivation. Should not be used in dogs that have a hypersensitivity to capromorelin. Please see the full Prescribing Information on page 50 for more detail.

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ENT-0364
Gallbladder Mucoceles in Border Terriers

Faith I. Buckley, DVM, DACVIM (SAIM)
Bulger Veterinary Hospital
North Andover, Massachusetts

In the Literature

FROM THE PAGE …

Gallbladder mucoceles (GBMs) are a common cause of biliary disease in dogs. Several breed predispositions have been reported, and several risk factors, including endocrine disease (ie, hyperadrenocorticism, hypothyroidism) and hyperlipidemia, have been recognized.1,2 Multiple factors, including genetic and epigenetic factors, likely contribute to GBM formation.

This study from the United Kingdom sought to evaluate GBM association with the border terrier breed. Medical records of 99 dogs (including 51 border terriers) with a diagnosis of GBM confirmed via ultrasonography were retrospectively reviewed and compared with a control group of 87 border terriers without GBM. The primary objective of this study was to determine whether border terriers have a breed predisposition to GBM and whether there are risk factors, clinical features, and outcomes specific to this breed. Because the odds of diagnosing GBM in a border terrier in this evaluation were 85 times that of all other breeds, a strong case for breed predilection can be made. This higher percentage may also be reflective of the increasing popularity of the breed and subsequent loss of genetic diversity in the pedigree in the United Kingdom. Concurrent endocrinopathies were infrequent in the reported cases, suggesting they may play a minimal role in GBM formation in this breed. Serum chemistry findings, particularly alkaline phosphatase and gamma-glutamyl transferase, in all study dogs were similar to those previously described for dogs with GBM.3 The surgical case fatality rate at 7 days was 11.7%.

… TO YOUR PATIENTS

Key pearls to put into practice:

1. A breed predisposition to GBMs in Shetland sheepdogs, American cocker spaniels, Chihuahuas, Pomeranians, and miniature schnauzers has been reported.2,4 The addition of border terriers to this list may be warranted.

2. Dogs presented with elevated cholestatic liver enzymes (ie, alkaline phosphatase, gamma-glutamyl transferase) along with vomiting, hyporexia, lethargy, and/or icterus warrant evaluation of the gallbladder to rule out GBM.

3. Although not observed in this study, there have been reports on the negative effects of gallbladder rupture on survival. Thus, rapid intervention is warranted in GBM patients, as survival rates of GBM patients that underwent cholecystectomy prior to rupture are good. Although medical management of GBM is possible with appropriate case selection, patients that are candidates for medical management are rarely seen, as GBM patients are often subclinical until disease is advanced, warranting surgical intervention.

References
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Dr. Anthony Caiafa
BVSc BDSc MACVSc  (SA Surgery and Veterinary Dentistry)
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Effects of Noise in the Operating Room

Laura L. Nelson, DVM, MS, DACVS
North Carolina State University

In the Literature

FROM THE PAGE …

The operating room (OR) can be loud, with noise arising from sources such as power tools, monitoring equipment, forced air blankets, music, human traffic, and conversation. Nonporous surfaces necessary for hygiene in OR environments can prolong noises generated from other sources because sound waves are reflected.

Increased noise in the OR has been associated with detrimental effects on communication, surgeon focus, veterinary staff stress, and incidence of complications and infections.1,3 The World Health Organization has noted that consistent recognition of speech in relaxed conversation is possible at noise levels of 45 dBA and subsequently recommends that workplace noise levels do not exceed 55 dBA.3 High background noise can be stressful and has been correlated with higher endogenous cortisol levels in surgeons.4

In this study, the mean, median, and maximum noise levels during 77 surgeries at an academic teaching hospital were recorded. Overall mean, median, and maximum decibel levels were 71.7 dBA, 69.4 dBA, and 90.3 dBA, respectively. Neurologic procedures had significantly higher mean and median decibel levels, presumably due to use of surgical power tools. Music significantly increased mean and median decibel levels (mean, 73.3 dBA with music vs 70.6 dBA without music; median, 71.3 dBA with music vs 68.2 dBA without music). Neither number of humans present nor number of staff members scrubbed in for a procedure significantly affected decibel levels.5

These results demonstrated decibel levels that substantially exceeded World Health Organization recommendations. To avoid risking miscommunication, verbal communication in this environment would need to exceed normal speaking volume. Although this study did not evaluate effects of high noise levels on outcomes such as complication rates or stress levels, the decibel levels measured were high enough to affect veterinary staff stress, based on results of a previous study.4 In addition, music was associated with significantly higher noise levels, representing a controllable, if controversial, source of noise.
... TO YOUR PATIENTS

Key pearls to put into practice:

1. Taking inventory of sources of noise in the OR and subsequently considering ways to lower the noise volume (eg, setting monitors at a lower volume) is recommended.

2. Turning down the music volume and polling staff should be considered. Asking staff to note their perceived level of stress or calm before and after the volume is reduced, then evaluating the need for raised voices, the frequency of repeated requests, and whether staff relax after a source of noise is eliminated can be helpful in determining the effect of noise in an OR.

3. A quiet environment should be created throughout the practice. Concentration, communication, and calm are key elements of a successful veterinary practice. Where possible, discussing and reducing unnecessary noise in the practice environment may provide a subtle yet substantive benefit.

References


Taking inventory of sources of noise in the OR and subsequently considering ways to lower the noise volume (eg, setting monitors at a lower volume) is recommended.
My world just isn’t the same when I have ticks* and fleas. Prescribe me Credelio® (lotilaner) — a small, tasty¹ chewable that acts fast²,³ to protect puppies and dogs like me all month long.

*Amblyomma americanum (lone star tick), Dermacentor variabilis (American dog tick), Ixodes scapularis (black-legged tick) and Rhipicephalus sanguineus (brown dog tick).

**IMPORTANT SAFETY INFORMATION**

The safe use of Credelio in breeding, pregnant or lactating dogs has not been evaluated. Use with caution in dogs with a history of seizures. The most frequently reported adverse reactions are weight loss, elevated blood urea nitrogen, increased urination, and diarrhea. For product information, including complete safety information, see page 56.


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Long-Term Outcome of Primary Immune-Mediated Thrombocytopenia

Lisa Singer, VMD, DACVIM
Veterinary Specialist Services
Queensland, Australia

In the Literature

FROM THE PAGE …

Immune-mediated thrombocytopenia is a life-threatening disease and one of the most common causes of canine thrombocytopenia. In primary immune-mediated thrombocytopenia (PIMT), autoantibodies adhere to the surface of blood platelets, resulting in platelet destruction by the immune system. Dogs have a high tendency for life-threatening, spontaneous hemorrhage when the platelet count drops below 30 × 10⁹/L to 50 × 10⁹/L. This is clinically seen as petechiae or ecchymoses on the skin and melena from the intestinal tract. Initial first-line treatment should be immunosuppressive therapy with glucocorticoids.

This study retrospectively evaluated the incidence of relapse, the risk factors associated with relapse, and whether the indefinite use of medications influences risk for relapse in dogs with PIMT. Review of records from 2007 to 2016 identified 45 dogs with presumed PIMT, 89.6% of which survived until discharge and 31% of which relapsed after discharge.

Initial treatment included prednisone (mean dose, 2.1 mg/kg q24h) with or without vincristine. Additional immunosuppressive agents included azathioprine, mycophenolate, or cyclosporine. A previous study has shown no difference in outcome or relapse based on glucocorticoids alone or compared with another agent.¹ In this study, use of vincristine, a second immunosuppressive agent, or indefinite medication did not reduce relapse rate.

The median time between discontinuation of prednisone and relapse was 79 days. Of the dogs that relapsed, 50% went on to have another relapse. Previous studies have reported relapse rates from 9% to 47%.¹² Most dogs in this study relapsed while still on medication.

Another study reported that melena was a negative prognostic indicator and that dogs were more likely to need a blood transfusion.² That study found that patients were twice as likely to relapse if they had received a blood transfusion. Overall, the response time after relapse is rapid and prognosis for recovery remains good.

... TO YOUR PATIENTS

Key pearls to put into practice:

1. Indefinite immunosuppressive treatment or the addition of a second drug aside from glucocorticoids to treat PIMT in dogs does not reduce risk for relapse.

2. Higher relapse rates have been noted in patients requiring blood transfusion while in the hospital as compared with those that did not.

3. Most relapses occur within 3 months of discontinuing glucocorticoids. Patients should have platelet counts checked regularly—minimally for the first year after remission and discontinuation of medications.

References


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☑ PUREVAX offers **THE ONLY** recombinant nonadjuvanted feline rabies vaccines: 1- and 3-year duration of immunity products

☑ PUREVAX offers **THE ONLY** recombinant nonadjuvanted Feline Leukemia Virus (FeLV) vaccine

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Salmonella Enteritidis Infection in Guinea Pigs

Radford Davis, DVM, MPH, DACVPM
Iowa State University

In the Literature

FROM THE PAGE ...

Although most cases of human salmonellosis in the United States have been attributed to contamination of food with animal feces,1 cases of human salmonellosis associated with pet rodents have been documented.1-3 This report discussed an 8-state outbreak of Salmonella enteritidis infection associated with guinea pigs that resulted in illness in 9 humans on or after January 1, 2015. One hospitalization and no deaths were recorded. Cases were identified as a result of an investigation that began after 2 human cases of Salmonella enteritidis were reported in 2017 and were found to be indistinguishable from a Salmonella strain responsible for a 2010 outbreak also connected to guinea pigs.1

Some guinea pigs that caused infection in the humans from the more recent outbreak came from the same wholesaler that supplied guinea pigs to pet stores in the 2010 outbreak; this emphasizes the difficulties in enforcing proper animal husbandry, welfare, and infection prevention in licensed and unlicensed operations. The pathway from breeder to final home for guinea pigs may involve breeders, vendors, distributors, retailers, significant handling, and lengthy, fragmented transportation, all of which may induce stress in the animal and potential shedding of Salmonella spp.

Multiple points along the supply chain can serve as sources of Salmonella spp infection for naïve guinea pigs (eg, commingling with infected animals, contaminated bedding).4 Shedding may occur with or without concomitant clinical signs.1,3 Morbidity and mortality are variable4 and may include subacute illness with severe diarrhea, emaciation, abortion, and/or sudden death.2 Guinea pigs may harbor subclinical infections and shed Salmonella spp intermittently for weeks to months.1 Prophylactic use of antimicrobials is not uncommon in the rearing of rodents for sale and can lead to multidrug-resistant Salmonella spp in guinea pigs4 and therefore humans.3
Pet rodents are likely an underrecognized source of *Salmonella* spp infection in humans; clinicians and pet store staff should educate owners on the risks of rodent ownership and on prevention measures (eg, frequently discarding pet feces; regularly changing bedding; thoroughly washing hands with soap and water for a minimum of 20 seconds after being in contact with the animal, cage, bedding, or food; supervising hand-washing in children and their handling and caring of rodents; discouraging eating while handling pets; discouraging kissing and holding animals close to the mouth).1,2,4

**… TO YOUR PATIENTS**

Key pearls to put into practice:

1. Clinicians, breeders, and distributors should consider submitting specimens for *Salmonella* spp isolation when substantial diarrhea-associated morbidity or mortality occurs in rodents intended for sale.4

2. Clinicians should advise owners of the risks of guinea pig ownership and educate them on the basic precautionary measures to protect them from *Salmonella* spp and other zoonoses.2

3. Treating guinea pigs to eliminate carriage of *Salmonella* spp is not reliably successful and may prolong shedding and thus is not recommended.5

**References**


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TOP 5 KEYS TO SUCCESSFUL MANAGEMENT OF OTITIS EXTERNA

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Otitis externa is a common inflammatory condition that affects 15% to 20% of dogs and 4% to 7% of cats.1 Dogs and cats of breeds predisposed to otitis externa may have pendulous ears, canal hypertrichosis, and familial seborrhea or cerumen gland hyperplasia.2,3

Although some patients may have irreversible external ear canal changes necessitating surgical management, many cases can be managed medically. Incorporating steps early in the disease course may help prevent chronic changes (eg, proliferation, fibrosis, mineralization of the external ear canal) and recurrence.

Following are the authors’ top 5 steps to manage otitis externa.

1 Classification
Successful treatment of otitis externa should begin with clinical assessment of the patient (ie, ear canal palpation, otoscopic examination, cytology). Palpating the ears can aid in determining whether a patient is best managed medically with antimicrobial drugs and glucocorticoids or surgically. Normal ear canals should be pliable. Surgical management should be considered for ear canals that are firm due to fibrosis and calcification and/or ossification (Figure 1).4

Otoscopic examination of both ears using a standard handheld otoscope with 2×/4× magnification and a reusable 0.75-inch cone includes assessment of the exudate type (eg, ceruminous, purulent), degree of stenosis, and integrity of the ear canal (eg, presence of ulceration, mass, polypoid changes, ceruminous gland hyperplasia) and tympanic membrane. In patients with stenotic ear canals (and those exhibiting signs of pain with comorbid diseases for which sedation or anesthesia may be initially contraindicated), otoscopy may be delayed and topical and/or oral steroid treatments prescribed to manage patient discomfort.1 If a sample for cytology can be obtained at the time of initial presentation, topical antimicrobial therapy should be initiated simultaneously with steroid therapy to address the infectious disease

Misdiagnosis and inappropriate therapy are possible if otic cytology results are not considered when culture results are interpreted.
component. In patients with severely stenotic ear canals, daily oral steroid therapy may be the best treatment option until the patient is comfortable and a cytology sample can be obtained.

Otic cytology is an essential test used to diagnose and characterize otitis externa. Type of organism present (eg, cocci, rods, yeast), relative numbers of organisms (1-4+ scale), and presence or absence of inflammatory cells (typically, neutrophils) should be recorded. Purulent exudate and ulcerative lesions in the canal are typically associated with Pseudomonas spp infection (Figure 2) or reaction to a topical medication. Inflammatory cells are not routinely observed when there is ceruminous discharge containing yeast organisms with or without bacteria.

Cytologic presence of neutrophils (with or without rods) and appropriate clinical findings may suggest Pseudomonas spp otitis or contact reactions, both of which should prompt aerobic culture; culture should also be performed if bacterial otitis does not respond to appropriate empiric treatment. Diagnosis of infectious otitis using culture results without cytology can be misleading. The ear canal hosts various species of bacteria in the healthy state, and bacterial organisms, including methicillin-resistant Staphylococcus spp, can be recovered from culture samples of healthy ears of dogs or cats. Misdiagnosis and inappropriate therapy are possible if otic cytology results are not considered when culture results are interpreted. Culture results should parallel cytology findings, allowing for selection of the appropriate pathogen-specific therapy. Susceptibility data are not used initially to select treatment because topical medications achieve higher local concentrations than those achievable in plasma, upon which susceptibility interpretation is determined. Susceptibility data are used for refractory cases unresponsive to standard treatment protocols.

### Treatment

Ear canals should first be opened, as ear canal epithelial inflammation and stenosis hinder effective topical treatment, and most cases therefore require topical and/or systemic corticosteroid treatment.

Ears should be cleaned by flushing, which removes dried medication and cerumen that may interfere with examination and treatment. Sterile saline flushing should be selected when tympanic membrane status is unknown to minimize concern for ototoxicity. Squalene is an effective ceruminolytic agent with demonstrated safety in the middle ear and is an alternative option when perforation is suspected. During treatment, at-home flushes containing salicylic acid or other mild ceruminolytics should be administered 2 to 3 times per week to maintain ear canal cleanliness.

Treatment selection is based on pathogen identification (yeast vs Pseudomonas spp vs other bacteria), exudate characteristics, and chronic ear canal changes. Because external ear canal volume varies among dog breeds (eg, brachycephalic breeds, 0.47 mL; mesaticephalic and dolichocephalic breeds, up to 5.86 mL), extra-label dosing (0.5-1 mL) of most topical ear medications should be administered.
be used for each affected ear to allow medication to sufficiently coat the ear canals. Antimicrobial medications, excluding long-acting, FDA-approved florfenicol otic medications, are applied twice daily (extra-label) to ensure maintenance of adequate antimicrobial concentrations and inflammation reduction. For stenotic canals, a solution is preferred over an ointment.

Topical antibiotics (eg, fluoroquinolones, amikacin, tobramycin, silver sulfadiazine, ceftazidime) are frequently used to treat *Pseudomonas* spp. Due to drug inactivation, gentamicin and neomycin are ineffective against *Pseudomonas* spp otitis, seemingly more so than other aminoglycosides such as amikacin and tobramycin, which have been effective for treatment of *Pseudomonas* spp otitis in the authors’ experience. Florfenicol is also ineffective against *Pseudomonas* spp otitis due to its spectrum limitations. Using a tris-EDTA–containing flush, which serves as a calcium-chelating agent, can help the effectiveness of topical antimicrobial treatment. These flushes are commercially available and increase the medication permeability of gram-negative organisms by damaging the outer cell wall membrane. The calcium-chelating flush should be applied as pretreatment in conjunction with topical therapy for improved treatment efficacy against *Pseudomonas* spp otitis.

Systemic antibiotics should be reserved for the treatment of otitis media and are ineffective in the treatment of otitis externa.

**Monitoring**
The patient should first be assessed 2 to 3 weeks after initiating treatment to determine if the treatment plan is effective based on otoscopic examination and cytology. Otoscopic examination and cytology should also be performed at each follow-up visit to document changes, including resolution. A successful outcome is dependent on timely recheck examinations with diagnostics, including sedation if needed for effective examination.

