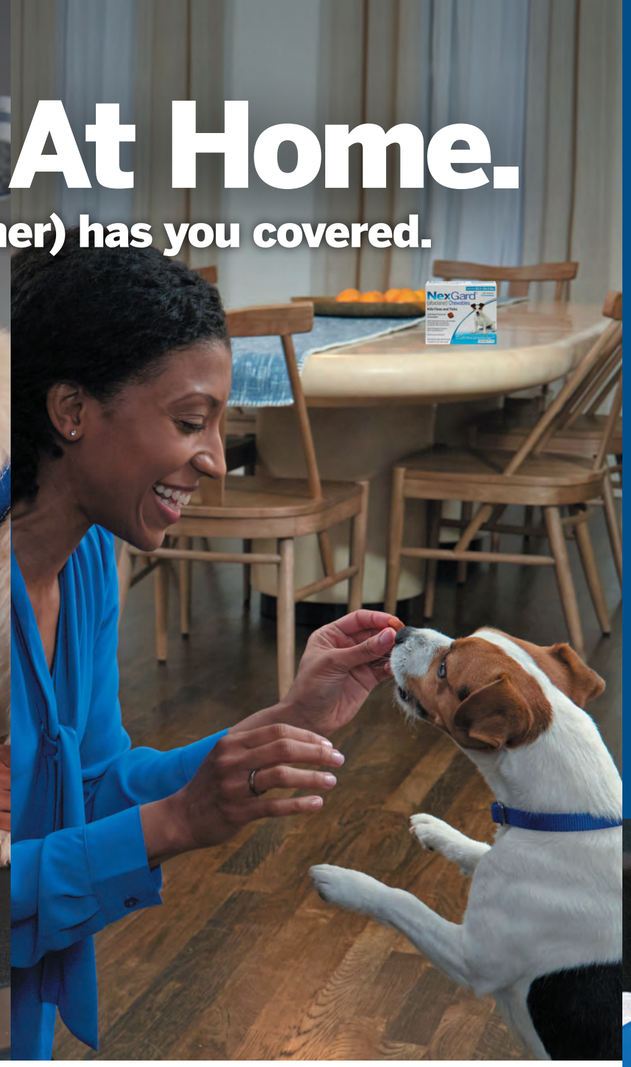
Trusted for Your Practice

- Designed with compliance in mind, *NexGard*® (afoxolaner) is the leader in **average number of months of flea and tick control product purchased per patient per year.***[1]
- More *NexGard* users purchased **a full 12 months of flea and tick protection** than users of any other flea and tick chew.*[1]

In Clinic. At Home.

NexGard® (afoxolaner) has you covered.



Trusted for Your Dog

- **#1 dog-preferred taste** with a delicious beef flavor.[2]
- **FDA-approved** to prevent Lyme infections by killing black-legged ticks.
- Safe for puppies as young as **8 weeks**, weighing as little as **4 pounds**.

Thank you for trusting us over 270 million times.[3]

NexGard®
(afoxolaner) Chewables

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 NexGardClinic.com.

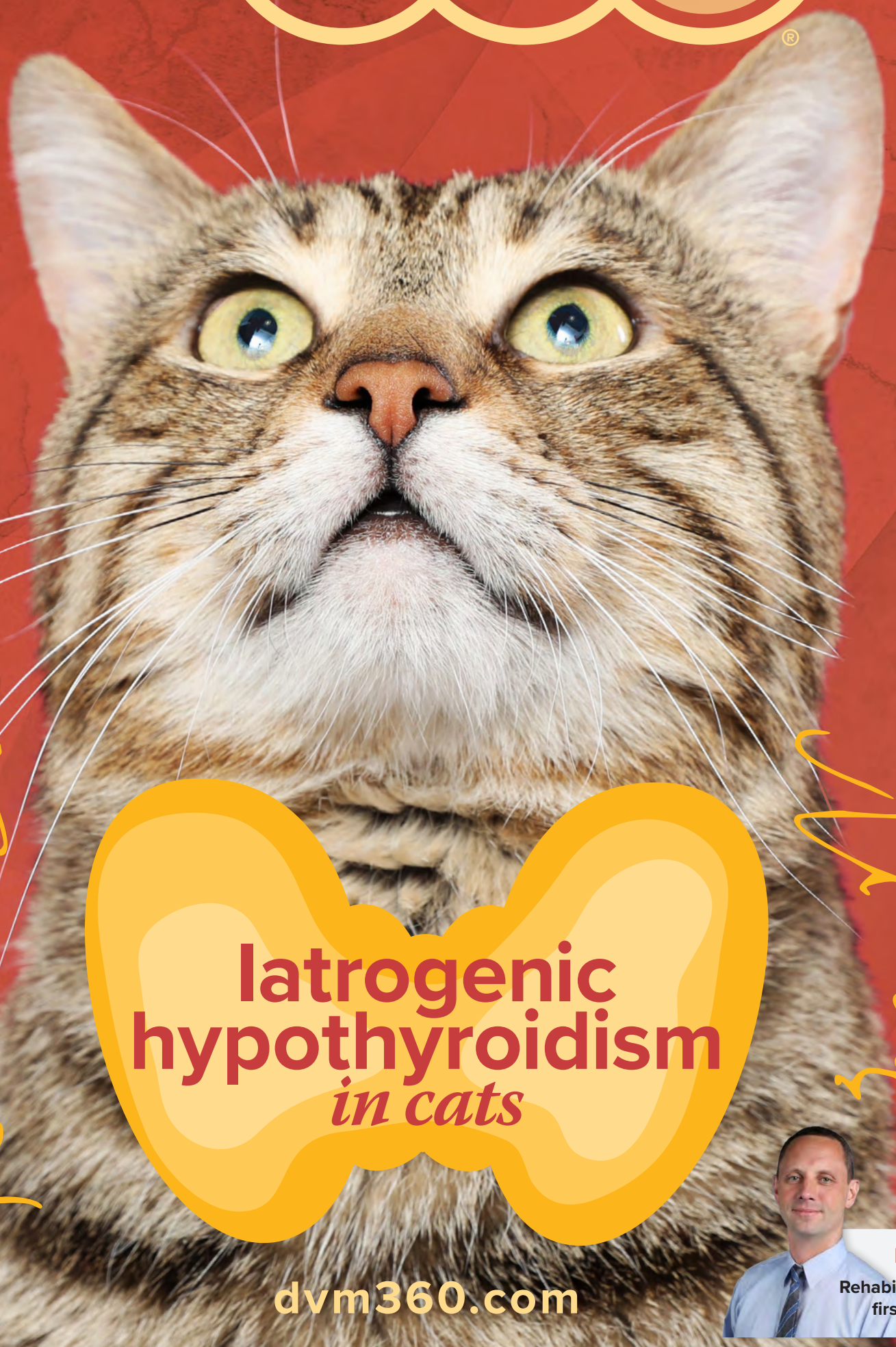
*Assessment was conducted by IDEXX and leveraged veterinary clinic PIMS transaction level data for 2021. This analysis included veterinary practices with consistent data from 2019 to 2021. To be included, patients needed to have at least one parasiticide transaction in 2020 and 2021. The analysis was limited to loyal patients, where loyalty was defined as having one flea/tick control brand during the full three-year period. The average number of months of NexGard purchased per year was 6.8. The average number of months of BRAVECTO purchased per year was 6.7. This analysis overestimates the duration of efficacy for BRAVECTO. For comparison purposes, each BRAVECTO chew was assessed as providing three months of flea & tick protection versus the labeled 12-week coverage for fleas and three species of ticks, and 8-week coverage for Lone Star ticks.

1. Data on file at IDEXX Laboratories, Inc. Westbrook, Maine USA. 2. Data on file at Boehringer Ingelheim. 3. Data on file at Boehringer Ingelheim.

Boehringer Ingelheim

JUNE 2022 | Vol. 53 | No. 6

dvm360®



Iatrogenic hypothyroidism *in cats*

P14 Conference insider
Rehabilitation expert to deliver first DIVM keynote session

dvm360.com

FROM SIDELINED TO SPIRITED

Trust the only NSAID formulated specifically for dogs.

PREVICOX® (firocoxib) is an NSAID designed exclusively to manage pain and inflammation in dogs. You can trust its canine-focused formulation to be strong enough for soft-tissue and orthopedic surgery patients, yet safe enough to provide long-term relief for osteoarthritis patients.[1] Prescribe PREVICOX and **help them get back to living the life they love**.

Previcox®
(firocoxib)

IMPORTANT SAFETY INFORMATION: PREVICOX (firocoxib) Chewable Tablets are for use in dogs only. As a class, cyclooxygenase inhibitory NSAIDs like PREVICOX may be associated with gastrointestinal, kidney, or liver side effects. Dogs should be evaluated for pre-existing conditions and currently prescribed medications prior to treatment with PREVICOX, then monitored regularly while on therapy. Concurrent use with another NSAID, corticosteroid, or nephrotoxic medication should be avoided or monitored closely. **For more information, please see full prescribing information.**

1. Autefage A, Palissier FM, Asimus E, Pepin-Richard C. Long-term efficacy and safety of firocoxib in the treatment of dogs with osteoarthritis. *Vet Rec.* 2011;168(23):617.

Boehringer Ingelheim

Previcox®
(firocoxib)

CHEWABLE TABLETS

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

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

Indications: PREVICOX (firocoxib) Chewable Tablets are indicated for the control of pain and inflammation associated with osteoarthritis and for the control of postoperative pain and inflammation associated with soft-tissue and orthopedic surgery in dogs.

Contraindications: Dogs with known hypersensitivity to firocoxib should not receive PREVICOX.

Warnings: Not for use in humans. Keep this and all medications out of the reach of children. Consult a physician in case of accidental ingestion by humans.

For oral use in dogs only. Use of this product at doses above the recommended 2.27 mg/lb (5.0 mg/kg) in puppies less than seven months of age has been associated with serious adverse reactions, including death (see Animal Safety). Due to tablet sizes and scoring, dogs weighing less than 12.5 lb (5.7 kg) cannot be accurately dosed.

All dogs should undergo a thorough history and physical examination before the initiation of NSAID therapy. Appropriate laboratory testing to establish hematological and serum baseline data is recommended prior to and periodically during administration of any NSAID. ***Owners should be advised to observe for signs of potential drug toxicity (see Adverse Reactions and Animal Safety) and be given a Client Information Sheet about* PREVICOX *Chewable Tablets.***

For technical assistance or to report suspected adverse events, call 1-888-637-4251. For additional information about adverse drug experience reporting for animal drugs, contact FDA at 1-888-FDAVETS or www.fda.gov/reportanimalae.

Precautions: This product cannot be accurately dosed in dogs less than 12.5 pounds in body weight. Consider appropriate washout times when switching from one NSAID to another or when switching from corticosteroid use to NSAID use.

As a class, cyclooxygenase inhibitory NSAIDs may be associated with renal, gastrointestinal and hepatic toxicity. Sensitivity to drug-associated adverse events varies with the individual patient. Dogs that have experienced adverse reactions from one NSAID may experience adverse reactions from another NSAID. Patients at greatest risk for adverse events are those that are dehydrated, on concomitant diuretic therapy, or those with existing renal, cardiovascular, and/or hepatic dysfunction. Concurrent administration of potentially nephrotoxic drugs should be carefully approached and monitored. NSAIDs may inhibit the prostaglandins that maintain normal homeostatic function. Such anti-prostaglandin effects may result in clinically significant disease in patients with underlying or pre-existing disease that has not been previously diagnosed. Since NSAIDs possess the potential to produce gastrointestinal ulceration and/or gastrointestinal perforation, concomitant use of PREVICOX Chewable Tablets with other anti-inflammatory drugs, such as NSAIDs or corticosteroids, should be avoided. The concomitant use of protein-bound drugs with PREVICOX Chewable Tablets has not been studied in dogs. Commonly used protein-bound drugs include cardiac, anticonvulsant, and behavioral medications. The influence of concomitant drugs that may inhibit the metabolism of PREVICOX Chewable Tablets has not been evaluated. Drug compatibility should be monitored in patients requiring adjunctive therapy. If additional pain medication is needed after the daily dose of PREVICOX, a non-NSAID class of analgesic may be necessary. Appropriate monitoring procedures should be employed during all surgical procedures. Anesthetic drugs may affect renal perfusion, approach concomitant use of anesthetics and NSAIDs cautiously. The use of parenteral fluids during surgery should be considered to decrease potential renal complications when using NSAIDs perioperatively. The safe use of PREVICOX Chewable Tablets in pregnant, lactating or breeding dogs has not been evaluated.

Adverse Reactions:

Osteoarthritis: In controlled field studies, 128 dogs (ages 11 months to 15 years) were evaluated for safety when given PREVICOX Chewable Tablets at a dose of 2.27mg/lb (5.0 mg/kg) orally once daily for 30 days. The following adverse reactions were observed. Dogs may have experienced more than one of the observed adverse reactions during the study.

Adverse Reactions Seen in U. S. Field Studies

Adverse Reactions	PREVICOX *(n=128)*	*Active Control (n=121)*
Vomiting	5	8
Diarrhea	1	10
Decreased Appetite or Anorexia	3	3
Lethargy	1	3
Pain	2	1
Somnolence	1	1
Hyperactivity	1	0

PREVICOX (firocoxib) Chewable Tablets were safely used during field studies concomitantly with other therapies, including vaccines, anthelmintics, and antibiotics.

Soft-tissue Surgery: In controlled field studies evaluating soft-tissue postoperative pain and inflammation, 258 dogs (ages 10.5 weeks to 16 years) were evaluated for safety when given PREVICOX Chewable Tablets at a dose of 2.27 mg/lb (5.0 mg/kg) orally approximately 2 hours prior to surgery and once daily thereafter for up to two days. The following adverse reactions were observed. Dogs may have experienced more than one of the observed reactions during the study.

Adverse Reactions Seen in the Soft-tissue Surgery Postoperative Pain Field Studies

Adverse Reactions	*Firocoxib Group (n=127)*	*Control Group* (n=131)*
Vomiting	5	6
Diarrhea	1	1
Bruising at Surgery Site	1	1
Respiratory Arrest	1	0
SQ Crepitus in Rear Leg and Flank	1	0
Swollen Paw	1	0

**Sham-dosed (pilled)*

Orthopedic Surgery: In a controlled field study evaluating orthopedic postoperative pain and inflammation, 226 dogs of various breeds, ranging in age from 1 to 11.9 years in the PREVICOX-treated groups and 0.7 to 17 years in the control group were evaluated for safety. Of the 226 dogs, 118 were given PREVICOX Chewable Tablets at a dose of 2.27 mg/lb (5.0 mg/kg) orally approximately 2 hours prior to surgery and once daily thereafter for a total of three days. The following adverse reactions were observed. Dogs may have experienced more than one of the observed reactions during the study.

Adverse Reactions Seen in the Orthopedic Surgery Postoperative Pain Field Study

Adverse Reactions	*Firocoxib Group (n=118)*	*Control Group* (n=108)*
Vomiting	1	0
Diarrhea	2**	1
Bruising at Surgery Site	2	3
Inappetence/ Decreased Appetite	1	2
Pyrexia	0	1
Incision Swelling, Redness	9	5
Oozing Incision	2	0

A case may be represented in more than one category.
*Sham-dosed (pilled).
**One dog had hemorrhagic gastroenteritis.