**Maintenance**
Otitis can cause changes to the ear canal, predisposing the patient to future infections. Ear flushing is required long-term unless return of self-cleaning mechanisms of the canal epithelium are documented. In addition, controlling ongoing low-level inflammation should decrease disease recurrence. Once-to–twice-weekly treatments with topical steroid formulations (ie, the least potent form to control clinical signs) are effective when an underlying cause cannot be identified or adequately controlled by other means. Systemic absorption of topical steroids should be considered when performing endocrine testing and, when used long-term, necessitates monitoring clinical signs and performing minimum database testing for adverse effects.

**Identification**
After otitis has resolved, the primary cause should be identified to help prevent recurrence, although identification is less useful in cases in which chronic ear canal changes become a perpetuating cause of disease or cases in which recurrence can be prevented by a simple maintenance regimen. Aural conformation, allergic conditions (especially atopy), and endocrinopathies (eg, Cushing’s disease, hypothyroidism) are common causes of otitis externa, with neoplasia and/or foreign bodies considered for patients with unilateral otitis.

**Conclusion**
Otitis externa is a common disease of dogs and cats presented for veterinary care. Most patients can be treated quickly, and recurrence can be prevented by incorporating these fundamentals early in the course of disease, which can help patients avoid chronic pain and pathology to the external ear canals.
References

TOP 5 ▶ CONTINUED FROM PAGE 31

References

LOOK FOR THESE ARTICLES IN FUTURE ISSUES
- Increased & Decreased Intraocular Pressure: Diagnosis & Management
- Burn Management
- Top 5 Bartonella Species of Human Significance
- Step-by-Step Full-Mouth Extraction
- Salter-Harris Fracture Case

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Mesenchymal stem cell therapy (MSCT) involves use of adult-derived mesenchymal stem cells to potentially restore health and proper function to damaged or diseased cells, tissue, and/or organs. MSCT has been widely researched in human medicine and used to treat osteoarthritis (OA), tendinopathies, and sports-related injuries, inspiring veterinary research to evaluate this modality in dogs. Research supporting MSCT in veterinary musculoskeletal disease management is still minimal.

There are 2 types of mammalian stem cells: those of embryonic origin and those derived from adult tissue. Embryonic stem cells are totipotent and capable of differentiating into any cell type, whereas adult-derived stem cells are multipotent and capable of differentiating into more than one but not all cell types. Derived from a mesodermal lineage, adult-derived stem cells (ie, mesenchymal stem cells) exist naturally as a reserve in muscle, fat, cartilage, bone and bone marrow, and tissue that make up the circulatory, urinary, and reproductive systems. In their natural state, activated mesenchymal stem cells undergo cell division to give rise to other cells that eventually function in a fully differentiated state, replacing dead cells in the process of tissue renewal. Mesenchymal stem cells may also mobilize and proliferate in response to injury or pathologic conditions, theoretically creating a basis for therapeutic application.
The International Society for Cellular Therapy has proposed a set of minimum criteria to qualify a cell as a therapeutic mesenchymal stem cell. The cell must be able to exhibit plastic adherence, possess specific sets of cell surface markers while lacking others, and be capable of differentiating into adipocytes, chondrocytes, and osteoblasts in vitro. Although these criteria are universal, there has been no standardization of terminology; thus, various terms (eg, stem cell, mesenchymal stem cell, mesenchymal stromal cell) are commonly used interchangeably, which can be confusing when navigating the literature and clinical studies. The International Society for Cellular Therapy has proposed the term mesenchymal stromal cell be used in reference to tissue harvested from bone marrow and fat and processed for MSCT use, based on the contention that these ex vivo isolated cells are a heterogeneous population of fibroblast-like cells that can self-renew and differentiate in culture but may not meet all criteria to be defined as true stem cells. Thus, the term stromal cell has been adopted for the products most commonly used in regenerative medicine. For the purposes of this article, the term mesenchymal stromal cell (MSC) will be used.

MSCs for Therapeutic Use
Adult-derived MSCs for therapeutic use can be subdivided into autologous (ie, those derived from the same animal), allogenic (ie, those derived from a different animal of the same species), and xenogenic (ie, those derived from an animal of a different species). Most research in dogs has been focused on adult-derived autologous MSCs, although investigation of the use of allogenic and xenogenic cells is underway. Adult-derived MSCs for therapeutic use are thought to assist in tissue regeneration and repair through angiogenesis enhancement, inflammation reduction, immune modulation, fibrosis inhibition, and the recruitment, survival, and proliferation of local stem cells at the site of injury. Although much regarding MSCs is known from in vitro and in vivo investigation, a complete understanding of how these cells function in vivo in any species once administered is not known.

There are several sources of therapeutic MSCs (eg, bone marrow, adipose tissue, umbilical cord tissue, amniotic fluid, dental pulp, peripheral blood, skeletal muscle). Common sources in veterinary orthopedics are bone marrow and adipose tissue; however, the processing of this tissue to isolate MSCs varies, and no cell source or isolation method has been established to be superior over the other.

Culture-Expanded & Noncultured Products
MSCs can be divided into culture-expanded and noncultured models.

Culture-Expanded
Culture-expanded models involve harvesting tissue (eg, bone marrow, fat), then isolating, processing, and expanding the stromal cells using culture techniques. An expanded product contains more stromal cells than the original sample, creating a more homogeneous population for administration. In the literature, cultured products are commonly referred to as bone marrow MSCs (BM MSCs) and adipose tissue-derived or adipose-derived MSCs (AD MSCs), among others.

Noncultured
Noncultured models involve harvesting and processing fat or bone marrow so the existing cells become concentrated but not expanded. This more heterogeneous product is a combination of MSCs and other cellular components (eg, mononuclear cells normally found in these tissue types). Although cultured products may seem more desirable due
to the larger number of purified cells in the final product, the harvested sample in cultured products takes 3 to 6 weeks to process before it can be administered.12 Thus, noncultured products may be more convenient for clinical scenarios and are described below.

Bone marrow aspirate concentrate (BMAC) is a concentrated—but not cultured—heterogeneous population of cells derived from a traditional bone marrow aspirate. As compared with a traditional bone marrow aspirate, BMAC has a higher population of MSCs but not as many as the culture-expanded forms previously described.12 A benefit of BMAC is the provision of other cell populations, growth factors, and fibrin, which may aid in the healing process and provide a scaffold for cells and other substances at the treatment site.12,13 Adipose-derived stromal vascular fraction cells—not to be confused with the culture-expanded AD MSCs—are an alternative to BMAC and are harvested from fat and processed without cultured cellular expansion.14,15 The result is a heterogeneous product of MSCs that likely contain a milieu of other cells in its stroma.14-16

Bone Marrow MSCs vs Adipose-Derived MSCs
Studies comparing the effectiveness of BM MSCs with AD MSCs in the treatment of orthopedic conditions in dogs or comparing cultured with noncultured products are lacking. However, there has been some investigation into the basic differences between BM MSCs and AD MSCs, such as cell proliferation, stem cell marker expression, and lineage-specific differentiation potential.11,14,17 Although BM MSCs and AD MSCs resemble each other morphologically and in expression of markers, they display differences in proliferation rate and differentiation potential into chondrogenic and osteogenic directions. In a study comparing AD MSCs with BM MSCs, AD MSCs exhibited faster population doubling but weaker differentiation into chondrogenic and osteogenic directions.11 In addition, greater numbers of MSCs have been found in adipose tissue,18,19 but it is not known if the number of MSCs in a sample is clinically significant.18 Although the clinical meaning of these differences and the clear advantages or disadvantages to either tissue source for MSCT are unclear, AD MSCs may offer a potential advantage due to ease of harvesting. Although bone marrow aspiration is a relatively routine procedure, fat can generally be found in abundant quantities in most patients and can be harvested through a surgical procedure that may be less invasive and painful as compared with bone marrow harvesting. Further research is needed to determine which approach, if either, offers greater benefits regarding efficacy and safety or conditions that may potentially be targeted by this therapy.

Clinical Impact
MSCT has been investigated and used clinically in dogs to treat OA,20-30 ligament injuries (eg, partial cranial cruciate ligament tears),31-36 and tendinopathies (eg, supraspinatus tendinopathy).37 Chondrocytes are easily damaged and heal poorly due to their low mitotic ability and due to their lack of blood and lack of lymphatic and nerve supply,38 making them an ideal therapeutic target for MSCT in dogs and humans.9 Several studies have investigated the use of AD MSCs for the treatment of naturally occurring OA affecting the canine hip, elbow, and shoulder joint.20-30 Most of these studies were well-designed, placebo-controlled, blinded, and randomized; many demonstrated reduction in pain on manipulation and range of motion20,21 and improvement in owner satisfaction20,21,25 and in subjective grading scale and objective lameness measurements.24,27,29 It is unclear whether the beneficial effects seen in these studies were due to the anti-inflammatory effects of MSCs, the repair or regeneration of articular cartilage, or a combination of these mechanisms.33,34

The investigation of MSCT in the treatment of other small animal orthopedic conditions (eg, cranial cruciate ligament tears) has been fueled by in vivo studies that have shown the potential for MSCs to engraft into the cranial cruciate ligament, meniscus, and cartilage.32,35,36 Although data are sparse, there is some clinical evidence
MSC PROCUREMENT, PROCESSING, & ADMINISTRATION

Although all types of MSCs can be sent to laboratories for processing and culture-expanding procedures, centrifuges that can process both adipose-derived stromal vascular fraction cells and BMACs are available to allow for more convenient processing and administration and to avoid delays between procedures. Laboratories are available to provide culture-expanded products. It is unknown if a single injection or a series of injections over time is needed to optimize therapeutic benefit.

Procurement
Patients should be sedated or anesthetized, and a fat retrieval procedure or bone marrow aspiration should be performed. In dogs, bone marrow is most easily obtained from the proximal humerus, tibia, ilium, or femur. Adipose tissue can be harvested from the axillary or inguinal region or where fat is abundant.

Processing
For noncultured products, samples should be processed onsite in a specially designed centrifuge or sent to a laboratory for concentration and separation of the mononuclear layer. For culture-expanded products, a further step is performed for cell expansion in a laboratory.

Administration
Administration is most commonly performed locally to target tissue (eg, intralesionally into tendons, ligaments, or joints). The method of administration depends on the target tissue. Tendon therapy generally requires ultrasonography guidance under heavy sedation or anesthesia, whereas the treatment of OA or cranial cruciate ligament injuries only requires a joint injection under sedation.

Recovery
Most patients recover as outpatients following administration. The author recommends treating patients postinjection with parenterally administered opioids (eg, buprenorphine [0.01-0.015 mg/kg IV or SC]) or oral analgesics (eg, gabapentin [5-10 mg/kg PO]). It is unknown whether administration of NSAIDs after MSCT therapy is detrimental to efficacy. After the procedure, most patients are enrolled in a physical rehabilitation program to further treat the underlying condition being targeted.

**AD MSC** = adipose-derived mesenchymal stromal cell
**BM MSC** = bone marrow mesenchymal stromal cell
**BMAC** = bone marrow aspirate concentrate
**MSC** = mesenchymal stromal cell
**MSCT** = mesenchymal stem cell therapy
**OA** = osteoarthritis

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sugestting that MSCs may be able to augment healing of early partial tears prior to development of mechanical instability, offering a potential non-surgical solution.31

Use of culture-expanded BM MSCs in the treatment of tendon injuries has been investigated in experimental studies of horses and laboratory animals; MSCs were implanted in surgically or collagenase-induced tendon lesions and had positive effects on tissue organization, composition, and mechanics of these structures.37-40 In a veterinary clinical study, a combination of AD MSCs and platelet-rich plasma was used to treat supraspinatus tendinopathy in 55 dogs, 61.8% of which failed to respond to NSAIDs and 45.5% of which failed to respond to rehabilitation therapy.41 Improvements in objective gait analysis, lameness, and diagnostic ultrasonography results (ie, improved fiber pattern and tendon size) showed that AD MSCs combined with platelet-rich plasma may show promise in the treatment of this condition in dogs.41 Additional studies are needed to better evaluate MSCT in the treatment of this and other tendon injuries in dogs.

**Advantages**

Although the advantages of MSCT have yet to be fully elucidated, a possible advantage of MSCT is its potential in the management of OA. OA affects an estimated 20% of the canine population42 and can be challenging to manage, particularly in patients refractory to traditional medical management (eg, weight control, physical rehabilitation, nutraceuticals, NSAIDs, intra-articular therapies).43-45 MSCT may prove to be an alternative to managing signs in clinically affected dogs.

MSCT is relatively easy to carry out in a small animal practice, owing largely to its point-of-care qualities. With a multitude of products available, preparation, processing, and administration can be performed in a properly equipped veterinary practice as opposed to a referral laboratory or research facility (see MSC Procurement, Processing, & Administration).
Disadvantages
The clinical use of MSCT is still new, and there is little information available to help guide treatment plans, develop treatment protocols, and predict patient outcomes. It is also unclear how MSCs function physiologically to provide clinical benefit to patients and how efficacious MSCT is in the treatment of different disorders and injuries, as many studies on MSCT have used different types of MSC products and vehicles of administration (eg, hyaluronic acid, platelet-rich plasma, saline).20-22,25,27,29 Experimental studies have suggested that these factors can influence clinical outcome due to cell–vehicle interaction.28

In addition, there are few comparative studies (eg, those comparing intra-articular MSCT with the current standards of care [eg, physical therapy, NSAIDs, nutraceuticals, intra-articular injections of corticosteroids, hyaluronic acid, platelet-rich plasma] in the treatment of conditions such as OA). In addition to these investigative and clinical disadvantages, MSC use in veterinary medicine can be cost-prohibitive.

Conclusion
Despite a lack of comprehensive evidence for the use of MSCT (see Open Questions), its clinical use in veterinary orthopedics is growing. Clinicians must be aware of the known data and have an open discussion with owners to set realistic expectations and inform them that, although MSCT offers clinical promise, it is largely experimental. MSCT may prove beneficial in the treatment of orthopedic-related injuries and conditions, but further investigation into its potential and benefits is needed.

References

Continues on page 74
Cat ownership continues to increase in the United States: 25% of households own at least one cat, and the average cat owner makes 2.4 veterinary visits per year. Preventive care is the cornerstone of pet ownership, and cats are no exception. Parasite prevention is a critical component of preventive care, protecting pets from infectious disease and mitigating the risk for zoonotic infection in humans.

**All cats, all year round**
Cats are fastidious groomers and often remove fleas and ticks before they are visible to their owners, leading to a false sense of security when it comes to parasitic infestations. A lack of visible parasites on a pet should not equate to a lack of risk. A recent study concluded that pet ownership more than doubled the risk for household tick encounters, potentially increasing the risk for contracting zoonotic diseases.

In addition, warm indoor temperatures may foster an environment that allows parasites, once inside, to remain active throughout the year. Owners can act as a vessel for indoor entrance of fleas and ticks via clothing or shoes. Protection may be especially important in cats that share homes with dogs that frequent the outdoors and therefore increase the risk for carrying parasites indoors. All cats—both indoor and outdoor—need appropriate protection.

**Prevention is better than treatment**
In the mildest cases, flea and tick infestations can lead to pruritus, allergic dermatitis, and intestinal parasitism. More severe diseases can develop secondary to flea and tick parasitism. Flea and tick infestation may result in transmission of infectious disease (eg, cytauxzoonosis, anaplasmosis), some with potential public health implications (eg, bartonellosis, hemotropic mycoplasmosis).

Once infestation has occurred, all household pets must be treated, and environmental decontamination is often necessary to prevent reinfection.

**Compliance**
Many cats can be more challenging to medicate than dogs, and the need for owners to administer medication may hinder effective feline preventive care. The ideal parasite preventive would be effective and long acting with a quick kill and limited stress of administration. An extended duration of protection has been shown to increase owner compliance with preventive administration and is therefore a desirable quality of this category of medicine. In general, topical preventives are easier to apply than administering oral medications for cats and can decrease stress for both the pet and owner, increasing the likelihood of proper adherence.

**Conclusion**
The consequences of feline parasite infestation range from mild to severe and can even result in zoonotic disease, putting all household members at risk. Proper prevention helps reduce the risk for exposure to both feline and human members and, if performed correctly, can make treatment of these diseases unnecessary. Compliance with preventive care can improve patient health and can strengthen the bond between the owner and the veterinary team throughout the life of a pet.

**REFERENCES**
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*BRAVECTO kills fleas, prevents flea infestations, and kills ticks (black-legged tick) for 12 weeks. BRAVECTO also kills American dog ticks for 8 weeks.

**IMPORTANT SAFETY INFORMATION**: The most common adverse reactions recorded in clinical trials were vomiting, itching, diarrhea, hair loss, decreased appetite, lethargy, and scabs/ulcerated lesions. BRAVECTO has not been shown to be effective for 12-weeks’ duration in kittens less than 6 months of age. BRAVECTO is not effective against American dog ticks beyond 8 weeks of dosing. For topical use only. Avoid oral ingestion. The safety of BRAVECTO has not been established in breeding, pregnant and lactating cats. Use with caution in cats with a history of neurologic abnormalities. Neurologic abnormalities have been reported in cats receiving BRAVECTO, even in cats without a history of neurologic abnormalities. See Prescribing Information on page 44.


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Over 20 years ago I attended an all-day seminar on the use of CO₂ surgical lasers in veterinary practice. I went in very skeptically. I left exuberant! The wide range of applications, the ease of use and the versatility and durability of the laser filled me with enthusiasm.

As a busy practitioner in a mixed-animal practice, I perceived the laser to be a tool that would improve the value of the procedures I was already doing because of the inherent benefits that my Aesculight CO₂ laser delivered for my practice, my patients and my clients.

Patient, Client Benefits
The patient benefits because the laser reduces about 80 percent of nuisance bleeding by sealing vessels up to 1 mm in diameter. Larger vessels—anything with a name!—still need to be ligated.

The laser is used in non-contact mode so there is less crushing or tearing of tissue and therefore inflammation is decreased. It may also reduce “seeding” of tumors. By sealing the nerve endings as it cuts without trauma, post-operative pain is diminished and healing and recovery are enhanced. The thermal effects also reduce bacterial contamination.

The client benefits because recovery is usually shorter and post-op complications are lessened. Patients can often go home sooner, may need fewer rechecks and fewer bandage changes. They return to their normal activity levels more quickly. This saves the client money and allows the pet to resume its role as an active member of the family again.

Professional Benefits
Benefits to me and my practice, however, were the most exciting. My laser helped me expand my surgical repertoire. The clear, dry surgical field gave me more confidence in complicated procedures such as oral surgery, perianal surgery, total ear canal ablation and large mass removals.

The precision allowed more control in delicate procedures, such as distichiasis, corneal ulcers, thyroid tumors, etc. Its unique interaction with tissue helped convert some major procedures to more minor ones, such as eyelid tumors, soft palate resection, stenotic nares, evaginated sacculles and entropion corrections.

The laser also gave me an additional option for some common intractable conditions, such as stomatitis, acral lick granulomas, tumors, aural conditions, and so on. But mainly it gave me a way to add value to what I was already doing every day, e.g., granulomas, tumors, aural conditions, and so on. But mainly it gave me a way to add value to what I was already doing every day, for example, spays, neuters, lump and bumps.

Therefore I could charge a laser fee for the enhanced benefits and generate more revenue on the procedures I perform every day.

Benefits to the Practice
I did perform more surgery because I expanded my skills and expertise on new procedures. But I also found patients seeking us out for the benefits of laser surgery and we were booking more routine procedures as well. In addition, I found myself doing more “locals” on small lumps and bumps that clients would often point out during routine health appointments. Rather than delaying these for a later date, we were able to inject them with a local anesthetic, provide a quick surgical prep, laser off the offending growth, and send the pet right home with the client. This was efficient; clients were very pleased and impressed.

All these things generated a measurable revenue stream. We consistently and almost immediately generated an additional $2,000 a month to our bottom line.

The chart in Figure 1 allows the veterinarian, using her/his own data, to estimate the potential return on investment (ROI), if the Aesculight laser is used in the practice.

Why the Laser
The laser is a very effective tool for general surgery because it produces a wavelength of energy that is best absorbed by the soft tissue; absorption coefficient at 10,600 nm is over a thousand times greater than at diode laser wavelengths (800-1,100 nm).¹

High absorption in water means that, with proper technique, the laser produces the most efficient photothermal ablation of water-rich soft tissue with extreme precision and minimal collateral thermal effects (sub 100 micrometers). This is what accounts for the unlimited versatility intra-operatively and improved recovery post-operatively.

Benefits for Practitioners
Could laser surgery be just what the doctor ordered to rejuvenate your enthusiasm? Are you looking for a new marketing niche? Do you need something to differentiate your practice from your neighbors? Would you like a new revenue stream to boost the bottom line? The following questions will help you decide.
* Do you like surgery? The CO₂ laser is just another tool. It will not improve your surgical skills. But in the right hands, it can enhance your surgical armamentarium.
* Are you doing at least six to eight surgeries per week? (Or would you like to be?!) Surveys have shown that when offered as part of the surgical options, laser surgery is accepted over 70 percent of the time by clients for their pets. With an additional fee of just $50 in an average practice you would conservatively generate at least $1,000/month in added surgical revenue—even without any new procedures or clients seeking the laser as an option.

The current cost of a new laser would be $500-$750/month based on a standard five-year financing option. The laser should not just pay for itself; it should be a new profit center and new marketing niche for your practice.
* Has the number of elective surgeries performed in your practice decreased?
Many low-cost spay/neuter clinics are providing the same level of high quality surgery at a lower price due to subsidized financial backing. These facilities are often clean and modern and no longer hold the stigma they once did for many clients. Laser surgery can be a highly recognized addition to differentiate your practice from them.
* Are you already so busy that adding another service would task your schedule or your practice financially? The CO₂ laser can add value to many of the procedures that are already part of your day. Adding an additional charge for the benefits of less pain, less bleeding, and faster recovery is well accepted.
* Are you looking for something to reconstruct your interest and love of veterinary medicine?
Laser surgery has a very short learning curve. It is safe and effective and versatile enough to be used for every surgery that walks in the door. And it is fun!

If you answered “Yes,” the next step is to find the best CO₂ surgical laser for your practice. The equipment and the company should have a history of reliability and innovation. Ease of use paramount, including durability and versatility of the delivery system and hand pieces. Adjustability to accommodate the wide variety of surgical procedures that we perform is paramount.

Clean-up and sterility issues should be seamless and easy for staff to implement and perform. A laser to your surgical armamentarium has a very short learning curve. However, make sure ongoing support is readily available. With the proper equipment and training, you would never have to pick up a scalpel again.

**Figure 1. Aesculight CO₂ Laser**

**REFERENCE:**

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**WATCH CO₂ LASER SURGERY VIDEOS:**

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**About Dr. Bradley:**
David Bradley, DVM, FASLMS, has practiced for over 30 years in mixed, small animal, equine, and exotics with a special interest in surgery. Dr. Bradley began using lasers in private practice in 1999. He has consulted with dozens of laser specialists and hundreds of veterinary and human physicians. Dr. Bradley has lectured nationally and internationally on veterinary laser use. He has authored numerous articles and a chapter in the recently published Laser Surgery textbook by Wiley.
Mineralocorticoid antagonist for use in dogs only.

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

**DESCRIPTION:** VETORYL® Capsules are available in 5 sizes, 5, 10, 30, 60, and 120 mg strengths, packaged in aluminum foil blister cards (trilostane) of 10 capsules, with 3 cards per carton.

VETORYL® Capsules are available in 5, 10, 30, 60 and 120 mg strengths, packaged in aluminum foil blister cards

**DOSAGE AND ADMINISTRATION:** Always provide the Client Information Sheet with prescription (see INFORMATION FOR DOG OWNERS).

1. **Starting dose.** The starting dose for the treatment of hyperadrenocorticism in dogs is 1-3 mg (2-6.7 µg/kg) once a day. The lowest possible dose based on body weight and available combinations of capsule sizes. VETORYL® Capsules should be administered with food.

2. **Action at 10-14 day evaluation (Table 1).** After approximately 10-14 days at this dose, re-examine the dog and conduct a 4-6 hour post-dosing ACTH stimulation test and serum biochemical tests (with particular attention to electrolytes, and renal and hepatic function). If physical examination is acceptable, take action according to Table 1. Owners should be instructed to stop therapy and contact their veterinarian immediately in the event of adrenal negativity or unexpected adverse reactions.

3. **Individual dose adjustments and close monitoring are essential.** Re-examine and conduct an ACTH stimulation test and serum biochemical tests (with particular attention to electrolytes, and renal and hepatic function) 10-14 days after every dose increase. Dogs must be taken during dose increases to monitor the dog's clinical signs.

Once daily administration is recommended. If, however, clinical signs are not controlled for the full 24-hour day, twice-daily dosing may be required. In some cases, an initial dose increase of 50% of the full dose may be necessary. The full dose should be given twice a day. After the initial increase, the daily dose can be decreased by 25% at a time if the clinical signs have improved. Owners should be instructed to stop therapy and contact their veterinarian immediately in the event of adrenal negativity or unexpected adverse reactions.

**CONTRAINdications:** Use of VETORYL® Capsules is contraindicated in dogs that have demonstrated hypersensitivity to trilostane. Do not use VETORYL® Capsules in animals with primary hepatic disease or renal failure (see WARNINGS). Do not use in pregnant dogs. Studies conducted with trilostane in non-human animals have shown teratogenic effects and early pregnancy loss. Avoid pregnancy in females until at least 6 months after discontinuation of VETORYL® Capsules.

**WARNINGS:** Hyperadrenocorticism can develop at any dose of VETORYL® Capsules. In some cases, it may take months for adrenal function to return and some dogs never regain adequate adrenal function. Owners should be advised to monitor their dogs carefully and to contact their veterinarian immediately in the event of adrenal negativity or unexpected adverse reactions. If needed, a dose increase of up to 50% of the total daily dose should be given if adrenal negativity is noted. The patient should not be continued on VETORYL® Capsules if clinical signs persist despite dose increase.

**Adverse Reactions:** In a multi-center US field study, the adverse reactions were similar to the short term study. Glomerulonephritis (5 dogs) and hyperglycemia (2 dogs) were noted. In a 2-year follow-up study, 11 dogs died (7 of which were possible deaths due to trilostane) and another died of pulmonary thromboembolism. Three dogs were euthanized during the study. Two dogs had renal failure and another had worsening arthritis and deterioration of appetite. In a long-term follow-up of dogs included in the UK study, the adverse reactions were similar to the short term study. Glomerulonephritis and glomerulonephritis with segmental glomerulosclerosis were the most common adverse reactions. Two dogs died of severe hepatitis. Two dogs had severe renal failure. One dog died of neoplasia and another of liver disease.

**Post-APPROVAL EXPERIENCE:** As of June 2013, the following adverse events are based on post-approval adverse drug experience reporting. Not all adverse reactions are reported to FAVA. It is not possible to reliably estimate the adverse event incidence using post-approval adverse drug experience reporting. Owners should be advised to monitor their dogs carefully and to contact their veterinarian immediately in the event of adrenal negativity or unexpected adverse reactions. If needed, a dose increase of up to 50% of the total daily dose should be given if adrenal negativity is noted. The patient should not be continued on VETORYL® Capsules if clinical signs persist despite dose increase.

**Administration of VETORYL® Capsules:** Owners should be advised to discontinue VETORYL® Capsules and contact their veterinarian immediately if signs of hyperadrenocorticism (e.g., vomiting, diarrhea, reduced appetite, weight loss, and lethargy) are observed.

**Adverse Reactions:** In a multi-center US field study, the adverse reactions were similar to the short term study. Glomerulonephritis (5 dogs) and hyperglycemia (2 dogs) were noted. In a 2-year follow-up study, 11 dogs died (7 of which were possible deaths due to trilostane) and another died of pulmonary thromboembolism. Three dogs were euthanized during the study. Two dogs had renal failure and another had worsening arthritis and deterioration of appetite. In a long-term follow-up of dogs included in the UK study, the adverse reactions were similar to the short term study. Glomerulonephritis and glomerulonephritis with segmental glomerulosclerosis were the most common adverse reactions. Two dogs died of severe hepatitis. Two dogs had severe renal failure. One dog died of neoplasia and another of liver disease.

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**ADVERSE Reactions:** The most common adverse reactions reported were poor/fasted appetite, vomiting, lethargy/dullness, diarrhea, and weight loss. Additional adverse reactions included, although not necessarily in any order, skin/coat, kidney, GI tract, respiratory, ear, eye, and musculoskeletal. As with any drug, you must monitor your dog for potential drug toxicity

**PRECAUTIONS:** Mitotane (o,p'-DDD) treatment will reduce adrenal function. Experience in foreign markets suggests that when mitotane therapy is stopped, an interval of at least one month should elapse before the introduction of VETORYL® Capsules. It is important to wait for 20-30 days after the discontinuation of corticosteroids before starting VETORYL® Capsules (trilostane) at a cortical level of 0.35 µg (2.2-6.7 µg/kg) before treatment with VETORYL® Capsules. Close monitoring of adrenal function is advised, as dogs previously treated with mitotane may be at risk for relapse of hyperadrenocorticism due to adrenal necrosis. One dog developed an adrenal rupture, believed to be secondary to adrenal necrosis, approximately six weeks after starting trilostane therapy. This dog responded to trilostane discontinuation and supportive care.

**STORAGE INFORMATION:** Store at controlled room temperature 25°C (77°F) with excursions between 15°C (59°F) and 30°C (86°F).

**HOW SUPPLIED:** VETORYL® Capsules are available in 5, 10, 30, 60, and 120 mg strengths, packaged in aluminum foil blister cards

**VETORYL® Capsules**

<table>
<thead>
<tr>
<th>Strength</th>
<th>NDC Code</th>
<th>Label</th>
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<td>17033-105-30</td>
<td>NDC 17033-105-30</td>
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<td>120 mg</td>
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1. **CONSULT THE EXPERTS PAGE 13**

The most common complication noted with desmopressin therapy is ____________.

A. Hypernatremia  
B. Hyponatremia  
C. Hyperkalemia  
D. Hypokalemia

2. **DIAGNOSTIC/MANAGEMENT TREE PAGE 19**

Which of the following is not true of simple corneal ulcers?

A. They can occur acutely.  
B. They can occur in any signalment.  
C. Corneal stromal loss is present.  
D. Distinct edges and/or margins are present.

3. **TOP 5 PAGE 28**

A positive diascopy result occurs when applied pressure does not result in skin blanching.

A. True  
B. False

4. **TOP 5 PAGE 63**

Which of the following might predispose a dog or cat to otitis externa?

A. Ear canal hypertrichosis  
B. Familiar seborrhea or cerumen gland hyperplasia  
C. Pendulous ears  
D. All of the above

5. **CUTTING EDGE PAGE 68**

Although the best delivery method for mesenchymal stem cell therapy is not yet known, administration is commonly performed ________________.

A. Subcutaneously  
B. Intramuscularly  
C. Intravenously  
D. Locally to the target tissue
Why treat just the signs of canine osteoarthritis when you can proactively treat the disease?

Only Adequan® Canine (polysulfated glycosaminoglycan) empowers you to proactively treat the disease and not just the signs of canine osteoarthritis (OA). In fact, it’s the only FDA-approved injectable, disease-modifying osteoarthritis drug (DMOAD) that inhibits cartilage loss in a dog’s joint.* It may also help to:

- **restore** joint lubrication
- **relieve** inflammation
- **renew** the building blocks of healthy cartilage

*The specific mechanism of action of Adequan® in canine joints is not known. Discover if Adequan® Canine is the right choice for your patients.

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**INDICATIONS** Adequan® Canine is recommended for intramuscular injection for the control of signs associated with non-infectious degenerative and/or traumatic arthritis of canine synovial joints.

**IMPORTANT SAFETY INFORMATION** Adequan® Canine should not be used in dogs who are hypersensitive to PSGAG or who have a known or suspected bleeding disorder. It should be used with caution in dogs with renal or hepatic impairment. Adverse reactions in clinical studies (transient pain at injection site, transient diarrhea, and abnormal bleeding) were mild and self-limiting. In post approval experience, death has been reported in some cases; vomiting, anorexia, depression/lethargy and diarrhea have also been reported. The safe use of PSGAG in breeding, pregnant or lactating dogs has not been evaluated. Please see Full Prescribing Information at adequancanine.com.

1. Adequan Canine Prescribing Information, Rev. 1/18
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TRESADERM® (thiabendazole, dexamethasone, neomycin sulfate solution) Dermatologic Solution

Brief Summary: Before using TRESADERM, please consult the product insert, a summary of which follows: CAUTION: Federal (U.S.A.) law restricts this drug to use by or on the order of a licensed veterinarian. WARNING: For topical use in dogs and cats. Avoid contact with eyes. Keep this and all drugs out of the reach of children. DESCRIPTION: TRESADERM Dermatologic Solution contains the following active ingredients in units per mL: 40mg thiabendazole, 1mg dexamethasone, 3.2mg neomycin (from neomycin sulfate); and inactive ingredients: glycerin, propylene glycol, purified water, hypophosphorus acid, calcium hypophosphite, about 8.5% ethyl alcohol and about 0.5% benzyl alcohol. INDICATIONS and USAGE: TRESADERM aids in the treatment of certain bacterial, mycotic, and inflammatory dermatoses and otitis externa in dogs and cats. The amount to apply and frequency of treatment are dependent upon the severity and extent of lesions. Five to fifteen drops of TRESADERM should be instilled in the ear twice daily. In treating dermatoses affecting areas other than the ear, the surface of the lesions should be well moistened (2-4 drops per square inch) twice daily. The volume required will be dependent upon the size of the lesion. PRECAUTIONS: Application of TRESADERM should be limited to a period not longer than 1 week. On rare occasions, application of the product may result in erythema or discomfort in the treated area. Erythema of the treated area can last from 24 to 48 hours. When applied to fissured or denuded areas, transient discomfort can follow with the expression of pain usually lasting 2-5 minutes. While systemic side effects are not likely with topically applied corticosteroids, the possibility of such side effects should be considered if use is prolonged or extensive. If signs of salt and water retention or potassium excretion are noticed, such as increased thirst, weakness, lethargy, reduced urine output, gastrointestinal disturbances or increased heart rate, treatment should be discontinued and appropriate measures taken to correct the electrolyte and fluid imbalance. The full FDA-approved product insert can be found at http://www.merial.us/SiteCollectionDocuments/TRESADERM-PI.pdf. For technical assistance, to request a Safety Data Sheet or to report suspected adverse events, call 1-877-217-3543. For additional information about adverse event reporting for animal drugs, contact FDA at 1-888-FDA-VETS, or http://www.fda.gov/AnimalVeterinary.