Post-Approval Experience (Rev. 2009): The following adverse reactions are based on post-approval adverse drug event reporting. The categories are listed in decreasing order of frequency by body system:

Gastrointestinal: *Vomiting, anorexia, diarrhea, melena, gastrointestinal perforation, hematemesis, hematachezia, weight loss, gastrointestinal ulceration, peritonitis, abdominal pain, hypersalivation, nausea*

Urinary: *Elevated BUN, elevated creatinine, polydypsia, polyuria, hematuria, urinary incontinence, proteinuria, kidney failure, azotemia, urinary tract infection*

Neurological/Behavioral/Special Sense: *Depression/lethargy, ataxia, seizures, nervousness, confusion, weakness, hyperactivity, tremor, paresis, head tilt, nystagmus, mydriasis, aggression, uveitis*

Hepatic: *Elevated ALP, elevated ALT, elevated bilirubin, decreased albumin, elevated AST, icterus, decreased or increased total protein and globulin, pancreatitis, ascites, liver failure, decreased BUN*

Hematological: *Anemia, neutrophilia, thrombocytopenia, neutropenia*

Cardiovascular/Respiratory: *Tachypnea, dyspnea, tachycardia*

Dermatologic/Immunologic: *Pruritis, fever, alopecia, moist dermatitis, autoimmune hemolytic anemia, facial/muzzle edema, urticaria*

In some situations, death has been reported as an outcome of the adverse events listed above.

For technical assistance or to report suspected adverse events, call 1-888-637-4251. For additional information about adverse drug experience reporting for animal drugs, contact FDA at 1-888-FDA-VETS or www.fda.gov/reportanimalae.

Information For Dog Owners: PREVICOX, 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 vomiting, diarrhea, decreased appetite, dark or tarry stools, increased water consumption, increased urination, pale gums due to anemia, yellowing of gums, skin or white 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 PREVICOX therapy and contact their veterinarian immediately if signs of intolerance are observed.** The vast majority of patients with drug-related adverse reactions have recovered when the signs are recognized, the drug is withdrawn, and veterinary care, if appropriate, is initiated. Owners should be advised of the importance of periodic follow up for all dogs during administration of any NSAID.

Effectiveness: Two hundred and forty-nine dogs of various breeds, ranging in age from 11 months to 20 years, and weighing 13 to 175 lbs, were randomly administered PREVICOX or an active control drug in two field studies. Dogs were assessed for lameness, pain on manipulation, range of motion, joint swelling, and overall improvement in a non-inferiority evaluation of PREVICOX compared with the active control. At the study's end, 87% of the owners rated PREVICOX-treated dogs as improved. Eighty-eight percent of dogs treated with PREVICOX were also judged improved by the veterinarians. Dogs treated with PREVICOX showed a level of improvement in veterinarian-assessed lameness, pain on palpation, range of motion, and owner-assessed improvement that was comparable to the active control. The level of improvement in PREVICOX-treated dogs in limb weight bearing on the force plate gait analysis assessment was comparable to the active control. In a separate field study, two hundred fifty-eight client-owned dogs of various breeds, ranging in age from 10.5 weeks to 16 years and weighing from 7 to 168 lbs, were randomly administered PREVICOX or a control (sham-dosed-pilled) for the control of postoperative pain and inflammation associated with soft-tissue surgical procedures such as abdominal surgery (e.g., ovariohysterectomy, abdominal cryptorchidectomy, splenectomy, cystotomy) or major external surgeries (e.g., mastectomy, skin tumor removal ≤8 cm). The study demonstrated that PREVICOX-treated dogs had significantly lower need for rescue medication than the control (sham-dosed-pilled) in controlling postoperative pain and inflammation associated with soft-surgery. A multi-center field study with 226 client-owned dogs of various breeds, and ranging in age from 1 to 11.9 years in the PREVICOX-treated groups and 0.7 to 17 years in the control group was conducted. Dogs were randomly assigned to either the PREVICOX or the control (sham-dosed-pilled) group for the control of postoperative pain and inflammation associated with orthopedic surgery. Surgery to repair a ruptured cruciate ligament included the following stabilization procedures: fabellar suture and/or imbrication, fibular head transposition, tibial plateau leveling osteotomy (TPLO), and 'over the top' technique. The study (n = 220 for effectiveness) demonstrated that PREVICOX-treated dogs had significantly lower need for rescue medication than the control (sham-dosed-pilled) in controlling postoperative pain and inflammation associated with orthopedic surgery.

Animal Safety: In a targeted animal safety study, firocoxib was administered orally to healthy adult Beagle dogs (eight dogs per group) at 5, 15, and 25 mg/kg (1, 3, and 5 times the recommended total daily dose) for 180 days. At the indicated dose of 5 mg/kg, there were no treatment-related adverse events. Decreased appetite, vomiting, and diarrhea were seen in dogs in all dose groups, including unmedicated controls, although vomiting and diarrhea were seen more often in dogs in the 5X dose group. One dog in the 3X dose group was diagnosed with juvenile polyarteritis of unknown etiology after exhibiting recurrent episodes of vomiting and diarrhea, lethargy, pain, anorexia, ataxia, proprioceptive deficits, decreased albumin levels, decreased and then elevated platelet counts, increased bleeding times, and elevated liver enzymes. On histopathologic examination, a mild ileal ulcer was found in one 5X dog. This dog also had a decreased serum albumin which returned to normal by study completion. One control and three 5X dogs had focal areas of inflammation in the pylorus or small intestine. Vacuolization without inflammatory cell infiltrates was noted in the thalamic region of the brain in three control, one 3X, and three 5X dogs. Mean ALP was within the normal range for all groups but was greater in the 3X and 5X dose groups than in the control group. Transient decreases in serum albumin were seen in multiple animals in the 3X and 5X dose groups, and in one control animal. In a separate safety study, firocoxib was administered orally to healthy juvenile (10-13 weeks of age) Beagle dogs at 5, 15, and 25 mg/kg (1, 3, and 5 times the recommended total daily dose) for 180 days. At the indicated (1X) dose of 5 mg/kg, on histopathologic examination, three out of six dogs had minimal periportal hepatic fatty change. On histopathologic examination, one control, one 1X, and two 5X dogs had diffuse slight hepatic fatty change. These animals showed no clinical signs and had no liver enzyme elevations. In the 3X dose group, one dog was euthanized because of poor clinical condition (Day 63). This dog also had a mildly decreased serum albumin. At study completion, out of five surviving and clinically normal 3X dogs, three had minimal periportal hepatic fatty change. Of twelve dogs in the 5X dose group, one died (Day 82) and three moribund dogs were euthanized (Days 38, 78, and 79) because of anorexia, poor weight gain, depression, and in one dog, vomiting. One of the euthanized dogs had ingested a rope toy. Two of these 5X dogs had mildly elevated liver enzymes. At necropsy all five of the dogs that died or were euthanized had moderate periportal or severe panzonal hepatic fatty change; two had duodenal ulceration; and two had pancreatic edema. Of two other clinically normal 5X dogs (out of four euthanized as comparators to the clinically affected dogs), one had slight and one had moderate periportal hepatic fatty change. Drug treatment was discontinued for four dogs in the 5X group. These dogs survived the remaining 14 weeks of the study. On average, the dogs in the 3X and 5X dose groups did not gain as much weight as control dogs. Rate of weight gain was measured (instead of weight loss) because these were young growing dogs. Thalamic vacuolation was seen in three of six dogs in the 3X dose group, five of twelve dogs in the 5X dose group, and to a lesser degree in two unmedicated controls. Diarrhea was seen in all dose groups, including unmedicated controls. In a separate dose tolerance safety study involving a total of six dogs (two control dogs and four treated dogs), firocoxib was administered to four healthy adult Beagle dogs at 50 mg/kg (ten times the recommended daily dose) for twenty-two days. All dogs survived to the end of the study. Three of the four treated dogs developed small intestinal erosion or ulceration. Treated dogs that developed small intestinal erosion or ulceration had a higher incidence of vomiting, diarrhea, and decreased food consumption than control dogs. One of these dogs had severe duodenal ulceration, with hepatic fatty change and associated vomiting, diarrhea, anorexia, weight loss, ketonuria, and mild elevations in AST and ALT. All four treated dogs exhibited progressively decreasing serum albumin that, with the exception of one dog that developed hypoalbuminemia, remained within normal range. Mild weight loss also occurred in the treated group. One of the two control dogs and three of the four treated dogs exhibited transient increases in ALP that remained within normal range.