IMPORTANT SAFETY INFORMATION: TRESADERM is for topical use only in dogs and cats. On rare occasions, application of the product may result in erythema or discomfort in the treated area. Discomfort in the treated area can last from 24 hours to 48 hours.

TRESADERM® Dermatologic Solution aids in the treatment of certain bacterial, mycotic, and inflammatory dermatoses, such as:

- ✔ Flea Allergy Dermatitis
- ✔ Focal Pyoderma
- ✔ Otitis Externa
- ✔ Ringworm
- ✔ Hot Spots

TRUST TRIPLE ACTION TRESADERM

Anti-fungal
Anti-inflammatory
Anti-bacterial

Approved for use on dogs and cats.

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Managing Canine Hyperadrenocorticism

Once hyperadrenocorticism (HAC) is diagnosed, focus should turn to management. Client education and communication are vital, as clients must monitor for certain clinical signs at home. Successful management often requires a substantial time and financial commitment from clients; however, a decrease in signs can be seen in as little as a few weeks. The following discussion highlights tips for discussing treatment with clients and managing this lifelong endocrinopathy.

Dr. Zimmerman: How do you approach the subject of treatment with clients?

Dr. Lathan: It’s important to emphasize that the goals of treatment for Cushing’s are to control the clinical signs and to prevent negative side effects. I talk to clients about how they are in charge of monitoring their pet and reporting in their journal how the pet is doing at home. Then when they come to see us, we’ll assess that and run tests, mostly to tell us whether the current dose is safe and efficacious or whether we need to adjust it.

Dr. Byers: I usually tell owners there are a lot of therapies available or that have been tried anecdotally, but right now there is only one drug for both pituitary- and adrenal-dependent hyperadrenocorticism that has gone through the extensive FDA approval process, and that is VETORYL Capsules. For the vast majority of patients, that is the drug that I recommend as initial therapy. Where my therapy may change from the labeled q24h dosing in the morning to a lower dose q12h is, for example, when I encounter diabetes in a patient. We’ll discuss that it is an off-label use as well as the benefits and potential risks. But, without question, we start with the FDA-approved drug, VETORYL Capsules.

Dr. Lathan: I don’t really discuss mitotane with owners much anymore, primarily because I think that a major
I don’t discuss mitotane with owners anymore, because a major benefit of the FDA-approved drug is that it’s a lot easier for clients and referring veterinarians to understand how to use it and monitor the pet.

—Dr. Lathan

benefit of the FDA-approved drug is that it’s a lot easier for clients and referring veterinarians to understand how to use it and monitor the pet. It doesn’t require teaching about how to break therapy into induction and maintenance phases.

Dr. Wasik: I think veterinarians overall feel more comfortable and safe with trilostane.

Dr. Lathan: Once we have established VETORYL Capsules as the drug of choice, I talk to clients first about dosing. Although the label states starting with once-daily dosing, I feel dogs exhibit regulation more quickly when I start with dosing twice a day. I begin at around 1 mg/kg twice a day. I recognize that the cost of the pills increases when using the drug twice a day: 2 30-mg capsules cost more than one 60-mg capsule. But in the long-term, you’re probably changing the dose less, pursuing less testing, and probably seeing a cost advantage to the point where it all evens out—and we get the patient regulated faster.

We also discuss the side effects. I send clients home with a few doses of dexa-methasone oral tablets at 0.1 mg/kg. I tell them that if over the next few days the dog has an episode of vomiting or diarrhea, especially more than once, but is doing okay otherwise, they can call us to make sure they don’t need to come into the hospital. If not, they can give the dexamethasone until our next appointment.

Dr. Wasik: For clients trying to operate on tighter budgets, many dogs will be adequately controlled on the labeled once-a-day recommendation. But there are certain cases, too, where I absolutely want to initiate therapy twice a day. Diabetics and patients with calcinosis cutis tend to do better on twice-a-day dosing. If a client is tending toward euthanasia because he is overwhelmed with the clinical signs and something has to happen right away, twice a day is probably a better idea.

Dr. Byers: There are so many options. Yes, the label dosing frequency is every 24 hours, based on the original FDA study in which 86% of patients completed the study successfully with very happy owners. That’s great, but as with any good therapy, we’ve continued to study it and we have evidence-based data showing a viable option is using a lower-dose, albeit off-label, twice-daily regimen. Anecdotal evidence, similar to published evidence, suggests that dogs actually respond more quickly, to the delight of their owners.

Dr. Lathan: I used to start all patients on once-a-day because my experience was they improved and most clients were happy. Then we started a study that involved giving trilostane twice daily. Patients were relieved of their clinical signs so much faster and dosage changes became less necessary. So now I start them on twice-a-day.

Given that trilostane doesn’t last for 24 hours in the blood, it makes sense that giving it twice a day would work better. But until I saw the clinical change, I didn’t see any point in giving it twice a day because of the cost. I do a 50/50 split between day and night. I’ve heard of people giving a different dose in the morning versus the evening to fit better with the capsule sizes, but patient monitoring should really be after their highest dose.

We ask the owner to call if the dog stops eating or has vomiting or diarrhea. Sometimes within the first couple of days dogs will show a slight decrease in appetite and maybe vomit once or twice. I tell them to make sure that they contact me if so; then we can decide our next
steps. I make sure they understand to contact us if anything emergent is happening.

Dr. Wasik: This is where the critical aspect of a strong technician team comes in. They can be checking in during those first initial days, or a couple of times during the first week, to make sure things are going well. If things are going south, you can intervene sooner rather than later.

Dr. Lathan: I dispense trilostane for 3 weeks and tell clients to come back for a recheck in 2 weeks, and definitely before they run out of medication.

Dr. Byers: I also recheck at 10 to 14 days, at which time they fill out a brief questionnaire, confirming the drug was given that day, that it was given with food, and the time it was given so we can plan a 4- to 6-hour post-pill testing if we are doing the traditional treatment per the FDA label. We also review their journal and obtain a complete patient history and a thorough physical examination. We re-evaluate electrolytes and the biochemical profile. We do have patients come in fasted, with the exclusion of the food they receive with their VETORYL Capsules dose. We evaluate only a post-ACTH stimulation cortisol level as a cost-saving measure.

Dr. Zimmerman: The VETORYL Capsules package insert says the ACTH stimulation test should be done 6 hours after administration. A study by Audrey Cook examined basal cortisol after the medication, and then a recent UK publication looked at basal cortisol before the medication was given. What are some pros and cons of those methods?

Dr. Lathan: Measuring the pre-pill cortisol makes sense in that if the value is above our concern range (eg, >2 µg/dL) and the patient is doing great otherwise, then I think it’s logical that we can continue with the current dose. If the pre-pill cortisol is <2 and the dog is doing great, I think an ACTH stimulation test is needed. The benefit of the pre-pill cortisol is it takes less time and it’s less expensive. The caveat: You cannot identify iatrogenic Addison’s based on its results.

In addition, there are some dogs that may have consistently lower pre-pill cortisol levels but their post-stim cortisol results are fine. Pre-pill cortisol is probably most useful in patients whose HAC has been successfully controlled and that are undergoing 6-month monitoring. We then know the patient is doing well clinically on the current monitoring. We then just need to determine whether continuing is safe.

I tell referring veterinarians to, for the first few ACTH stimulation tests, have patients come in first thing in the morning (before their dose) and collect blood for a pre-pill cortisol. Then give VETORYL Capsules with food, start an ACTH stimulation test 3 hours after giving VETORYL Capsules, and submit all 3 samples together because 3 samples of cortisol are not much more expensive than 2. They can then look at the trends and see if they would have done anything different based on the pre-pill value. That helps people get more comfortable with actually using the test.

Dr. Byers: Obviously when we’re talking about an FDA-approved drug used in an off-label fashion, we tell owners that and ideally have them sign an informed consent. When you’re using pre-pill cortisol levels or alternative monitoring strategies, not the ACTH stimulation test, which is the label recommendation, how does that conversation go with your clients?

Dr. Lathan: I tell owners and residents that the normal monitoring test can be used, but it takes a bit of time and costs $200 or more. We have begun monitoring a steroid, a cortisol concentration, before your dog gets the medication to see if that tells us that it’s safe to continue the medication. There haven’t been many studies on this yet, but especially if you are having a hard time affording all the testing and the medication together, then this is a way that we can try to decrease the expense and still regulate your dog. There are some pitfalls to this approach, and sometimes we need to do an ACTH stimulation test anyway, but I think this works in the majority of patients.

Dr. Zimmerman: Any other thoughts on monitoring tests?

Dr. Lathan: The most frequent question I get from veterinarians is, “Do we really have to monitor?” Yes, we have to monitor in some way. I understand that people have financial constraints, but we first must do no harm. If we continue a dog on medica-
We have to monitor. If we continue a dog on medication that might be resulting in Addison’s and we haven’t checked it, we are morally and legally liable.

—Dr. Lathan

Dr. Wasik: But here’s the great news. We’ve got multiple modalities by which we can safely monitor most patients: ACTH stimulation, pre-pill cortisol levels, basal cortisol levels. Work with the client to figure out what’s possible. If they’re not able to do any objective monitoring or close monitoring of resolution of clinical signs, they should not be giving the drug.

Dr. Lathan: There are different ways that a patient can develop Addison’s when on trilostane. The first is because trilostane inhibits cortisol production excessively. In these situations, it’s usually temporary: You stop the medication, wait for the clinical signs of HAC to return, ideally measure cortisol prior to restarting the medication at a lower dose, and continue monitoring as usual long-term.

Dr. Zimmerman: When you get your post-ACTH stimulation result after the first dose of trilostane, what is your expectation and next step?

Dr. Lathan: I want to make sure the dog is not Addisonian. The key is making sure that it’s safe to continue. If at the 2-week mark it were below even 2.5 µg/dL, I would probably be nervous because trilostane should have even more effect at 4 weeks at the same dose, so I would worry that at 4 weeks we would bottom out. That isn’t always the case, but it is a worry.

Also, look at clinical signs and specifically ask the owner about water intake and urination. I don’t necessarily change the dose even if it is higher than my ideal stimulation number (2-6 µg/dL). But if it’s 10 at 2 weeks, there is a good chance it will continue coming down. If it’s 20 at 2 weeks, I might increase the dose.

Dr. Wasik: It depends what’s going on clinically. If the dog is dramatically improved, then I’m not so worried about a 20. My preferred cortisol concentration range for dogs with controlled signs is 2 to 6 µg/dL pre- and post-ACTH stimulation.

Dr. Lathan: It also depends on the owner. If he or she is very attentive, you are less worried about a 3.

Dr. Wasik: My sweet spot is approximately >2, <6 at the 2-week mark.

As to clinical signs, patients should be more active. They look like they feel better. The owners perceive that there is a definite improvement, whether in PU, panting, or overall.

Dr. Lathan: Certain patients that are doing better clinically still have PU/PD and are not well controlled. If so, we would increase the dose. But if we just heard it’s doing great we would not. Each clinical sign is really important.

Dr. Zimmerman: So the report from the client is that the patient is doing well with no adverse effects. If you’re happy with the cortisol results, what’s your next step?

Dr. Byers: Repeat the process another month. If all continues to go well, review the patient’s journal, get a patient history, perform the examination, re-evaluate chemistry and electrolytes, and run a post-ACTH stimulation cortisol level.

Dr. Lathan: I often have them come back 2 weeks later, but I’m fine with 2 to 4 weeks after the initial recheck.

Dr. Byers: The more important point in terms of when you have them return is anytime you do decide to make a change to the VETORYL Capsules dose,
see them in 2 weeks. One reason for this is that I want the family to report that there has been an improvement in the clinical signs. But I also want to see the ACTH number to help me gauge if it’s safe to make a dosage adjustment. Clinical signs help me decide whether treatment is effective; the number helps me know whether making needed adjustments is safe.

Dr. Zimmerman: When you do decide to make a dosage adjustment, even if it’s a rare event, what is your typical increase and what do you expect from it?

Dr. Lathan: It depends on 3 things: 1) how bad are the clinical signs, 2) how much are they driving the owner crazy, 3) how high is the pre-pill or post-ACTH stimulation cortisol. If the ACTH value is 8 to 9, maybe a 15% to 20% increase. If the ACTH value is 20, then I might do a little bit more. Pill size is a guiding factor in the adjustment. If I can change to get just one pill twice a day, that would be optimal.

Dr. Wasik: My dose reductions are typically just dropping down a capsule size. I’ve not found this to be too dramatic clinically. I’m a bit more cautious when ramping up the dose. I’ll usually increase the daily dose or one or both of the doses if giving it twice daily by 5 to 10 mg per administration. I’m comfortable taking a dog on 60 mg once a day down to 30 mg if I’m worried I may be pushing too hard with respect to how the cortisol values are trending. How the dog is doing clinically and the cortisol values (emphasis on clinical signs) help me decide. A lot of it is more an “art” than a “science.” From a cost-savings standpoint, I’ve become comfortable just decreasing down to the next pill size, as many dogs I see are still controlled with a 50% dose reduction. Obviously, everyone is less worried about causing a crisis when decreasing the dose versus increasing the dose.

Dr. Byers: It’s important that the decision is based on the individual patient and not on cost. I bring this up because I know many colleagues would reach for a compounded formulation here to save money. While I can appreciate that, it’s just not acceptable.

Dr. Zimmerman: Tell me a little bit more about your thoughts and understanding of compounded trilostane.

Dr. Byers: I am not anti-compounding. I don’t think a veterinarian today can be anti-compounding, but one should follow compounding best practices. One of those is simply a straight up fact: that as a veterinarian no one should compound to save money—period.

If one feels that absolutely an 18.5-mg capsule or a liquid formulation is needed because perhaps an owner is at risk for being bitten and they have immunosuppressive disease themselves, then the compounded formulation should be from the FDA-approved drug, not from the active pharmaceutical ingredient.

If you are using a compounding pharmacy, clients must understand the compound is not a generic drug and that the pharmacy should be approved by the Pharmacy Compounding Accreditation Board. I would never work with a non-accredited pharmacy.

Dr. Lathan: Compounded trilostane from bulk chemical is less consistent, and even though it might be less expensive initially, if you have variations in regulation and you have to keep changing the dose, then that is not less expensive in the long run.

Dr. Zimmerman: Are there any other points you can share about monitoring VETORYL Capsules therapy?

Dr. Lathan: We look to clinical signs to decide whether we need to increase the dose. Then we need to use a cortisol monitoring technique to determine whether it’s safe at the current dose and an increase is safe.

Dr. Wasik: Trends are important, too. Have cortisol values been consistently 1 to 3 for 6 months, or is this the first 1 to 3 result you are seeing? And what’s the overall picture? How’s the dog doing? What is the history? It’s putting all the pieces of the puzzle together versus just trying to make a decision based on one single data point.

Dr. Zimmerman: What are some of the conversations that you have with the client as the dog is being treated? Do they report a notice-
In general, I want the panting, lethargy, and PU/PD to no longer be an issue within 8 to 12 weeks.

—Dr. Byers

able difference in the dog? Do they see the value of the diagnostic procedures and treatment?

Dr. Lathan: The biggest thing that I have reported is the degree of PU/PD. But several have definitely noted that their older dog, who they thought just didn’t play with toys anymore because of age, is playing again, or who would stay right beside the owner during walks previously will now wander off more energetically and show interest in the surroundings. One of my friends actually said that in hindsight she was pretty certain that her dog had been depressed, which is interesting because it is such a common finding in people that have HAC.

Dr. Byers: The difference clients see in pets is very important. I’ve had many pet owners tell me that they had started to resent their dog from always having to fill the water bowl, clean up urinary accidents, return to my office repeatedly for various problems, be woken during the night by the dog’s panting.

All that stops once therapy is initiated. The bond between owner and dog is restored. They don’t care about having to give the pet medication; they actually look forward to doing it because the annoyances have stopped. It is an overall positive experience for owners.

Dr. Lathan: When owners come in the first time, you can tell they are at wit’s end. They love their dog, but they are not the most enthusiastic. But when the clinical signs have improved, you can just tell they are happier people overall. No more sleep deprivation!

Dr. Byers: In some dogs, it takes 4 to 6 weeks to start seeing improvement. Those clients are a bit grumpier about having to go through the whole process.

With lethargy, just about anything can cause it, so it does not always respond to treatment. But improvement in activity, responsiveness, and interaction with the family coupled with reduced panting makes for a happy client.

Dr. Zimmerman: How quickly do owners report a change in polyuria and panting?

Dr. Wasik: Usually pretty quickly, within a week or 2. The panting seems to respond most quickly in my experience, followed by lethargy. PU may take a bit longer.

Dr. Lathan: I would say exactly the opposite. I feel the PU/PD and attitude improve within the first 2 to 4 weeks, whereas the panting takes a month or 2 to really get under control.

Dr. Zimmerman: Could that be related to their weight? Is the panting worse in severely obese dogs, and does it improve as they start losing weight?