Made in France
Marketed by: Boehringer Ingelheim Animal Health USA Inc., Duluth, GA 30096.
1-888-637-4251
Approved by FDA under NADA # 141-230

US-PET-0405-2021

Rev. 12-2018

Boehringer Ingelheim

dvm360

MISSION

Through its extensive network of news sources, **dvm360®** provides unbiased multimedia reporting on all issues affecting the veterinary profession.

STAFF LISTING

AN MJH life sciences® BRAND

2 Clarke Drive, Suite 100, Cranbury, NJ 08512

Subscriber Services dvm360.com to request or change a subscription, or email our Customer Service Department at mmhinfo@mmhgroup.com. **Reprints** John Hydrusko at (609) 716-7777 or jhydrusko@mmhgroup.com. **Books and Resource Guides** Industrymatter.com. **List Rental Sales** email our Customer Service Department at mmhinfo@mmhgroup.com. **Editorial Office** MultiMedia Healthcare LLC, 2 Clarke Drive, Suite 100, Cranbury, NJ 08512. **Websites** dvm360.com; fetchdvm360.com.

Editorial Advisory Board

CALENDAR

Note that many of this year's industry events are now being held online or via a combination of live and virtual learning. Please visit individual event websites for details.

JULY

14

OVMA Conference
July 14-16
Toronto, Ontario
ovma.org/veterinarians/continuing-education/ovma-conference-trade-show/

21

2022 CVMA Convention
July 21-24
Halifax, Nova Scotia (Virtual component available as well)
https://pheedloop.com/cvma22/site/home/

29

AVMA Convention
July 29-August 2
Philadelphia, Pennsylvania
avma.org/events/avma-convention

AUGUST

12

North Carolina Veterinary Medical Association Summer Veterinary Conference
August 12-14
Kiawah Island, South Carolina
https://ncvma.org/summer-conference/

14

ExoticsCon
August 14-18
Denver, Colorado
exoticscon.org

25

VETgirl U 2022
August 25-28
Minneapolis, Minnesota
https://vetgirlontherun.com/vetgirl-u-2022/

Join us in August for another engaging educational experience, once again face to face. Our safety protocols mean that you can earn CE credits plus interact and network in person with peers, friends, and faculty—all in complete safety!

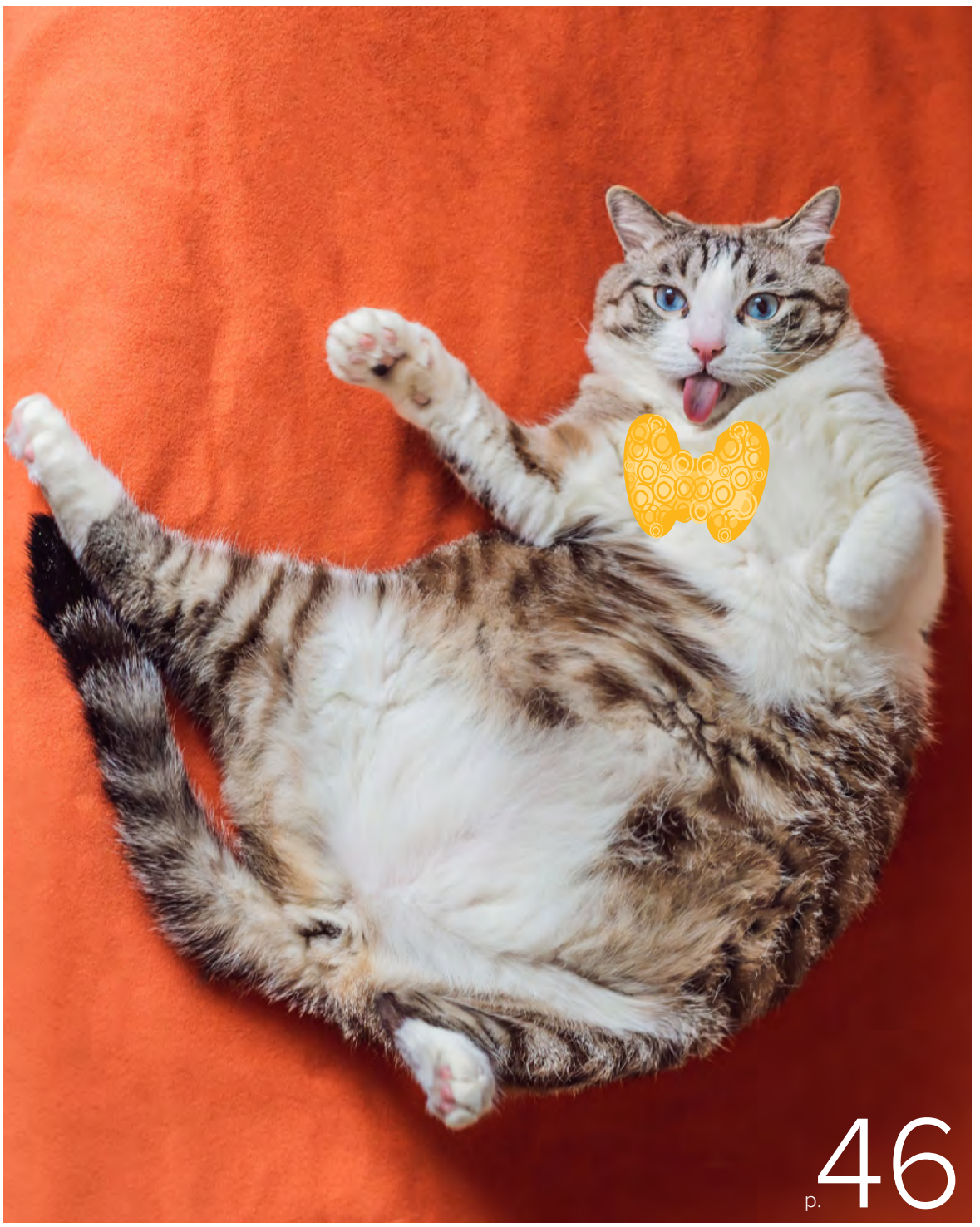
26

Fetch dvm360® Kansas City
August 26-28
Kansas City, Missouri
https://bit.ly/FetchKC2022

dvm360® (Print ISSN: 2326-0688, Digital ISSN: 2326-070X) is published monthly by MultiMedia Healthcare, LLC, 2 Clarke Drive, Suite 100, Cranbury, NJ 08512. Subscription rates: $48 for one year in the United States & Possessions, Canada and Mexico; all other countries $108. International pricing includes air-expedited service. Periodicals postage paid at Trenton, NJ 08650 and additional mailing offices. POSTMASTER: Please send address changes to dvm360, PO Box 457, Cranbury NJ 08512-0457 Attn: Publications Mail Printed in the U.S.A.

Table of contents

Vol. 53, No. 6, **JUNE 2022**


p. 46

Departments

Contributors

Continuing Education

From the cover

46 Iatrogenic hypothyroidism in cats

What is gained from certain treatments and what we miss in patients receiving them

Heather Kvitko-White, DVM, DACVIM

Cover story images credit to New Africa and galitskaya/ Adobe stock

Everything Starts With Protecting Them.

Canine and Feline Vaccines From Boehringer Ingelheim.

Research. Innovations. Solutions. All With One Goal.

We packed years of research and innovations into each of our vaccines. But it all **started with prevention**. See how the RECOMBITEK® canine vaccines, PUREVAX® feline vaccines, and IMRAB® rabies vaccines help protect against common dangerous infectious diseases for canines and felines.

Talk to your Boehringer Ingelheim Sales Representative today to learn more.

IMRAB® PUREVAX® RECOMBITEK®

Boehringer Ingelheim

Publisher's note

Two (or more) is better than 1

As the president and CEO of a life sciences company whose mission is to improve the quality of life through health care communications, education, and research, I thought I would devote this month's letter to the importance of collaboration, both internally and externally, here at MJH Life Sciences®.

Years ago, MJH Life Sciences® started, with great success, a Strategic Alliance Partnership (SAP) program to align specific brands with partners that would make for good, mutual collaborations. These SAPs are usually nonprofits, charities, veterinary hospitals, and organizations where we envision a mutual benefit of raising awareness for one another's missions and objectives. These partnerships offer both parties virtually endless opportunities to elevate awareness, whether that be through sharing content, introducing key thought leaders, creating partner webinars, or promoting one another's conferences. Please feel free to visit our SAP page online at www.dvm360.com/sap-partner to see the current partners of dvm360®.

Along with our editorial staff and contributing veterinary authors, our SAP partners also contribute monthly to this publication. Throughout the book every month, you will notice partner logos that indicate their authors' affiliation. In June, our SAP articles include a moving commentary piece from PrideVMC on page 12, tips for diversifying your client base (page 52) from GeniusVets, part 2 of a leadership training series from Empowering Veterinary Teams on page 58, and a look at preventive care for pot-bellied pigs (page 60) from VetAhead.

Finally, the most important partnerships of all begin and end with you. As both readers and contributors to every issue of *dvm360®*, you, as veterinary care providers, help keep us in the know when it comes to caring for our animals. You let us know when you have found a study or article particularly illuminating, or even when you have disagreed with something we said. Thank you for your long-standing partnership with us, and let these beautiful relationships continue to prosper!

—Mike Hennessy Jr
President & CEO,
MJH Life Sciences®

Table of contents

Vol. 53, No. 6, JUNE 2022

Latest News

Medicine+Surgery360

Medicine+Surgery360

Vetted

Partner Perspective

WHERE PROTECTION MEETS AFFORDABILITY

Now Available at an Average Cost of

$6.62 a dose*

Complete Protection Against Heartworms, Fleas, and Other Parasites for Cats and Dogs

COMPARE THE SIMILARITIES:

	REVOLT® (selamectin)	REVOLUTION® (selamectin)
Same active ingredient and dosing regimen as Revolution® (selamectin)	✓	✓
Same protection against heartworms, fleas and parasites	✓	✓
Product color coding matches Revolution® for ease of product conversion	✓	✓
Identical, weight-specific product dosing packaging	✓	✓
Unique twist and apply minimizes application errors	✓	✗
Best price always plus highest margin opportunity	✓	✗

*Based on Revolt® prices of cats and dogs up to 40 lbs.

Provide Value Without Compromising Safety or Efficacy, Prescribe Revolt® Today.

aurora PHARMACEUTICAL®

Revolt® Proudly Made in the USA ad000150 01/2022

midwest veterinary supply

PENN Veterinary Supply, Inc.

first veterinary supply
Putting Veterinarians First

Revolt® (selamectin)

For more information call 1-800-345-1793

Revolt® (selamectin)
Topical Parasiticide for Dogs and Cats

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

DESCRIPTION:
Revolt (selamectin) Topical Parasiticide is available as a colorless to yellow, ready to use solution in single dose tubes for topical (dermal) treatment of dogs six weeks of age and older and cats eight weeks of age and older. The content of each tube is formulated to provide a minimum of 2.7 mg/lb (6 mg/kg) of body weight of selamectin. The chemical composition of selamectin is (5Z,25S)-25-cyclohexyl-4′-*O*-de(2,6-dideoxy-3-*O*-methyl-α-L-*arabino*-hexopyranosyl)-5-demethoxy-25-de(1-methylpropyl)-22,23-dihydro-5-hydroxyiminoavermectin A_{1a}.

INDICATIONS:
Revolt is recommended for use in dogs six weeks of age or older and cats eight weeks of age and older for the following parasites and indications:

Dogs:
Revolt kills adult fleas and prevents flea eggs from hatching for one month and is indicated for the prevention and control of flea infestations (*Ctenocephalides felis*), prevention of heartworm disease caused by *Dirofilaria immitis*, and the treatment and control of ear mite (*Otodectes cynotis*) infestations. Revolt also is indicated for the treatment and control of sarcoptic mange (*Sarcoptes scabiei*) and for the control of tick infestations due to *Dermacentor variabilis*.

Cats:
Revolt kills adult fleas and prevents flea eggs from hatching for one month and is indicated for the prevention and control of flea infestations (*Ctenocephalides felis*), prevention of heartworm disease caused by *Dirofilaria immitis*, and the treatment and control of ear mite (*Otodectes cynotis*) infestations. Revolt is also indicated for the treatment and control of roundworm (*Toxocara cati*) and intestinal hookworm (*Ancylostoma tubaeforme*) infections in cats.

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

In humans, Revolt may be irritating to skin and eyes.
Reactions such as hives, itching and skin redness have been reported in humans in rare instances. Individuals with known hypersensitivity to Revolt should use the product with caution or consult a health care professional. Revolt contains isopropyl alcohol and the preservative butylated hydroxytoluene (BHT). Wash hands after use and wash off any product in contact with the skin immediately with soap and water. If contact with eyes occurs, then flush eyes copiously with water. In case of ingestion by a human, contact a physician immediately. The safety data sheet (SDS) provides more detailed occupational safety information. To report suspected adverse drug events, for technical assistance or to obtain a copy of the SDS, contact Aurora Pharmaceutical at 1-888-215-1256 or www.aurorapharmaceutical.com. For additional information about adverse drug experience reporting for animal drugs, contact FDA at 1-888-FDA-VETS or online at www.fda.gov/reportanimalae.

Flammable - Keep away from heat, sparks, open flames or other sources of ignition.

Do not use in sick, debilitated or underweight animals (see SAFETY).

PRECAUTIONS:
Prior to administration of Revolt, dogs should be tested for existing heartworm infections. At the discretion of the veterinarian, infected dogs should be treated to remove adult heartworms. Revolt is not effective against adult *D. immitis* and, while the number of circulating microfilariae may decrease following treatment, Revolt is not effective for microfilariae clearance.

Hypersensitivity reactions have not been observed in dogs with patent heartworm infections administered three times the recommended dose of selamectin. Higher doses were not tested.

ADVERSE REACTIONS:

Pre-approval clinical trials:
Following treatment with selamectin, transient localized alopecia with or without inflammation at or near the site of application was observed in approximately 1% of 691 treated cats. Other signs observed rarely (≤0.5% of 1743 treated cats and dogs) included vomiting, loose stool or diarrhea with or without blood, anorexia, lethargy, salivation, tachypnea, and muscle tremors.

Post-approval experience:
In addition to the aforementioned clinical signs that were reported in pre-approval clinical trials, there have been reports of pruritus, urticaria, erythema, ataxia, fever, and rare reports of death. There have also been rare reports of seizures in dogs (see **WARNINGS**).

DOSAGE:
The recommended minimum dose is 2.7 mg selamectin per pound (6 mg/kg) of body weight.
Administer the entire contents of a single dose tube (or two tubes used in combination for dogs weighing over 130 pounds) of Revolt topically in accordance with the following tables. (See **ADMINISTRATION** for the recommended treatment intervals.)

Cats (lb)	Package Color	mg per tube	Potency (mg/mL)	Administered volume (mL)
Up to 5	Rose	15 mg	60	0.25
5.1-15	Blue	45 mg	60	0.75
15.1-22	Taupe	60 mg	60	1.0

For cats over 22 lbs use the appropriate combination of tubes.