Dr. Lathan: There is more panting in the more obese dogs. The answer to whether it gets better as they lose weight is kind of difficult because they are losing weight as they have more treatment, so I don’t know whether it’s the weight loss or the treatment itself.

Dr. Zimmerman: What do you tell clients about how long it’s going to take for their dogs to start to feel better with treatment?

Dr. Byers: Effective treatment requires the owner to be an active participant. I need owners to keep a journal because what they record and bring to me at each recheck is just as important as a number on paper. In general, I want the panting, lethargy, and PU/PD to no longer be an...
issue within 8 to 12 weeks. I do tell them that some dogs will see unusual improvement within 2 weeks, and that is supported by the initial FDA trial of VETORYL Capsules, but I try not to set unrealistic expectations. For dermatologic manifestations, I set an expectation of 4 to 6 months.

Dr. Lathan: I tell clients to expect at least 6 months for dermatologic resolution to begin. In general, I tell them not to expect any significant changes in any sign for at least a month. Then they are pleasantly surprised if something happens in a week or 2.

I agree about keeping a journal. Monitoring clinical signs is more important than numbers, as long as the numbers are in a safe range. For that reason, I think it’s really helpful to have clients fill out a questionnaire regarding the severity of the clinical signs at every visit. Then you can show them the difference over time.

Dr. Byers: Clients like to keep the journal. They feel that they are an active participant in their pet’s care.

Dr. Lathan: They do enjoy doing the journal! Those who are most engaged in their pet’s treatment and progression like it best.

Dr. Zimmerman: What are some of the most common concerns that pet owners voice about therapy for HAC?

Dr. Wasik: That they are going to kill their dog with therapy. Because of Dr. Google or Facebook groups, they have some information and seem to be scared to treat before they even walk in the door.

Dr. Lathan: I find it helps to explain that we are using lower doses of trilostane these days than is reflected in many consumer sources.

Dr. Zimmerman: We talked about recurrent infections. How do you handle such secondary conditions, and what expectations do you set for the client?

Dr. Wasik: Although usually less likely in the age group that develops hyperadrenocorticism, if T4 levels remain low despite improvement in clinical signs, particularly if hair is not growing back to the owner’s satisfaction, screening further for hypothyroidism may be appropriate. I generally instruct veterinarians to suspend any thyroid testing until we get the HAC under better control. I try to be minimalistic with regard to systemic antimicrobials during that time, which helps in preventing development of methicillin resistance. Then if 3, 4, 5 months down the line we are still having some dermatologic problems or the hair is not growing and the T4 is still low, I consider a more extensive profile, especially if any hypercholesterolemia isn’t improving either.

Dr. Lathan: In patients with dermatologic signs, especially if they have infections or atopy on top of that, I sometimes think that the excess cortisol has been decreasing the inflammation, so when you start treatment, they may have exacerbation. We need to warn owners about this phenomenon and then come up with a treatment plan for those affected. I usually consult with our dermatologist.

Dr. Zimmerman: Do you ever find in dogs with recurrent infections that once the hyperadrenocorticism is stabilized the infection responds as expected to topical or systemic therapy?

Dr. Byers: Yes. I see more UTIs than bacterial pyoderma. With effective management of hypercortisolemia, the recurrence of UTIs is dramatically reduced. You will have patients that develop a hardy biofilm in the urinary bladder, and those are more challenging. But, at least in my experience, that has not been common.

Dr. Wasik: I don’t know if the infection is eradicated. But instead of an incident every couple of months, maybe the dog has a couple per year.

Dr. Zimmerman: Are there any other pitfalls that can occur beyond just monitoring for this disease? When you are treating the patient for other things that come up in its life, like common drug interactions or otherwise?

Dr. Byers: If you are dealing with a concurrent endocrine combination like Cushing’s and diabetes, you have to prepare the client for the inevitability that
the patient’s insulin requirements are going to drop—and if you don’t prepare them and empower them with tactics to address it, or if you just keep the insulin dose the same as you are addressing the hypercortisolemia, prepare the team for an iatrogenic hypoglycemic event. I ask them to monitor urine glucose on a daily basis around the same time of day and I give them guidelines by which to adjust their insulin dose.

Dr. Zimmerman: What do you see more commonly: the diabetic who then gets Cushing’s, or the Cushing’s who then becomes diabetic?

Dr. Lathan: I feel like we definitely see both of them. They were probably cushingoid before we diagnosed the diabetes as well. I don’t think it’s that Cushing’s came afterwards—I think the Cushing’s had been there all the time.

One drug side effect to note is with ketoconazole: You do not want to give ketoconazole concurrently with trilostane, as this can precipitate hypocortisolism.

Dr. Zimmerman: Many of these patients are also overweight and they tend to have a lot of abdominal fat. Do you ever recommend a weight loss diet or a diet change?

Dr. Lathan: I try to prescribe a metabolic and mobility diet for every single one.

Dr. Byers: I take a more human–animal bond approach. If an overweight or obese human’s physician tells her to get more exercise, the likelihood of her doing so is low. If you tell her that her dog needs to lose weight and needs to achieve at least 30 minutes of exercise per day so the dog loses weight, she is going to do it. I counsel to increase their activity level and feed 5% to 10% less per day (and help them with a calculation), but I don’t change the diet.

Dr. Lathan: Some of these dogs also have joint disease. We start treating them for Cushing’s, and their joint disease can worsen because the anti-inflammatory effects of cortisol are decreased, so I use a metabolic and mobility diet with other joint supplements, which, to me, is an ideal combination.

Dr. Byers: I’m always hesitant to change diets because I’m concerned the patient is going to develop food aversion. However, a potential negative effect of my approach includes a regular comment of, “She’s just staring at me. She wants the food.” We encourage clients to use that time to further enhance the human–animal bond: Go do an activity with the pet and get food off the mind. Now they’re getting more exercise, expending more calories, and, theoretically, improving the bond.

Dr. Zimmerman: Are there any major developments other than necrosis that you see when you’re treating dogs with Cushing’s?

Dr. Lathan: I have learned, with all endocrinopathies, not to micromanage or rely so much on the numbers and to put the focus back on treating patients, addressing clinical signs, and monitoring to avoid causing harm. If the clinical signs are well-controlled, even if the number is a little higher than the norm, don’t adjust the dose.
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Khursheed Mama, DVM, DACVAA (Anesthesia & Analgesia)
Professor, Veterinary Anesthesiology at Colorado State University
Dr. Mama pursued an anesthesia and critical care residency at University of California, Davis, and worked at UC Davis for 3 years before moving to Colorado State University in 1996. She enjoys working with a variety of species while also teaching DVM and graduate students and has pursued research interests directed at improving patient care and safety.

Denis Marcellin-Little, DEDV, DACVS, DECVS, DACVSMR (Orthopedics)
Professor, Surgical and Radiological Sciences at University of California, Davis
Dr. Marcellin-Little is a diplomate of the American and European Colleges of Veterinary Surgeons and a charter diplomate of the American College of Veterinary Sports Medicine and Rehabilitation. His research focuses on the management of complex orthopedic problems, including joint replacement and the management of limb deformities.

Mary Gardner, DVM (Geriatrics)
Cofounder and CTO, Lap of Love Veterinary Hospice
Dr. Gardner’s professional goal is to increase awareness and medical care for the geriatric veterinary patient and to help make the final life stage as peaceful as possible. She is the cofounder and CTO of Lap of Love, which has over 130 veterinarians around the country dedicated to in-home end-of-life care.

Meredyth Jones, DVM, MS, DACVIM (Small Ruminants)
Associate Professor at Oklahoma State University
Owner of Large Animal Consulting & Education
Dr. Jones earned her DVM from Oklahoma State University in 2002, later completing a residency in large animal internal medicine with an emphasis on food animals and earning an MS degree in veterinary biomedical sciences at Oklahoma State University. She is the owner of an online continuing education company and joined the food animal faculty at Oklahoma State in the fall of 2018.

Darci Palmer, BS, LVT, VTS (Anesthesia & Analgesia)
Veterinary Anesthetist, Southeastern Veterinary Surgery Center
Darci has been a credentialed veterinary technician since 2000. She became certified as a VTS in anesthesia and analgesia in 2006 and currently holds the executive secretary position for the Academy of Veterinary Technicians in Anesthesia and Analgesia (AVTAA). She also serves on the Committee of Veterinary Technician Specialists (CVTS). Darci is a board moderator and CE instructor for the Veterinary Support Personnel Network (VSPN) and has lectured at several veterinary conferences.

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<td>TAHOE</td>
<td>Cat Corneas: FHV-1 &amp; More</td>
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<td>CARSON1</td>
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<td>5:00 PM</td>
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**Speaker Details**

- **Denis Marcellin-Little**
  - DECV, DACVSMR
  - Professor, Surgical and Radiological Sciences
  - University of California, Davis

- **Thomas Chen**
  - DVM, MS, DACVO
  - Clinical Assistant Professor, Small Animal Clinical Sciences
  - University of Tennessee

- **Khursheed Mama**
  - DVM, DACVSMR
  - Professor, Anesthesiology
  - Colorado State University

- **Wailani Sung**
  - MS, PhD, DVM, DACVB
  - Staff Veterinarian Mission Campus, San Francisco SPCA

- **Dan Johnson**
  - DVM, DABVP (Exotics)
  - Founder Avian and Exotic Animal Care Veterinary Hospital

- **Monique Feyrecilde**
  - BA, LVT, VTS
  - Founder and CEO Teaching Animals (Behavior)

- **Karl Salzsieder**
  - DVM, JD, CVA
  - Founder and CEO Teaching Animals (Behavior)

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  - DVM, JD, CVA
  - Founder and CEO Teaching Animals (Behavior)
## Business Theater
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<td>Recruitment Strategies</td>
<td>Louise Dunn, Founder and CEO, Snowgoose Veterinary Management Consulting</td>
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<td>Top Tips for Employee Retention</td>
<td>Louise Dunn, Founder and CEO, Snowgoose Veterinary Management Consulting</td>
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<td>3:50 PM – 4:40 PM</td>
<td>Risky Personnel Practices You Are Doing Every Day</td>
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<td>Descriptions</td>
<td>Karl Salzsieder, DVM, JD, CVA, Valuation Analyst, Total Practice Solutions Group</td>
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<td>Keep Your Cool: Handling the Top 3 Emergencies in Practice</td>
<td>Courtney Maxman, CVT, VTS (ECC), Instructional Technologist, Purdue University</td>
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<td>The Role of Technicians in Veterinary Behavioral Medicine</td>
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<td>6:00 PM – 7:40 PM</td>
<td>Bites &amp; Scratches &amp; Bruises, No More! Fear-Free Animal Handling</td>
<td>Monique Feyrecilde, BA, LVT, VTS (Behavior), Founder, Teaching Animals</td>
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## Aphids, Equine, & Farm
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### CLINICAL THEATER 1
#### TAHOE ROOM

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<td>Behavior &amp; Anxiety in Dogs</td>
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<td>Tips &amp; Clinical Pearls for Working with Community Pharmacists</td>
</tr>
<tr>
<td>4:00 PM – 4:50 PM</td>
<td>Stop Bugging Me: The Role of the Vector in Immune-Mediated Hemolytic Anemia</td>
</tr>
<tr>
<td>5:00 PM – 5:50 PM</td>
<td>Can’t Find a Vein? Alternate Routes for Euthanasia</td>
</tr>
<tr>
<td>6:00 PM – 7:40 PM</td>
<td>Anatomy of a Complaint</td>
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### CLINICAL THEATER 2
#### CARSON 1-2

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:15 AM – 9:03 AM</td>
<td>Better Living Through Chemistry: Sedation Protocols for Every Patient</td>
</tr>
<tr>
<td>10:00 AM – 11:15 AM</td>
<td>Clinical Pathology in the ER: When You Need Results Fast</td>
</tr>
<tr>
<td>1:15 PM – 2:30 PM</td>
<td>Is That Normal for an Old Dog (or Cat)? Geriatric Variants in Radiology</td>
</tr>
<tr>
<td>4:45 PM – 6:00 PM</td>
<td>The Essential Guide to GI Obstruction: Diagnosis &amp; Treatment</td>
</tr>
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</table>

### CLINICAL THEATER 3
#### CARSON 3-4

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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<tbody>
<tr>
<td>6:30 AM – 7:20 AM</td>
<td>SESSION DELIVERED BY TPSG</td>
</tr>
<tr>
<td>8:30 AM – 9:45 AM</td>
<td>Beyond Opioids: Acupuncture for Pain Management</td>
</tr>
<tr>
<td>10:15 AM – 11:05 AM</td>
<td>Beyond Opioids: Laser Therapy for Pain Management</td>
</tr>
<tr>
<td>11:15 AM – 12:30 PM</td>
<td>Vector-Borne Disease Screening Using Available Diagnostic Panels: What Am I Missing?</td>
</tr>
<tr>
<td>1:00 PM – 2:15 PM</td>
<td>Neuropathic Pain: How to Diagnose &amp; Manage</td>
</tr>
<tr>
<td>2:45 PM – 4:00 PM</td>
<td>Beyond Opioids: Veterinary Botanicals for Pain Management</td>
</tr>
<tr>
<td>4:30 PM – 5:45 PM</td>
<td>Is That Normal for a Bulldog? Breed Variations in Radiology</td>
</tr>
</tbody>
</table>

**Speakers:**
- Rebecca Windsor DVM, DACVIM (Neurology/Neurosurgery) Veterinary Specialist, Wheat Ridge Animal Hospital
- Khursheed Mama DVM, DACVIM Professor, Anesthesiology Colorado State University
- Narda Robinson DO, DVM, MS, FAAMA President and CEO CuraCore Integrative Medicine and Education Center
- Anthony Pease DVM, PhD, DACVIM Associate Professor, Small Animal Internal Medicine Western University of Health Sciences
- Karl Salzsieder DVM, JD, CVA Valuation Analyst Total Practice Solutions Group
- Karen Felsted DVM
- Meredyth Jones DVM, NVMA, CVPM, CVA CPA, MS, DVM, FAAMA
- Nicole Scherrer DVM, BA, LVT, VTS
- Courtney Waxman DVM
- Karen Felsted DVM
- Meredyth Jones DVM, NVMA, CVPM, CVA CPA, MS, DVM, FAAMA
- Nicole Scherrer DVM, BA, LVT, VTS
- Courtney Waxman DVM