Dogs (lb)	Package Color	mg per tube	Potency (mg/mL)	Administered volume (mL)
Up to 5	Rose	15 mg	60	0.25
5.1-10	Purple	30 mg	120	0.25
10.1-20	Brown	60 mg	120	0.5
20.1-40	Maroon	120 mg	120	1.0
40.1-85	Teal	240 mg	120	2.0
85.1-130	Plum	360 mg	120	3.0

For dogs over 130 lbs use the appropriate combination of tubes.
Recommended for use in dogs 6 weeks of age and older and in cats 8 weeks of age and older.

ADMINISTRATION:
A veterinarian or veterinary technician should demonstrate or instruct the pet owner regarding the appropriate technique for applying Revolt topically to dogs and cats prior to first use.

While holding the tube in an upright position, twist the cap to break the seal. The cap will remain on the tube. To administer the product, part the hair on the back of the animal at the base of the neck in front of the shoulder blades until the skin is visible. Place the tip of the tube on the skin and squeeze the tube 3 or 4 times to empty its entire contents directly onto the skin in one spot. Keeping the tube squeezed, drag it away from the liquid and lift to remove. Check the tube to ensure that it is empty.

Do not massage the product into the skin. Due to alcohol content, do not apply to broken skin. Avoid contact between the product and fingers. Do not apply when the haircoat is wet. Bathing or shampooing the dog 2 or more hours after treatment will not reduce the effectiveness of Revolt against fleas or heartworm. Bathing or shampooing the cat 2 hours after treatment will not reduce the effectiveness of Revolt against fleas. Bathing or shampooing the cat 24 hours after treatment will not reduce the effectiveness of Revolt against heartworm.

Stiff hair, clumping of hair, hair discoloration, or a slight powdery residue may be observed at the treatment site in some animals. These effects are temporary and do not affect the safety or effectiveness of the product. Discard empty tubes in your ordinary household refuse.

Flea Control in Dogs and Cats
For the prevention and control of flea infestations, Revolt should be administered at monthly intervals throughout the flea season, starting one month before fleas become active. In controlled laboratory studies >98% of fleas were killed within 36 hours. Results of clinical field studies using selamectin monthly demonstrated >90% control of flea infestations within 30 days of the first dose. Dogs and cats treated with selamectin, including those with pre-existing flea allergy dermatitis, showed improvement in clinical signs associated with fleas as a direct result of eliminating the fleas from the animals and their environment.

If the dog or cat is already infested with fleas when the first dose of Revolt is administered, adult fleas on the animal are killed and no viable fleas hatch from eggs after the first administration. However, an environmental infestation of fleas may persist for a short time after beginning treatment with Revolt because of the emergence of adult fleas from pupae.

Heartworm Prevention in Dogs and Cats
For the prevention of heartworm disease, Revolt must be administered on a monthly basis. Revolt may be administered year-round or at least within one month after the animal's first exposure to mosquitoes and monthly thereafter until the end of the mosquito season. The final dose must be given within one month after the last exposure to mosquitoes. If a dose is missed and a monthly interval between dosing is exceeded then immediate administration of Revolt and resumption of monthly dosing will minimize the opportunity for the development of adult heartworms. When replacing another heartworm preventive product in a heartworm disease prevention program, the first dose of Revolt must be given within a month of the last dose of the former medication.

Selamectin, the active ingredient in Revolt, is a macrocyclic lactone compound. These compounds effectively prevent the development of adult heartworms when administered to dogs and cats within one month of exposure to infective (L_3) *Dirofilaria immitis* larvae. Efficacy of macrocyclic lactones decreases below 100% in dogs, however, if first administered >2 months after exposure to infective larvae. Thus, in heartworm endemic regions, delaying initiation of heartworm prevention using Revolt beyond 2 months of first exposure to infective larvae (e.g., starting puppies and kittens at >8 weeks of age), or gaps of >2 months in the administration of Revolt during periods of heartworm transmission, increases the risk of the animal acquiring heartworms. Animals with unknown heartworm history that test negative for heartworms prior to the initiation of Revolt may be harboring pre-patent infections at the time Revolt was started. Testing such animals 3–4 months after initiation of Revolt would be necessary to confirm their negative heartworm status.

At the discretion of the veterinarian, cats ≥ 6 months of age may be tested to determine the presence of existing heartworm infections before beginning treatment with Revolt. Cats already infected with adult heartworms can be given Revolt monthly to prevent further infections.

Ear Mite Treatment in Dogs and Cats
For the treatment of ear mite (*O. cynotis*) infestations in dogs and cats, Revolt should be administered once as a single topical dose. A second monthly dose may be required in some dogs. Monthly use of Revolt will control any subsequent ear mite infestations. In the clinical field trials ears were not cleaned, and many animals still had debris in their ears after the second dose. Cleansing of the infested ears is recommended to remove the debris.

Sarcoptic Mange Treatment in Dogs
For the treatment of sarcoptic mange (*S. scabiei*) in dogs, Revolt should be administered once as a single topical dose. A second monthly dose may be required in some dogs. Monthly use of Revolt will control any subsequent sarcoptic mange mite infestations. Because of the difficulty in finding sarcoptic mange mites on skin scrapings, effectiveness assessments also were based on resolution of clinical signs. Resolution of the pruritus associated with the mite infestations was observed in approximately 50% of the dogs 30 days after the first treatment and in approximately 90% of the dogs 30 days after the second monthly treatment.

Tick Control in Dogs
For the control of tick (*Dermacentor variabilis*) infestations in dogs, Revolt should be administered on a monthly basis. In heavy tick infestations, complete efficacy may not be achieved after the first dose. In these cases, one additional dose may be administered two weeks after the previous dose, with monthly dosing continued thereafter.

Nematode Treatment in Cats
For the treatment and control of intestinal hookworm (*A. tubaeforme*) and roundworm (*T. cati*) infections, Revolt should be applied once as a single topical dose.

SAFETY:
Selamectin has been tested safe in over 100 different pure and mixed breeds of healthy dogs and over 15 different pure and mixed breeds of healthy cats, including pregnant and lactating females, breeding males and females, puppies six weeks of age and older, kittens eight weeks of age and older, and avermectin-sensitive collies. A kitten, estimated to be 5–6 weeks old (0.3 kg), died 8 1/2 hours after receiving a single treatment of selamectin at the recommended dosage. The kitten displayed clinical signs which included muscle spasms, salivation and neurological signs. The kitten was a stray with an unknown history and was malnourished and underweight (see **WARNINGS**).

DOGS: In safety studies, selamectin was administered at 1, 3, 5, and 10 times the recommended dose to six-week-old puppies, and no adverse reactions were observed. The safety of selamectin administered orally also was tested in case of accidental oral ingestion. Oral administration of selamectin at the recommended topical dose in 5- to 8-month-old beagles did not cause any adverse reactions. In a pre-clinical study selamectin was dosed orally to ivermectin-sensitive collies. Oral administration of 2.5, 10, and 15 mg/kg in this dose escalating study did not cause any adverse reactions; however, eight hours after receiving 5 mg/kg orally, one avermectin-sensitive collie became ataxic for several hours, but did not show any other adverse reactions after receiving subsequent doses of 10 and 15 mg/kg orally. In a topical safety study conducted with avermectin-sensitive collies at 1, 3 and 5 times the recommended dose of selamectin, salivation was observed in all treatment groups, including the vehicle control. Selamectin also was administered at 3 times the recommended dose to heartworm infected dogs, and no adverse effects were observed.

CATS: In safety studies, selamectin was applied at 1, 3, 5, and 10 times the recommended dose to six-week-old kittens. No adverse reactions were observed. The safety of selamectin administered orally also was tested in case of accidental oral ingestion. Oral administration of the recommended topical dose of selamectin to cats caused salivation and intermittent vomiting. Selamectin also was applied at 4 times the recommended dose to patent heartworm infected cats, and no adverse reactions were observed.

In well-controlled clinical studies, selamectin was used safely in animals receiving other frequently used veterinary products such as vaccines, anthelmintics, antiparasitics, antibiotics, steroids, collars, shampoos and dips.

STORAGE CONDITIONS: Store below 30°C (86°F).

HOW SUPPLIED: Available in eight separate dose strengths for dogs and cats of different weights (see **DOSAGE**). Revolt for puppies and kittens is available in cartons containing 3 single dose tubes. Revolt for cats and dogs is available in cartons containing 3 or 6 single dose tubes.

Approved by FDA under ANADA # 200-673

Revolt® (selamectin)
Manufactured By:
Aurora Pharmaceutical, Inc.
Northfield, MN 55057
www.aurorapharmaceutical.com
Manufactured in U.S.A.

Taking Pride in Yourself and Others

Adam Christman, DVM, MBA

Were you ever the last kid to be picked for the soccer team? Or the one left out of the school play? Kinda sucked, right? Being an outsider or on the sidelines when others participate in something to which you felt you could have contributed feels downright awful. Imagine working in an environment where you can't be your true self or feel as if your ideas cannot be shared because you will be excluded. It's awful—and sad. Unfortunately, our society has a long way to go in terms of inclusiveness.

During Pride Month, it is crucial that we take time to be an ally and recognize the importance of inviting everyone to dance at the party! It's really a no-brainer that diversity and inclusion make for a stronger workforce. When companies embrace and value employees of different backgrounds, they reap the rewards in creativity and innovation, a strong company culture, and improved employee performance. To me, this approach obviously leads to success, whether you're a society or nonprofit organization, a veterinary hospital, or a company. An inclusive workplace celebrates diversity and its role in the organizational fabric. Such companies do not *pretend* that everyone enjoys an equal footing or a level playing field. Instead, they *acknowledge* differences and systemic differentiation and *take responsibility* for offering equal opportunities to all. Good companies and hospitals are the ones that are walking the walk.

Inclusivity in the workplace stems from the top of the organizational chart. If your employer sets the precedent with continuing education and training on how to create an inclusive workplace, you are more likely to walk the walk and model inclusive language, check in often with team members, offer safe spaces, and even have a taskforce dedicated to creating fun events that show support for everyone.

During this month of celebration, I want to share a personal story. As a gay man, I have been bullied, been made fun of, taunted, berated, and verbally attacked. And to this day I still receive hateful speech on social media. I decided early on that I was going to let my "haters" become my "motivators."

Life is precious, short, and sometimes challenging. I was blessed to receive tremendous support from my mother, father, and brother, who loved me for who I was and saw nothing other than a son and brother who was passionate about veterinary medicine at an early age. Yes, I struggled. School didn't come easy to me. In high school, I was scared that if people knew I was gay it would be the end of my journey toward becoming a vet. "What if they find out about me?" The question was constantly on my mind when I was a veterinary technician. Leaning on my family and friends was crucial for me as I tried to achieve the beautiful DVM reward. And part of that journey was my coming out to my family and friends. It was terrifying, but also liberating. I wanted the world to see Adam Christman the way I saw Adam Christman.

Looking back, I can comfortably say that I am the best veterinarian, friend, brother, uncle, colleague, and husband I can possibly be because of being my authentic self. I'm so thankful to have married my best friend, Chris, almost 5 years ago and to have been together for 18 years. He makes me a better person every day (as well as our dachshunds!). I would never have thought as a kid that I would be able to marry anyone. Having that security and happiness means so much to us and our friends in the LGBTQ+ community. To those of you potentially struggling with any of this, I hear you and am here for you. Lean on me, your friends, your family, Pride VMC, Pride Student VMC, or any other organization with which you feel comfortable. The world is a beautiful place, and no one should have to live with inequality, exclusion, and/or discrimination.

I learn many, many things from my patients, and I continue to learn from them every day. But the one thing that I find strikingly beautiful is the unconditional love our pets have for us. They don't care who you love or what color your skin is. They love us for *who* we are and for what we do for them. If we can all take a page from the animal playbook, the world would be an even more beautiful place.

"Look out 'cuz here I come! And I'm marching on to the beat I drum. I'm not scared to be seen. I make no apologies. This is me!"–*The Greatest Showman*.

Happy Pride Month!

Adam Christman, DVM, MBA

—Adam Christman, DVM, MBA

Talking pride in the veterinary profession

A Q&A with PrideVMC President Dane Whitaker, DVM, MPVM

Introduction and questions by **Bob Alaburda, Senior Editor**

June is Pride Month, a time to commemorate the events that took place in 1969 in the Greenwich Village neighborhood of New York City and came to be known as the Stonewall Uprising. On the night of June 28, a violent police raid on the Stonewall Inn sparked resistance and protests among bar patrons and Village residents that lasted several days and became a watershed moment in the fight for LGBTQ+ rights in America.[1] More than 50 years later, our society is on pace to set a record in antitrans legislation, with over 300 antitrans bills having been introduced as of this past May.[2] PrideVMC President Dane Whitaker, DVM, MPVM, took part in an email interview with *dvm360®* to discuss the work of PrideVMC on the front lines of this battle and to share how the veterinary profession can have an impact.

Q WHAT WORK IS PRIDEVMC DOING?

Dane Whitaker, DVM, MPVM, PrideVMC president: The PrideVMC mission is to create a better world for the LGBTQ+ veterinary community. To that end, our priorities are 3-fold:

1. Education and advocacy for LGBTQ+ diversity, equity, and inclusion through the lens of antiracism and intersectionality
2. Student empowerment through leadership development and mentorship
3. Member recruitment, engagement, and outreach

Q WHAT IS THE GENDER IDENTITY BILL OF RIGHTS?

Whitaker: The Gender Identity Bill of Rights (GIBOR) is a document that outlines the baseline rights needed for transgender, nonbinary, and gender nonconforming people to exist in the veterinary profession. It was written by a panel of transgender, nonbinary, gender nonconforming, and ally writers, editors, and reviewers.

The GIBOR is important because it serves as a moral and ethical bridge or guidance between legal support for gender diverse rights and what that translates to in the veterinary profession. This is the reason why affinity organizations that support marginalized groups within veterinary medicine have understood its importance and rallied behind it.

Q WHAT INITIATIVES DOES PRIDEVMC HAVE IN RECOGNITION OF PRIDE MONTH?

Our Pride 2022 theme is #BetterTogether, and the activities and events listed below are open to all. The details and links to registration for these events can be found at PrideVMC.org/calendar.

JUNE

- **5-25** Relief Rover Virtual 5K
- **10** Global #VetMedPride Celebration
- **18** VMI: The Power of Affinity Organizations – Celebrating Diversity Part II *(live and virtual event at NABVC)*
- **24** Colleagues and Cocktails in Partnership With PrideVMC @ ACVIM Forum
- Pride Film Festival With AAVMC

Q WHAT CAN INDIVIDUALS DO RIGHT NOW TO MAKE A DIFFERENCE?

Whitaker: There are 2 important things that anyone can do right now to support the veterinary LGBTQ+ community, and they go hand in hand. Put simply, they are education and action. First is to educate yourself about our community, and second is to put that knowledge to use. Learn what struggles we're facing and what it's like to walk in our shoes, and then apply that knowledge. Get comfortable with being uncomfortable. Learn about the anti-LGBTQ+ legislation that is being proposed in your area and how you can get involved to support LGBTQ+ folks in your community.

Helping to push back against these laws and standing with your veterinary LGBTQ+ community is a good way to be an ally. Sign the GIBOR, become a PrideVMC member, and help us continue the work we do to create a better world for the LGBTQ+ veterinary community. Even something as simple as introducing yourself with your pronouns in your practice or school is an important step.