**Partner:**
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<table>
<thead>
<tr>
<th>BUSINESS THEATER CRYSTAL 1-2</th>
</tr>
</thead>
<tbody>
<tr>
<td>9:10 AM – 10:00 AM</td>
</tr>
<tr>
<td>Caregiver Burden &amp; Relief: When Loving Hurts</td>
</tr>
<tr>
<td>Mary Gardner DVM Cofounder and CTO Lap of Love Veterinary Hospice</td>
</tr>
<tr>
<td>10:20 AM – 11:10 AM</td>
</tr>
<tr>
<td>Driving Financial Success</td>
</tr>
<tr>
<td>Karen Felsted CPA, MS, DVM, CVPM, CVA Founder and President PantheraT</td>
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<tr>
<td>11:30 AM – 12:20 PM</td>
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<tr>
<td>Workplace Happiness: Is It Possible?</td>
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<tr>
<td>Mary Gardner DVM Cofounder and CTO Lap of Love Veterinary Hospice</td>
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<tr>
<td>1:30 PM – 2:20 PM</td>
</tr>
<tr>
<td>Using Effective Pricing Strategies</td>
</tr>
<tr>
<td>Karen Felsted CPA, MS, DVM, CVPM, CVA Founder and President PantheraT</td>
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<tr>
<td>2:40 PM – 3:30 PM</td>
</tr>
<tr>
<td>Get Your Veterinary Groove Back</td>
</tr>
<tr>
<td>Mary Gardner DVM Cofounder and CTO Lap of Love Veterinary Hospice</td>
</tr>
<tr>
<td>3:50 PM – 4:40 PM</td>
</tr>
<tr>
<td>You Can’t Ask That: Understanding Service Dog Laws &amp; Having Conversations About Them</td>
</tr>
<tr>
<td>Courtney Waxman CVT, VTS (ECC) Instructional Technologist Purdue University</td>
</tr>
<tr>
<td>4:30 PM – 5:20 PM</td>
</tr>
<tr>
<td>A Focus on Equine Medicine</td>
</tr>
<tr>
<td>Speaker details to come.</td>
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<th>VETERINARY NURSING THEATER CRYSTAL 3-4</th>
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<tr>
<td>9:10 AM – 10:00 AM</td>
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<tr>
<td>Minutes Count: Traumatic Brain Injury</td>
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<tr>
<td>Courtney Waxman CVT, VTS (ECC) Instructional Technologist Purdue University</td>
</tr>
<tr>
<td>10:20 AM – 11:10 AM</td>
</tr>
<tr>
<td>Behavior Essentials: Preventive Care for Puppies &amp; Kittens</td>
</tr>
<tr>
<td>Monique Feyrecilde BA, LVT, VTS (Behavior) Founder Teaching Animals</td>
</tr>
<tr>
<td>11:30 AM – 12:20 PM</td>
</tr>
<tr>
<td>The Perils of Parasites: How to Protect More Patients</td>
</tr>
<tr>
<td>Beckie Mossor RVT Director of Operations 3K9 Working Dogs, Inc</td>
</tr>
<tr>
<td>1:30 PM – 2:20 PM</td>
</tr>
<tr>
<td>Dr. Dolittle Is on Duty! Communicating With Animals the Fear-Free Way</td>
</tr>
<tr>
<td>Monique Feyrecilde BA, LVT, VTS (Behavior) Founder Teaching Animals</td>
</tr>
<tr>
<td>2:40 PM – 3:30 PM</td>
</tr>
<tr>
<td>Desert Dangers: Rattlesnake Envenomation</td>
</tr>
<tr>
<td>Courtney Waxman CVT, VTS (ECC) Instructional Technologist Purdue University</td>
</tr>
<tr>
<td>3:50 PM – 4:40 PM</td>
</tr>
<tr>
<td>You Can’t Ask That: Understanding Service Dog Laws &amp; Having Conversations About Them</td>
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<tr>
<td>Beckie Mossor RVT Director of Operations 3K9 Working Dogs, Inc</td>
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<tr>
<td>4:30 PM – 5:20 PM</td>
</tr>
<tr>
<td>A Focus on Equine Medicine</td>
</tr>
<tr>
<td>Speaker details to come.</td>
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<thead>
<tr>
<th>APHIS, EQUINE, &amp; FARM CRYSTAL 5</th>
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<tbody>
<tr>
<td>8:30 AM – 9:20 AM</td>
</tr>
<tr>
<td>Module 19: Animal Emergency Response</td>
</tr>
<tr>
<td>Nicole Scherrer DVM, MS, DAVIM Associate Professor Oklahoma State University</td>
</tr>
<tr>
<td>9:40 AM – 10:30 AM</td>
</tr>
<tr>
<td>Module 12: Animal Disease Traceability</td>
</tr>
<tr>
<td>Meredyth Jones DVM, MS, DACVIM Associate Professor Oklahoma State University</td>
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Program subject to change.
<table>
<thead>
<tr>
<th>Time</th>
<th>Clinical Theater 1</th>
<th>Clinical Theater 2</th>
<th>Clinical Theater 3</th>
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</thead>
<tbody>
<tr>
<td>8:00 am – 8:50 am</td>
<td>Complicated Wound Care Cases Made Easy</td>
<td>A Focus on Diabetes</td>
<td>Navigating the Muddy Waters of Pharmacy: Improving Communication &amp; Reducing Error</td>
</tr>
<tr>
<td>9:10 am – 10:00 am</td>
<td>Cancer Palliation: Oral Therapies &amp; Beyond</td>
<td>Assessing Quality of Life</td>
<td>Mast Cell Tumors, Melanoma, &amp; Beyond: Clinical Approach to Cutaneous Masses</td>
</tr>
<tr>
<td>10:20 am – 11:10 am</td>
<td>On the Mind: Survival Guide to Traumatic Brain Injury</td>
<td>Top 5 Emergency Room Procedures You Can Use in General Practice</td>
<td>Lessons From the Street: Opioid Diversion in the Veterinary Clinic</td>
</tr>
<tr>
<td>11:30 am – 12:20 pm</td>
<td>In-House Compounding: Do’s &amp; Don’ts in General Practice</td>
<td>Queen of Denial: How Cats Show (&amp; Hide) Pain &amp; What to Do About It</td>
<td>Retching Rufus: The Clinical Approach to Chronic Vomiting in Dogs</td>
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<tr>
<td>1:30 pm – 2:20 pm</td>
<td>Veterinary Hospice &amp; Palliative Care From the Trenches</td>
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<tr>
<td>2:40 pm – 3:30 pm</td>
<td>Diversion Concerns in Veterinary Practice</td>
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<tr>
<td>5:00 pm – 5:50 pm</td>
<td>Dermatology or Ophthalmology? The Eyelid Margin Wars</td>
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Program subject to change.

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<table>
<thead>
<tr>
<th>Time</th>
<th>BUSINESS THEATER CRYSTAL 1-2</th>
<th>VETERINARY NURSING THEATER CRYSTAL 3-4</th>
<th>APHIS, EQUINE, &amp; FARM CRYSTAL 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>9:00 AM – 10:00 AM</td>
<td><strong>Top Tips to Stay Sane</strong></td>
<td>Stayin’ Alive: The RECOVER Guidelines</td>
<td>Complications of Equine Field Surgery</td>
</tr>
<tr>
<td></td>
<td>Mary Gardner DVM</td>
<td>Jo Woodison RVT</td>
<td>Shane Miller DVM, DACVS</td>
</tr>
<tr>
<td></td>
<td>Co-Founder and CTO</td>
<td>Representative California Veterinary Medical Association</td>
<td>Equine Surgeon Comstock Equine Hospital</td>
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<tr>
<td></td>
<td>Lap of Love Veterinary Hospice</td>
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</tr>
<tr>
<td>9:20 AM – 10:20 AM</td>
<td><strong>What to Do with Out-of-Control Inventory Costs</strong></td>
<td>Block Pain Before It Starts: Local &amp; Regional Blocks in Clinical Practice</td>
<td>Blood Work in Small Ruminants: What to Run &amp; How to Interpret</td>
</tr>
<tr>
<td></td>
<td>Eric Garcia CEO</td>
<td>Dari Palmer BS, LVT, VTS (Anesthesia &amp; Analgesia) Veterinary Anesthetist Southeastern Veterinary Surgery Center</td>
<td>Meredith Jones DVM, MS, DACVIM Associate Professor Oklahoma State University</td>
</tr>
<tr>
<td></td>
<td>Simply Done Tech Solutions</td>
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<tr>
<td>11:00 AM – 12:00 PM</td>
<td><strong>Self-Care: Why There Needs to Be an ‘I’ in ‘Team’</strong></td>
<td>It’s Not Over Yet: Managing Anesthesia Recovery</td>
<td>A Focus on Equine Medicine</td>
</tr>
<tr>
<td></td>
<td>Megan Brashear BS, CVT, VTS ( ECC) Specialty Technician Trainer VCA Northwest Veterinary Specialists</td>
<td>Darci Palmer BS, LVT, VTS (Anesthesia &amp; Analgesia) Veterinary Anesthetist Southeastern Veterinary Surgery Center</td>
<td>Speaker details to come.</td>
</tr>
<tr>
<td></td>
<td>Jada Velasquez RVT</td>
<td></td>
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<tr>
<td>2:00 PM – 3:00 PM</td>
<td><strong>Compassion Fatigue Versus Burnout</strong></td>
<td>Drug Protocols in Small Ruminants</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Karen Felsted CPA, MS, DVM, CVPM, CVA Founder and President PantheraT</td>
<td>Darci Palmer BS, LVT, VTS (Anesthesia &amp; Analgesia) Veterinary Anesthetist Southeastern Veterinary Surgery Center</td>
<td></td>
</tr>
<tr>
<td>3:30 PM – 4:30 PM</td>
<td><strong>The Do’s &amp; Don’ts of Blood Transfusions</strong></td>
<td>Speaker details to come.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Megan Brashear BS, CVT, VTS ( ECC) Specialty Technician Trainer VCA Northwest Veterinary Specialists</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Jo Woodison RVT</td>
<td>Equine Regenerative Medicine Made Easy</td>
<td>Shane Miller DVM, DACVS</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>Equine Surgeon Comstock Equine Hospital</td>
</tr>
<tr>
<td></td>
<td>Eric Garcia CEO</td>
<td></td>
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*CDW* |
### CLINICAL THEATER 1
**CLINICAL THEATER 2**

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Speaker</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 AM – 9:15 AM</td>
<td>What's New? Emerging Issues in Small Animal Toxicology</td>
<td>Raegan Wells DVM, MS, DACVECC</td>
<td>TAHOE ROOM</td>
</tr>
<tr>
<td>9:35 AM – 10:25 AM</td>
<td>Food Allergy: Dr. Google Debunked</td>
<td>Alexander Werner VMD, DACVD Animal Dermatology Center</td>
<td>TAHOE ROOM</td>
</tr>
<tr>
<td>10:55 AM – 12:10 PM</td>
<td>Hyperthyroidism &amp; Beyond: Feline Endocrine Case Studies</td>
<td>Margie Scherk DVM, DABVP (Feline Practice) Veterinary Specialist Cat Healthy</td>
<td>TAHOE ROOM</td>
</tr>
<tr>
<td>8:00 AM – 9:15 AM</td>
<td>Picky Kitty: Feeding the Inappetent or Anorectic Cat</td>
<td>Margie Scherk DVM, DABVP (Feline Practice) Veterinary Specialist Cat Healthy</td>
<td>CARSON 1-2</td>
</tr>
<tr>
<td>9:35 AM – 10:25 AM</td>
<td>A Focus on Endocrinology</td>
<td>Peter Chapman BVetMed (Hons), DECVIM-CA, DACVIM, MRCVS Internal Medicine Specialist Veterinary Specialty and Emergency Center—Blue Pearl Philadelphia</td>
<td>CARSON 1-2</td>
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### BUSINESS THEATER

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Speaker</th>
<th>Location</th>
</tr>
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<tbody>
<tr>
<td>8:00 AM – 9:15 AM</td>
<td>Getting Your Team on Board With Change: Hospital Protocols</td>
<td>Megan Brashear BS, CVT, VTS (ECC) Specialty Technician Trainer VCA Northwest Veterinary Specialists</td>
<td>CRYSTAL 1-2</td>
</tr>
<tr>
<td>10:55 AM – 12:10 PM</td>
<td>Top Communication Mistakes Online &amp; Off</td>
<td>Megan Brashear BS, CVT, VTS (ECC) Specialty Technician Trainer VCA Northwest Veterinary Specialists</td>
<td>CRYSTAL 1-2</td>
</tr>
<tr>
<td>8:00 AM – 9:15 AM</td>
<td>Beyond Opioids: Balanced Anesthesia Meets Multimodal Analgesia—Developing a Patient-Specific Drug Protocol</td>
<td>Daci Palmer BS, DVM, DACVD (Anesthesia &amp; Analgesia) Veterinary Anesthetist Southeastern Veterinary Surgery Center</td>
<td>CRYSTAL 3-4</td>
</tr>
<tr>
<td>9:35 AM – 10:25 AM</td>
<td>Just Breathe: Respiratory Emergencies</td>
<td>Jo Woodison RVT Representative California Veterinary Medical Association</td>
<td>CRYSTAL 3-4</td>
</tr>
<tr>
<td>10:55 AM – 12:10 PM</td>
<td>Oh, Baby! Anesthesia &amp; Analgesia Management for C-Sections &amp; Neonatal Care</td>
<td>Daci Palmer BS, DVM, DACVD (Anesthesia &amp; Analgesia) Veterinary Anesthetist Southeastern Veterinary Surgery Center</td>
<td>CRYSTAL 3-4</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>WEDNESDAY, OCTOBER 23</th>
<th>THURSDAY, OCTOBER 24</th>
<th>FRIDAY, OCTOBER 25</th>
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<tr>
<td>NEVADA 10</td>
<td>NEVADA 9</td>
<td>NEVADA 9</td>
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<td>1:00 PM – 4:00 PM</td>
<td>9:00 AM – 1:00 PM</td>
<td>1:00 PM – 3:00 PM</td>
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<tr>
<td>Surgeries of the Equine Eyelid</td>
<td>How to Intubate Almost Any Exotic Companion Mammal</td>
<td>In-House Compounding Laboratory</td>
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</tbody>
</table>

Nicole Scherrer  
DVM  
Clinical Assistant Professor, Ophthalmology  
University of Pennsylvania

Dan Johnson  
DVM, DABVP (Exotics)  
Founder  
Avian and Exotic Animal Care Veterinary Hospital

Lauren Eichstadt Forsythe  
PharmD, DICVP, FSVHP  
Pharmacy Director  
University of Illinois College of Veterinary Medicine

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What’s on your must-see list for New York? Whether you’ve been before or you’re visiting for the first time, we’ve got you covered. Explore our list of attractions and experiences on page 10.

Pricing

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<tr>
<th></th>
<th>Special Rate for Clinician’s Brief Readers (Expires July 26)</th>
<th>June 29 – September 27</th>
<th>September 28 – November 1</th>
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<tr>
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<td>Exhibition Only</td>
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<tr>
<td>Students</td>
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CAR

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Through a partnership with onPeak, we are able to offer a variety of convenient and affordable options for your stay. onPeak’s pay delay feature and flexibility make booking at one of these hotels a no-brainer.

Four Points by Sheraton – Manhattan Midtown West
$249 USD/night
0.2 miles from the Javits Center

Candlewood Suites
New York City – Times Square
$239 USD/night
0.5 miles from the Javits Center

The New Yorker – A Wyndham Hotel
$209 USD/night
1 mile from the Javits Center

DoubleTree by Hilton Hotel
New York – Times Square South
$259 USD/night
0.4 miles from the Javits Center

Yotel New York
$199 USD/night
0.6 miles from the Javits Center

New York Marriott Marquis
$379 USD/night
1.3 miles from the Javits Center

BOOK YOUR ROOM
Rates vary depending on your hotel selection. Additional hotel options are available. To select your hotel and reserve a room, visit newyork.vetshow.com/accommodation. A limited number of reduced-rate rooms are available—book soon to take advantage of your discount.

EXPLORE NEW YORK CITY
New York City is a land of opportunity, offering breathtaking views, unparalleled museums and live performances, and an endless selection of culinary experiences. There’s something here for everyone. Learn more on page 10.
<table>
<thead>
<tr>
<th>Time</th>
<th>Theaters 1</th>
<th>Time</th>
<th>Theaters 2</th>
</tr>
</thead>
</table>
| 9:00 AM – 9:50 AM | **Clinician’s Brief**  
**CLINICAL THEATER 1**  
**Prepubertal Neutering: What’s the Evidence?**  
Laura Selmic  
BVetMed (Hons), MPH, DACVS-SA, DECVS, MRCVS, ACVS Founding Fellow, Surgical Oncology  
Professor, Surgical Oncology  
The Ohio State University | 9:15 AM – 10:05 AM | **Clinician’s Brief**  
**CLINICAL THEATER 2**  
**Beyond the Nose: Challenges of Brachycephaly in All Body Systems**  
Dan Brockman  
BVSc, CertVR, CertSAO, DACVS, DECVS  
Professor, Small Animal Surgery, Head of CSS  
Royal Veterinary College |
| 10:25 AM – 11:15 AM | **Surgical Extractions: Numb It & Remove It!**  
Mark Smith  
VMD, DACVS, DAVDC  
Co-Owner  
Center for Veterinary Dentistry and Oral Surgery | 10:45 AM – 11:35 AM | **Beyond the Nose: Challenges of Brachycephaly in All Body Systems**  
Lisa Powell  
DVM, DACVECC  
Associate Critical Care Clinician  
BluePearl Veterinary Partners |
| 11:45 AM – 12:35 PM | **SESSION SUPPORTED BY Zoetis**  
Steve Castillo  
CEO  
Fee Technology Inc | 12:15 PM – 1:05 PM | **Can’t Touch This: Sedation Strategies for Fractious Patients**  
Stephanie Krein  
DVM, DACVAA  
Veterinary Anesthesiologist  
MSPCA-Angell |
Andrew Rosenberg  
DVM, DACVD  
Veterinary Dermatologist and Practice Owner  
Animal Dermatology and Allergy Specialists | 2:05 PM – 2:55 PM | **Clinical Pathology Clues to Endocrinopathies**  
Thomas Schermerhorn  
VMD, DACVIM (SAIM)  
Professor, Small Animal Internal Medicine  
Kansas State University |
| 1:45 PM – 2:35 PM | **Taking the Fear Out of Brachycephalic Anesthesia**  
Stephanie Krein  
DVM, DACVAA  
Veterinary Anesthesiologist  
MSPCA-Angell | 3:15 PM – 4:05 PM | **SESSION SUPPORTED BY Petplan**  
Speaker details to come. |
| 3:00 PM – 3:50 PM | **Feline Orthopedics: Cats Are Not Small Dogs**  
Sue Casale  
DVM, DACVS  
Veterinary Surgeon  
(Orthopedic and Soft Tissue)  
MSPCA-Angell | 4:15 PM – 5:05 PM | **All Sewn Up: Am I Choosing the Right Suture for My Procedure?**  
Laura Selmic  
BVetMed (Hons), MPH, DACVS-SA, DECVS, MRCVS, ACVS Founding Fellow, Surgical Oncology  
Professor, Surgical Oncology  
The Ohio State University |
| 4:05 PM – 4:55 PM | **Your Essential Guide to Insulin: So Many Choices, Which Do I Choose?**  
Thomas Schermerhorn  
VMD, DACVIM (SAIM)  
Professor, Small Animal Internal Medicine  
Kansas State University | 5:10 PM – 6:00 PM | **Skin in the Game: Importance of Topical Therapy**  
Andrew Rosenberg  
DVM, DACVD  
Veterinary Dermatologist and Practice Owner  
Animal Dermatology and Allergy Specialists |
| 5:10 PM – 6:00 PM | **Is That Normal for a Dachshund? Recognizing Radiographic Breed Variants in Every Body System**  
Anthony Pease  
DVM, MS, DACVR  
Chief Veterinary Medical Officer  
WVC |  | |
| 7:00 PM – 7:50 PM | **SESSION SUPPORTED BY ElleVet**  
Speaker details to come. |  | |

Program subject to change.
<table>
<thead>
<tr>
<th>TIME</th>
<th>THEATER</th>
<th>SPEAKER</th>
<th>UNIVERSITY/ORGANIZATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>9:30 AM – 10:20 AM</td>
<td>Controlled Substance: Prescribing, Reporting, Record Keeping, &amp; Diversion Prevention (Part 1)</td>
<td>Lisa Penny RPh, FSVHP, FACVP</td>
<td>Director of Pharmacy, Cornell University Hospital for Animals</td>
</tr>
<tr>
<td>9:00 AM – 9:50 AM</td>
<td>Happy Team, Happy Bottom Line</td>
<td>Josh Vaisman CCFP</td>
<td>Colounder and Positive Change Ninja, Flourish Veterinary Consulting LLC</td>
</tr>
<tr>
<td>9:00 AM – 9:50 AM</td>
<td>Rehabilitate Your Protocols: Rehab Tips for General Practice</td>
<td>Heather Hopkinson RVT, VTS-EVN, CCRP</td>
<td>Technician, Rehabilitation and Mobility, North Carolina State University</td>
</tr>
<tr>
<td>9:25 AM – 10:15 AM</td>
<td>Controlled Substance: Prescribing, Reporting, Record Keeping, &amp; Diversion Prevention (Part 2)</td>
<td>Lisa Penny RPh, FSVHP, FACVP</td>
<td>Director of Pharmacy, Cornell University Hospital for Animals</td>
</tr>
<tr>
<td>10:00 AM – 10:50 AM</td>
<td>What a Relief! How to Maximize Your Career as a Relief Veterinarian</td>
<td>Cindy Trice DVM</td>
<td>Founder and CEO, ReliefRover</td>
</tr>
<tr>
<td>10:30 AM – 11:20 AM</td>
<td>Kitty Cooperative Care</td>
<td>Monique Feyrecilde BA, LVT, VTS (Behavior)</td>
<td>Founder, Teaching Animals</td>
</tr>
<tr>
<td>12:00 PM – 12:50 PM</td>
<td>Session Supported by Patterson Veterinary Supply</td>
<td>Speaker details to come.</td>
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</tr>
<tr>
<td>1:00 PM – 1:50 PM</td>
<td>Getting the Most From Your Stethoscope: Practical Cardiology Toolkit in Primary Care (Part 1)</td>
<td>Amara Estrada DVM, DACVIM (Cardiology)</td>
<td>Professor, Cardiology, University of Florida</td>
</tr>
<tr>
<td>1:40 PM – 2:30 PM</td>
<td>Smart Use of Smartphones in Your Practice</td>
<td>Caleb Frankel DVM</td>
<td>Founder and CEO, Instinct Science</td>
</tr>
<tr>
<td>1:40 PM – 2:30 PM</td>
<td>Stand Out From the Crowd: How to Market Yourself</td>
<td>Heather Prendergast RVT, CVPM, SPHR</td>
<td>CEO, Synergie Consulting</td>
</tr>
<tr>
<td>2:40 PM – 3:30 PM</td>
<td>So You’re Thinking About Buying a Practice</td>
<td>Lance Roasa DVM, MS, JD</td>
<td>Founder, Flatwater Veterinary Group, PC, The Roasa Law Group</td>
</tr>
<tr>
<td>3:00 PM – 3:50 PM</td>
<td>Capnography in Practice</td>
<td>Heather Sidari RVT, VTS (Anesthesia and Analgesia)</td>
<td>Chief of Veterinary Nursing, Veterinary Specialty Hospitals for the Carolinas</td>
</tr>
<tr>
<td>4:20 PM – 5:10 PM</td>
<td>Extraction Complications: Tips &amp; Tricks to Get Out of Trouble</td>
<td>Mark Smith DVM, DACVS, DAVDC</td>
<td>Co-Owner Center for Veterinary Dentistry and Oral Surgery</td>
</tr>
<tr>
<td>4:40 PM – 5:30 PM</td>
<td>Temperature Extremes: From Hypothermia to Heat Stroke</td>
<td>Courtney Waxman CVT, VTS (ECC)</td>
<td>Instructional Technologist, Purdue University</td>
</tr>
<tr>
<td>5:25 PM – 6:15 PM</td>
<td>Pediatric Orthopedics: Sprains, Strains, &amp; Salter-Harris</td>
<td>Sue Casale DVM, DACVS</td>
<td>Veterinary Surgeon (Orthopedic and Soft Tissue), MSPCA-Angell</td>
</tr>
<tr>
<td>4:40 PM – 5:30 PM</td>
<td>Cybersecurity: Protect Your Practice</td>
<td>Joseph Axne Owner IT Guru</td>
<td></td>
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</table>

Theater 3: Clinician’s Brief
<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Speaker</th>
<th>Institution/University</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 AM – 8:50 AM</td>
<td>Red Light, Green Light Cases</td>
<td>Lauren Trepanier</td>
<td>University of Wisconsin–Madison</td>
</tr>
<tr>
<td>9:00 AM – 9:50 AM</td>
<td>Getting the Most From Your Stethoscope: Practical Cardiology Toolkit in Primary Care (Part 2)</td>
<td>Amarra Estrada</td>
<td>University of Florida</td>
</tr>
<tr>
<td>10:00 AM – 10:50 AM</td>
<td>Survival Guide to Inflammatory Nervous System Diseases</td>
<td>Simon Platt</td>
<td>University of Georgia</td>
</tr>
<tr>
<td>11:10 AM – 12:00 PM</td>
<td>Stop Going Rogue &amp; Start Doing Right: Essential Practices in Evidence-Based Medicine</td>
<td>Adrian Boswood</td>
<td>University of Georgia</td>
</tr>
<tr>
<td>1:00 PM – 1:50 PM</td>
<td>Not Just Laryngeal Paralysis: Understanding GOLPP (Geriatric Onset Laryngeal Paralysis Polyneuropathy)</td>
<td>Todd Archer</td>
<td>Michigan State University</td>
</tr>
<tr>
<td>2:05 PM – 2:55 PM</td>
<td>Immune-Mediated Diseases &amp; Immunosuppressive Therapy: What You Might Be Missing (Case-Based Review)</td>
<td>Todd Archer</td>
<td>Mississippi State University</td>
</tr>
<tr>
<td>3:10 PM – 4:00 PM</td>
<td>Dry Your Tears: Managing Tear Production Disorders</td>
<td>A. Brady Beale</td>
<td>University of Pennsylvania</td>
</tr>
<tr>
<td>4:10 PM – 5:00 PM</td>
<td>More Than One Problem: Wound Management in Complicated Patients</td>
<td>Bryden Stanley</td>
<td>Michigan State University</td>
</tr>
<tr>
<td>9:30 AM – 10:20 AM</td>
<td>Managing Collapsing Trachea: Beyond Hydrocodone</td>
<td>Todd Archer</td>
<td>Mississippi State University</td>
</tr>
<tr>
<td>10:35 AM – 11:25 AM</td>
<td>Recognizing &amp; Managing Self-Harming Dogs &amp; Cats</td>
<td>E’lise Christensen Bell</td>
<td>Animal Care Center of Castle Pines</td>
</tr>
<tr>
<td>11:40 AM – 12:30 PM</td>
<td>Mastering Vestibular Diseases in Dogs &amp; Cats: All You Need to Know</td>
<td>Simon Platt</td>
<td>University of Georgia</td>
</tr>
<tr>
<td>1:00 PM – 1:50 PM</td>
<td>Beyond the Curve: Monitoring Blood Glucose in Dogs &amp; Cats</td>
<td>Thomas Schermerhorn</td>
<td>Kansas State University</td>
</tr>
<tr>
<td>2:00 PM – 2:50 PM</td>
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<tr>
<td>3:00 PM – 3:50 PM</td>
<td>SESSION SUPPORTED BY zoetis</td>
<td>Steve Castillo</td>
<td>Fee Technology Inc</td>
</tr>
<tr>
<td>3:10 PM – 4:00 PM</td>
<td>Dust Off Your Ultrasound Machine: The Nonradiologist’s Guide to Ultrasound in General Practice</td>
<td>Anthony Pease</td>
<td>WVC</td>
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Program subject to change.
<table>
<thead>
<tr>
<th>Time</th>
<th>Business Theater</th>
<th>Veterinary Nursing Theater</th>
<th>Clinician's Brief</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 AM – 8:50 AM</td>
<td>Susan Savage, CVT, CVPM, MBA, PhD, CVPM Candidate, Liaison, Veterinary Hospital Managers Association</td>
<td>Certified Veterinary Practice Manager (CVPM) Certification: Informational Session</td>
<td>Not All Melanomas Are the Same: Understanding the Importance of Location, Malignancy, &amp; Species</td>
</tr>
<tr>
<td>10:00 AM – 10:50 AM</td>
<td>Jason Coe, DVM, Associate Professor, Ontario Veterinary College</td>
<td>How to Handle Confrontational Clients</td>
<td>Nutritional Therapy for Diarrhea: Tips, Tricks, &amp; Pearls</td>
</tr>
<tr>
<td>11:00 AM – 11:50 AM</td>
<td>Peter Weinstein, DVM, MBA, Executive Director, Southern California Veterinary Medical Association</td>
<td>Ready to Grow: When, Why, &amp; How to Expand Your Practice</td>
<td>Food Allergy: Is It Really as Common as Owners &amp; Pet Stores Think?</td>
</tr>
<tr>
<td>12:05 PM – 12:55 PM</td>
<td>Denise Tumblin, CPA, Owner and President, WTA Veterinary Consultants Inc</td>
<td>Embezzlement: How to Spot It &amp; How to Protect Yourself</td>
<td>What Goes Up Must Come Down: Diagnosis &amp; Management of Intraocular Pressure Disorders</td>
</tr>
<tr>
<td>1:00 PM – 1:50 PM</td>
<td>David McCormick, MS, CVA, Veterinary Appraiser, Consultant, and Broker Simmons Mid-Atlantic</td>
<td>Helping Canine Patients Stress Less</td>
<td>Mitral Valve Management</td>
</tr>
<tr>
<td>2:05 PM – 2:55 PM</td>
<td>david mccormick, MS, CVA, Veterinary Appraiser, Consultant, and Broker Simmons Mid-Atlantic</td>
<td>The Value of Valuation</td>
<td>9:15 AM – 10:05 AM, The First 48: Caring for Your Critical Trauma Patient</td>
</tr>
<tr>
<td>3:05 PM – 3:55 PM</td>
<td>E'lise Christensen Bell, DVM, DACVB, Veterinary Behaviorist, Animal Care Center of Castle Pines</td>
<td>What to Say When Things Go Wrong: Communication in Challenging Situations</td>
<td>9:15 AM – 10:05 AM, How to Spot It &amp; How to Protect Yourself</td>
</tr>
<tr>
<td>4:05 PM – 4:55 PM</td>
<td>Neal Mauldin, DVM, DACVM, (Internal Medicine and Oncology), DACVR (Radiation Oncology), Chief Medical Officer, PetCure Oncology</td>
<td>How You Can Afford to Give Your Team a Raise</td>
<td>2:05 PM – 2:55 PM, The Value of Valuation</td>
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</tbody>
</table>

**Clinical’s Brief**

- **CLINICAL THEATER 3**
  - **9:15 AM – 10:05 AM** Not All Melanomas Are the Same: Understanding the Importance of Location, Malignancy, & Species
  - **10:20 AM – 11:10 AM** Nutritional Therapy for Diarrhea: Tips, Tricks, & Pearls
  - **12:00 PM – 12:50 PM** Ready to Grow: When, Why, & How to Expand Your Practice
  - **2:05 PM – 2:55 PM** Mitral Valve Management
  - **3:05 PM – 3:55 PM** When You’re Scared of Your Patients: Human-Directed Aggression (Clinical Cases)
  - **4:05 PM – 4:55 PM** Stereotactic Radiosurgery: Data-Driven Treatment Recommendations

**BUSINESS THEATER**

- **8:00 AM – 8:50 AM** Certified Veterinary Practice Manager (CVPM) Certification: Informational Session
- **10:00 AM – 10:50 AM** How to Handle Confrontational Clients
- **11:00 AM – 11:50 AM** Ready to Grow: When, Why, & How to Expand Your Practice
- **12:05 PM – 12:55 PM** Embezzlement: How to Spot It & How to Protect Yourself
- **2:05 PM – 2:55 PM** The Value of Valuation
- **3:00 PM – 3:50 PM** What to Say When Things Go Wrong: Communication in Challenging Situations
- **4:00 PM – 4:50 PM** How You Can Afford to Give Your Team a Raise

**VETERINARY NURSING THEATER**

- **9:15 AM – 10:05 AM** The First 48: Caring for Your Critical Trauma Patient
- **10:15 AM – 11:05 AM** Ride the Wave: ECG Survival Kit
- **11:15 AM – 12:05 PM** Helping Canine Patients Stress Less
- **12:15 PM – 1:05 PM** Negotiation: How to Get What You Want at Work
- **12:45 PM – 1:35 PM** Urine for the Win
- **1:45 PM – 2:35 PM** Urine for the Win

**Speaker Details**

- **Brooke Britton, DVM, DACVIM (Oncology), Medical Oncologist, BluePearl Veterinary Partners**
- **Martha Clune, DVM, DACVN, Veterinarian, (Clinical Nutrition), Red Bank Veterinary Hospital**
- **Andrew Rosenberg, DVM, DACVIM (Oncology), Medical Oncologist, BluePearl Veterinary Partners**
- **A. Brady Beale, VMD, DACVO, Instructor, Clinical Ophthalmology, University of Pennsylvania**
- **Dan Brockman, BVS, CertVR, CertSAO, DACVS, DECVS, Professor, Small Animal Surgery, Head of CSS, Royal Veterinary College**
- **Adrian Boswood, MA, VMBB, MBRCVS, DVC, DECVM-CA (Cardiology), Professor, Veterinary Cardiology, Royal Veterinary College**
- **E’lise Christensen Bell, DVM, DACVB, Veterinary Behaviorist, Animal Care Center of Castle Pines**
- **Neal Mauldin, DVM, DACVIM (Internal Medicine and Oncology), DACVR (Radiation Oncology), Chief Medical Officer, PetCure Oncology**
- **Susan Savage, CVT, CVPM, MBA, PhD, CVPM Candidate, Liaison, Veterinary Hospital Managers Association**
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- **Heather Prendergast, RVT, CVPM, SPHR, CEO Synergie Consulting**
- **Courtney Wozman, CVT, VTS (ECC), Instructional Technology, Purdue University**

newyork.vetshow.com
**BIG IDEAS IN THE BIG APPLE**

Big Ideas in the Big Apple is a workshop run by New York State Veterinary Medical Society (NYSVMS) for attendees of New York Vet. This 2-day program brings veterinary professionals together to engage in meaningful discussions about current issues in the profession. This year, the program is focused on animal welfare and personal well-being for private practice veterinarians. For more information, visit vets.nysvms.org/events/bigideas.

### THURSDAY, NOVEMBER 7

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<th>Time</th>
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<tr>
<td>10:00 AM – 10:50 AM</td>
<td>An Overview of the Law &amp; Reporting Animal-Related Crimes</td>
</tr>
<tr>
<td>11:10 AM – 12:00 PM</td>
<td>Real Case Examples: Reporting Animal-Related Crimes</td>
</tr>
<tr>
<td>2:30 PM – 3:20 PM</td>
<td>Walking Through a Case &amp; How to Handle It</td>
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<tr>
<td>3:40 PM – 4:30 PM</td>
<td>Testimony Workshop</td>
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</tbody>
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### FRIDAY, NOVEMBER 8

<table>
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<tr>
<th>Time</th>
<th>Session</th>
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</thead>
<tbody>
<tr>
<td>10:00 AM – 10:50 AM</td>
<td>Overwhelmed by Compassion Fatigue &amp; Burnout? There Are Solutions!</td>
</tr>
<tr>
<td>11:10 AM – 12:00 PM</td>
<td>Imposter Syndrome: How Feeling “Not Good Enough” Might Be a Symptom of Success</td>
</tr>
<tr>
<td>2:30 PM – 3:20 PM</td>
<td>Workplace Culture &amp; Well-Being: How to Make a Change</td>
</tr>
<tr>
<td>3:40 PM – 4:30 PM</td>
<td>Drafting Your Well-Being Framework: A Hands-On Workshop</td>
</tr>
</tbody>
</table>

**Speakers**

- **Alison Liu**
  - DVM
  - Forensic Veterinarian

- **Laura Niestat**
  - DVM
  - Forensic Veterinarian

- **Elizabeth Brandler**
  - JD
  - Legal Advocacy Senior Counsel

- **Erin Satterthwaite**
  - JD
  - Legal Advocacy Bronx Counsel

- **Makenzie Peterson**
  - MSc
  - Well-Being Program Director

Program subject to change.
New York Vet Welcome Party

Thursday, November 7
5:30 PM – 6:30 PM
Central Catering Area
Javits Center, New York City

Grab a drink and soak up the excitement of the conference at an event where colleagues, speakers, and exhibitors all come together to build new connections and meaningful relationships.

DON’T MISS IT.

WE’VE GOT THE PARTY.
All that’s missing is you.

Save the Date
Thursday, November 7

After Party with the NYCVMA

The NYCVMA will be hosting an after-hours social gathering for all attendees of New York Vet. Proceeds from the party will go to NYSAVE, a nonprofit foundation in New York City that helps animals in need of medical care.

Join us for music and drinks in support of this important foundation.

For more information and to purchase tickets, visit newyork.vetshow.com/faqs.
FIND YOUR NEW YORK CITY

Whether you love the bustle of New York City or find it a bit intimidating, we’ve got you covered. From hidden pearls of art, culture, and food to the sights and flavors that have made New York famous, here’s your guide to the best the Empire City has to offer.

UPPER EAST SIDE
1. The Metropolitan Museum of Art
   Tackling the permanent collection at The Met can prove a challenge. If you’re short on time, focus on must-see works by Georgia O’Keeffe, Pablo Picasso, Claude Monet, and Vincent Van Gogh. Looking for more? The Guggenheim is a few steps down Museum Mile, and the Jewish Museum and El Museo del Barrio are also close by.

2. Meijin Ramen | $$
   Ramen cravings are common during the rainy season in New York City. If you find yourself on the Upper East Side looking for something soothing and slurpable, stop in Meijin for a steaming bowl of ramen and a side of soft-shell crab tempura.

UPPER WEST SIDE
3. Jacob’s Pickles | $$
   Don’t let the name distract you; this isn’t a restaurant just for pickles. Jacob’s offers the warmth and charm of Southern-style comfort food in a lively New York City atmosphere.

4. American Museum of Natural History
   A New York icon, this museum is packed with must-see exhibitions. Be sure to visit the dinosaur wing, and take a moment in the Milstein Hall of Ocean Life to gaze in awe at the life-size model of a blue whale.

5. Central Park
   Central Park is a model for green spaces across the country. An urban oasis of wooded gardens, rolling meadows, sculptures, and skyline vistas, this 843-acre park is a welcome respite from concrete and skyscrapers.

6. Levain Bakery | $$
   This tiny basement bakery is primarily known for monstrous cookies that have been proclaimed the best in New York City. If you’re looking for something more savory, Levain also offers a line of fine breads, from olive herb semolina and sourdough to walnut raisin loaves. If you’re in a hurry, stop by Levain’s new expanded location around the corner.

7. Parm | $$
   Parm is best known for its carefully braised meatball parm hero and airy pizza knots, among several other handcrafted and thoughtfully prepared Italian-American culinary delights. It’s a small spot, but worth the wait for a table or a seat at the bar.

HELLO’S KITCHEN
8. Press Lounge | $$$
   Enjoy 360-degree vistas of midtown’s stunning skyline from this comfortably elegant rooftop bar. Press offers an expansive cocktail and wine list and plenty of indoor and outdoor seating.

9. Gotham West Market | $$
   A spacious full-service food hall, Gotham West offers casual cuisine from 8 critically-acclaimed restaurants; it’s the perfect spot for groups with varied preferences. Grab a taco from Choza and treat yourself to ice cream or baked goods from Ample Hills, one of the best ice cream shops in New York City.

MIDTOWN MANHATTAN
10. Broadway
   There’s nothing quite like the energy of a live show in New York City. If you’re a fan of the theater, be sure to check into upcoming shows and book early, as tickets go quickly.

11. Top of the Rock – Rockefeller Plaza
   The Top of the Rock at the Rockefeller Plaza offers sweeping, panoramic views of both Central Park and Manhattan’s skyscrapers. Book a ticket to go up at sunset and take in the unforgettable views.

LOOKING FOR DEALS?
Take advantage of the New York City Delegate Discount Pass to get discounts and offers at more than 75 restaurants, attractions, museums, and retailers throughout the city. See our website for details.
Locations on this map are approximate.
CHELSEA

12. **Vessel at Hudson Yards**
Be among the first to climb the 2,500 steps of over 150 different staircases that comprise the Vessel, the striking new landmark of Chelsea. The stunning views from the top are worth the nearly mile of vertical incline.

13. **The High Line**
Once a rail line, now nearly a mile and a half of footpath punctuated by gardens, overlooks, and art installations, the High Line winds through Chelsea and Hudson Yards, with an entrance facing the Javits Center. Stroll along the High Line for views of Chelsea, the Hudson River, and other urban delights.

FLATIRON DISTRICT

14. **Eataly | $$$$**
Called both a “wonderland” and a “temple,” Eataly is a must-see mélange to a market, bakery, cheese counter, and butcher counter as well as a range of sit-down pasta and pizza restaurants, Eataly is a mecca of Italian delights.

15. **Thai Villa | $$**
Nestled in an unassuming shopfront just around the corner from the famous Flatiron building, Thai Villa is a lush, sumptuously decorated tribute to Thai style. Treat yourself to a classic curry or traditional gai yang under a canopy of glittering gold leaves.

LOWER MANHATTAN

16. **Milk Bar | $$**
Milk Bar believes in seizing every opportunity to celebrate. Revel in the simple joy of being in New York City with a slice of their famous Milk Bar Pie, a sky-high piece of confetti cake, or a truly decadent cookie.

17. **Katz’s Delicatessen | $$**
Whether you order Katz’s legendary pastrami on rye or go for a classic corned beef, savor the bustling experience of a true Jewish deli, complete with turnstiles and lunch tickets.

18. **SoHo**
One of the city’s most eclectic shopping districts, SoHo (an acronym for ‘South of Houston Street’) is home to everything from big name brands like Chanel to one-of-a-kind boutiques and bargain emporiums. Stop for lunch at the district’s best vegetarian spot, West-Bourne, to fuel up for an afternoon of shopping.

19. **Sweetgreen | $$**
Take the freshest ingredients and pair them with the best vegetable puns and you have Sweetgreen. This clean, modern salad bar offers a mix of creative grain and salad bowls, as well as build-your-own options for the creatively inclined.

FINANCIAL DISTRICT

20. **Le District | $$**
Treat yourself to an impressive array of French-inspired fare at Le District. Enjoy river views and outdoor seating at their two stand-alone restaurants, Beaubourg and L’Appart, or simply wind down with a glass of wine or craft cocktail at Le Bar.

21. **Brooklyn Bridge**
Looking for an iconic New York City experience (and the best photo opportunities)? Take a stroll across the Brooklyn Bridge to admire this iconic architectural marvel and take in views of New York Harbor, the Brooklyn and Manhattan skylines, and the Statue of Liberty.

22. **One World Trade Center & The Oculus**
Built on the site of the original Six World Trade Center, the One World Trade Center rises 1,776 feet into the sky above Manhattan. Nearby, The Oculus—a transit hub, shopping concourse, and architectural marvel—spreads its white, dove-like wings over the streets of New York.

23. **Staten Island Ferry**
Embark on a 25-minute voyage from Lower Manhattan to Staten Island via New York’s free Staten Island Ferry, which provides passengers with spectacular vistas of New York Harbor, the Manhattan skyline, and the Statue of Liberty.
TIP

Download Google Maps or use Apple Maps for simple directions, whether you’re driving, walking, or relying on public transit.

New York City is known for its walkability, and getting around on foot is the best way to familiarize yourself with the city's many neighborhoods. For destinations that lie beyond the reach of your feet, hop on the subway, climb aboard a bus, or flag down a cab or rideshare.
New York City’s rail and bus system reaches virtually every corner of the city and is inexpensive, environmentally friendly, and operates 24 hours a day, 7 days a week.

For $2.75, you can use the subway system citywide and transfer to other subway lines as many times as you need, as long as you don’t exit through a turnstile. Pay-per-ride MetroCards cost $1 and can be purchased and reloaded at any subway station.

If you find navigating the subway daunting, be sure to download Google Maps and select the transit directions to easily locate the right train, platform, and stop.

Lyft and Uber are also widely available in New York City. Download one of the free apps, add your payment information, and schedule a ride from your phone.

Download New York’s new official cab-hailing app, Waave, to easily connect with a nearby cabbie. The app allows you to get upfront fares, surge-free pricing, and estimated arrival times before you even hail the cab.

New York’s waterways offer a unique opportunity to skip the street traffic and see the city from an entirely new vantage point. The extensive ferry system can get you to uptown or downtown Manhattan and across the rivers to Staten Island, Brooklyn, Queens, and New Jersey.

For all the details on navigating New York City, visit nycgo.com/transportation.
Can’t Touch This: Sedation Strategies for Fractious Patients

Examine the various pharmacologic options for pre-hospital and in-hospital sedation and antianxiety medication. Review a variety of pharmacologic agents as well as specific drug combinations for both cats and dogs.

Stephanie Krein, DVM, DACVAA, is currently a veterinary anesthesiologist at MSPCA-Angell. She earned her DVM from University of Illinois in 2007 and went on to complete a rotating internship in Chicago and work as an emergency doctor at Cape Cod Veterinary Specialists. In 2013, Dr. Krein completed an anesthesia residency at Tufts University and joined the team at University of Pennsylvania as a clinical lecturer. She passed the ACVAA board exam the following year and joined the team at Angell in March of 2015. She has a strong interest in emergency and critical care anesthesia and the effect of various drugs on the cardiovascular system.

Clinician’s Brief Clinical Theater 2 | Thursday, November 7 | 12:15 PM – 1:05 PM

Red Light, Green Light Cases

Review a series of clinical cases and consider possible drug interactions or drug contraindications specific to each patient during this in-depth, case-based session.

Lauren Trepanier, DVM, PhD, DACVIM (SAIM), DACVCP, is a professor of internal medicine and assistant dean for clinical and translational research at University of Wisconsin–Madison, where she has worked for 22 years. She earned her DVM with honors from Cornell University and completed an internship and residency in small animal internal medicine at the Animal Medical Center in New York. She then earned a PhD in pharmacology at Cornell. Her job involves managing internal medicine referral cases; training students, interns, and residents; conducting pharmacogenetics research; and developing initiatives to support clinical and collaborative research by veterinarians.

Clinician’s Brief Clinical Theater 1 | Friday, November 8 | 8:00 AM – 8:50 AM

Beyond the Curve: Monitoring Blood Glucose in Dogs & Cats

Monitoring a diabetic dog or cat is a crucial part of diabetes management. Unfortunately, expert recommendations for optimal monitoring protocols vary to the point of frustration for many veterinarians. This session will cover the physiologic basis for a variety of tests used to monitor glycemia, as well as the pros and cons of each test. Get recommendations for developing and implementing a useful strategy for managing patients with chronic diabetes.

Thomas Schermerhorn, VMD, DACVIM (SAIM), is currently professor and Jarvis Chair of Veterinary Medicine at Kansas State University. He earned his VMD from University of Pennsylvania in 1990. He completed an internship at South Shore Veterinary Associates and then a residency in small animal internal medicine and a research fellowship in molecular medicine at Cornell University. His clinical and research interests are focused on endocrinology—particularly diabetes mellitus and related metabolic disorders—in dogs and cats.

Clinician’s Brief Clinical Theater 2 | Thursday, November 8 | 1:00 PM – 1:50 PM

See the program on page 4.
Immune-Mediated Diseases & Immunosuppressive Therapy: What You Might Be Missing (Case-Based Review)

Explore the differing options surrounding immunosuppressive therapy in a case-based review that emphasizes strategies for not only achieving initial disease remission but also tapering medications over the chronic phase of treatment.

Todd Archer, DVM, MS, DACVIM (SAIM), is currently an associate professor and service chief of small animal internal medicine at Mississippi State University. His teaching and clinical interests include hematology, immunology, and endocrine disorders. He earned his DVM and completed his internship and residency at Mississippi State University.

All Sewn Up: Am I Choosing the Right Suture for My Procedure?

How do you choose suture material? Which needle type is best? Matching the biomechanical characteristics of suture material with those of the healing tissues can provide optimal support during healing and prevent early failure. In this session, explore common tissues, suture materials, and needle recommendations that will make life easier in your operating room.

Laura Selmic, BVetMed (Hons), MPH, DACVS-SA, DECVS, MRCVS, ACVS Founding Fellow, Surgical Oncology, is an assistant professor of soft tissue and oncologic surgery at The Ohio State University. She graduated from Royal Veterinary College in 2004. After 2 years in private practice and an internship, she completed a residency in small animal surgery at Texas A&M University as well as a clinical fellowship in oncologic surgery and a master of public health.

Fact vs Fiction: Sound Clinical Nutrition in a World Driven by Nutritional Pseudoscience

Myths and half-truths plague veterinary nutrition. It is difficult for many clients to make sense of pet food packaging and sometimes even more difficult for us to educate them. This lecture will address popular nutrition myths, provide key client communication tips, and review how best to judge the quality of pet food.

Martha Cline, DVM, DACVN, is a board-certified veterinary nutritionist at Red Bank Veterinary Hospital in Tinton Falls, New Jersey, where she has practiced clinical nutrition since 2013. She earned her DVM from University of Tennessee, completed a rotating small animal internship at Oradell Animal Hospital, and then completed her residency in small animal clinical nutrition at University of Tennessee. She is the coeditor and an author for the textbook Obesity in the Dog and Cat and has contributed to several other textbooks and peer-reviewed publications. She is president of the American Academy of Veterinary Nutrition (2017-2019) and has served on their executive board since 2013.

Register today at newyork.vetshow.com for $299 with code PEG299.
NEW AT NEW YORK VET 2019
We’re raising the bar for New York Vet with a variety of new programs and features to help you get the most out of your CE. See what’s new and noteworthy at New York Vet this year.

NEW YORK VET BUILDS
New York Vet Builds is a state-of-the-art practice design program for veterinarians who are looking to expand, renovate, or build a veterinary hospital.

Why New York Vet Builds?
Attendees will gain a variety of strategies to help avoid costly mistakes during each phase of practice design. Topics include:

• Questions to ask during each phase of the design process
• How to qualify and identify the best industry partners
• How to determine an appropriate budget
• Key success factors for staying within the budget
• Regulations, codes, and financing requirements for meeting long-term financial goals

This program will help prepare attendees to take the next steps toward executing a successful hospital design business plan.

BIG IDEAS IN THE BIG APPLE
Big Ideas in the Big Apple is a 2-day workshop program run by New York State Veterinary Medical Society (NYSVMS) for attendees of New York Vet.

Day 1: Animal Welfare for Private Practice Veterinarians
Supported by the ASPCA, this series of presentations and workshops will help you understand how the animal welfare system works, what to do when caring for abused or stray animals, and how to help your local shelter.

Day 2: Putting the Well Into Your Well-Being
This program is focused on issues such as debt reduction and career development as well as strategies for managing difficult clients and reducing workplace stress.

See the program on page 8.
To attend, simply register for New York Vet to drop into any session or take part in the whole program. To access the New York Vet NYSVMS member discount, visit vets.nysvms.org/events/bigideas.

THE NEW YORK VET MOTHER’S AREA
Supporting veterinary parents is an important component of New York Vet’s goal to deliver a high-quality experience for all attendees. Access private pumping areas, seating, refrigeration, and other amenities in a private space away from the bustle of the event.

JOHNSON & JOHNSON WET LABS
Get hands-on education at New York Vet during 2 full days of wet labs created and supported by Johnson & Johnson. This program presents a meaningful opportunity to enhance your CE experience at New York Vet and pick up a few new skills.
NOVEMBER 8-9, 2018 | GENERAL INFORMATION

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NEW YORK VET
NOVEMBER 7 – 8, 2019
Javits Center, New York City, NY
16 hours of CE

WILD WEST VET
OCTOBER 23 – 26, 2019
Grand Sierra Resort and Casino, Reno, NV
36 hours of CE

NEW YORK VET
NOVEMBER 7 – 8, 2019
Javits Center, New York City, NY
16 hours of CE

CE INSPIRED
BY YOU

CHICAGO VET
MAY 13 – 15, 2020
Navy Pier, Chicago, IL
24 hours of CE

AUSTIN VET
APRIL 20 – 21, 2020
Palmer Event Center, Austin, TX
16 hours of CE

The Vet Shows are curated by practicing veterinarians to help you conquer your daily challenges in practice.

There’s a Vet Show for everyone—find yours.

VISIT VETSHOW.COM FOR MORE INFORMATION.
FAQ

Who can attend New York Vet? 
Every member of the team can attend. Family and friends are welcome; guest passes are available for $49 and allow entry into the exhibit hall. Conference theater attendance is reserved for those with attendee registration.

Will food be provided? 
Complimentary lunch and beverages will be available daily in the exhibit hall for all registered attendees.

What are the event rates? 
The special rate for Clinician's Brief readers is $299 (using code PEG299). This rate ends July 26. The full-price rate is $499.

Are proceedings included in the registration fee? 
Proceedings are included with your registration fee and will be available at the start of the conference at newyork.vetshow.com. Attendees can also access proceedings at VIN.com for free during and after the conference.

How do I obtain my certificate? 
Certificates will be available on-site at the end of the second day of the conference. Certificates will also be emailed to you a few weeks after you have returned to practice. (Veterinary professionals licensed in Texas must pick up their certificates on-site.)

Are there any special rates or discounts available? 
Yes! Discounts are available for groups and students. For more information, please call (646) 437-9080.

How do I register? 
Visit newyork.vetshow.com and click on the “Register” button, or call us directly at (646) 437-9080.

Can I register the day of the event? 
We would be happy to assist you with registration at the event. The on-site registration fee is $499.

How many CE hours are offered? 
You can choose from 100+ hours of practical, RACE- and NYSED-approved CE and bring home up to 16 hours.

Are there any events and activities planned? 
The opening reception and cocktail hour will be held on Thursday, November 7. NYSVMS will also be hosting an after-party to benefit NYSAVES. For more information, visit newyork.vetshow.com/faqs.
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