REFERENCES

1. Stonewall riots. Wikipedia. Accessed May 16, 2022. https://en.wikipedia.org/wiki/Stonewall_riots
2. The state legislative attacks on LGBTQ+ people. The Human Rights Campaign. 2022. Accessed May 16, 2022. https://www.hrc.org/campaigns/the-state-legislative-attack-on-lgbtq-people

Pride 2022: Better Together

Learn more about the events PrideVMC has planned for Pride 2022.

The Gender Identity Bill of Rights

Sign the GIBOR to help build a better world for the LGBTQ+ veterinary community.

Even something **as simple as introducing yourself** with your pronouns is an important step.

The Solution for Behavior is Here

- Advanced behavioral and cognitive supplement for cats and dogs
- Clinically shown to support calm behavior within 30 minutes*
- Available in feline-focused and multi-species chews or liquid formula for picky eaters
- Great for training, thunderstorms, fireworks, traveling and vet visits

VIEW ALL OF OUR **BEHAVIOR** PRODUCTS!

CLINICALLY PROVEN CALMING INGREDIENTS

	🐈	🐕🐈	💧
Thiamine (Vitamin B1)	50 mg	100 mg	134 mg
L-Trytophan	37.5	75 mg	75 mg
Colostrum Calming Complex® Biopeptide Blend	12.5 mg	25 mg	22 mg
L-Theanine	12.5 mg	25 mg	21 mg

CONTACT YOUR DISTRIBUTOR TODAY!

VetriSCIENCE® Laboratories PRO LINE

Veterinary-exclusive supplements featuring clinically-researched ingredients to support animal health.

QUALITY SEAL NASC NATIONAL ANIMAL SUPPLEMENT COUNCIL

1.800.882.9993 **www.vetriproline.com**

* CanCog Technologies Study "Assessment of Anxiolytic Properties of a Novel Compound in Beagle Dogs with a Noise-Induced Model of Fear and Anxiety"
LEARN MORE ABOUT THE STUDY AT **WWW.VETRIPROLINE.COM/RESEARCH**

Rehabilitation expert to deliver first DIVM keynote session

Gain a comprehensive understanding of laser therapy—and earn continuing education credits—through interactive learning at the new Directions in Veterinary Medicine conference

written by **Sydney Yankowicz, Assistant Editor**

Matthew Brunke, DVM, DACVSMR, CCRP, CVPP, CVA, medical director for rehabilitation and sports medicine at Veterinary Surgical Centers in Virginia, is one of the keynote speakers at the forthcoming Directions in Veterinary Medicine (DIVM) conference, June 24 to 25 in Indianapolis, Indiana. His June 24 lecture, "Laser Therapy in Veterinary Rehabilitation," is sponsored by Multi Radiance Medical.

"I am really looking forward to being in [Indianapolis]. It's an inaugural meeting, which is really tremendous to be a part of, and to be the keynote for it is downright humbling," Brunke said.

"The crew and the team of people who are coming together to speak is just a blast. I'm looking forward to sitting in on other people's lectures [and] hearing different perspectives," he added.

Brunke received his bachelor's degree in animal science from Cornell University in Ithaca, New York, in 2000 and his veterinary medicine degree from Ross University School of Veterinary Medicine in Basseterre, Saint Kitts and Nevis, 4 years later. In 2008, he was certified in rehabilitation through the University of Tennessee Certificate Program in Canine Physical Rehabilitation.

"When I started with [laser therapy], we weren't sure what lasers were safe and which ones weren't. When I got into rehab training, only certain [lasers were] safe and they definitely needed to be [used] in the office. Now, not only do we have some really powerful, safe, and effective lasers—with a lot of research to back [them]—we…even have lasers that I can trust to work effectively at home in the hands of [pet] owners," Brunke said.

"That, to me, is a whole other level of ways to help our patients," he added.

In addition to his keynote presentation, Brunke is scheduled to co-lecture with Kirsty Oliver, VN, DipAVN (surgical), CVT, CCRP, CVPP, VTS (physical rehabilitation), on "Injectable Therapy for Canine Elbow Osteoarthritis," on June 25. "Kirsty and I are really looking forward to our co-lecture on elbow arthritis and how she works on treating it and I work on finding it and injecting it," he said.

This conference is taking place in collaboration with the International Veterinary Academy of Pain Management (IVAPM). Although a smaller conference compared to our Fetch dvm360® conference held in Charlotte, North Carolina, in April 2022, DIVM will not be short of a variety of clinical topics and lectures over the duration of the weekend.

"I'm thankful it's a small gathering. I think there will be a lot of attendees, but I like the fact that it's a single track," said Brunke.

"Sometimes when you go to the bigger meetings, you [think], 'I wanted to be in so-and-so's lecture, but there are only so many spots and how do you get into every room or learn all that?' So by having a nice, focused group, where it's just one powerhouse presenter after another…I'm not missing out because I'm not in somebody else's lecture room," he continued.

Brunke also explained that he is glad to meet everyone at the conference and get the chance to network with other attendees. He noted that it is often difficult to have the time to network and sit in on lectures during the work week while at the clinic, but DIVM will give all attendees the opportunity to do so.

"We come in as speakers and our slides are prepared in advance. And [the dvm360® team] does a tremendous job of putting it all together behind the scenes for us. I fully thank you guys and respect all the work you put in," he said.

Catch Brunke and all our other speakers at Directions in Veterinary Medicine. For full details and to register, visit **dvm360.com/divm-indianapolis**.

Jeeheon Cho

Pennies are not so lucky for pets

Alyssa Thunder did not think twice when her dog Winnie the Pug vomited a couple of coins. It is not uncommon for dogs to swallow things that they shouldn't, so she was not worried at first. However, when Winnie was sick for multiple days, her concern grew.

"Dogs eat all sorts of things. When we found that Winnie had thrown up a few quarters and nickels, I didn't think it was that big of a deal," Thunder said. "Next there were 2 pennies and a nickel. When she started bringing up bile 2 days in a row, we decided to take her to the hospital."

Once at the animal hospital, an x-ray showed there still were coins in Winnie's stomach. Winnie was moved to PAW Health Network in Kronenwetter, Wisconsin, because the original hospital did not have a surgeon available to treat her.

The veterinary professionals began to suspect she had zinc poisoning. Pennies minted after 1982 contain zinc, which is highly toxic to dogs when ingested. The main clinical sign of zinc poisoning is gastrointestinal (GI) distress with the possibility of ulceration and hemolysis. Other signs can include pancreatitis, cardiac changes, and possibly renal failure or hepatic damage.

"Once they confirmed that Winnie still had coins in her stomach, including pennies that contained zinc, it was critical that she got to surgery as soon as possible due to potential zinc poisoning," Renee Schmid, DVM, DABT, DABVT, a senior veterinary toxicologist at Pet Poison Helpline, said. "Winnie had clinical signs consistent with zinc poisoning, including anemia due to hemolysis, pancreatitis, and severe GI distress."

They decided to surgically remove the coins instead of doing chelation. "Chelation increases zinc absorption if the zinc-containing object is still present in the stomach or intestinal tract. Once the coins are removed, zinc levels decrease quickly and chelation is usually not necessary," Schmid explained.[1]

Winnie had to go through 2 surgeries. The first was to remove the coins, but a follow-up x-ray showed another coin was still in her system. The penny had been eroded by acid, so they had to scrape it out.

"She had to spend 2 nights in the hospital," Thunder said. "When she got home, she had to wear a cone, she wasn't allowed to jump, and she was prescribed a number of medications. The good news is she's back to her normal little self. We still have no idea where she found the coins. My dad rebuilds old cars, so we think she may have gone scrounging around and found some old coins in one of the cars that had something tasty spilled on them. Who knows?"

REFERENCE

1. Winnie the Pug's unlucky penny. Pet Poison Helpline. May 23, 2022. Accessed May 23, 2022. https://www.prnewswire.com/news-releases/winnie-the-pugs-unlucky-penny-301536553.html

Winnie the Pug

Industry news

Aquarium & wildlife

National Aquarium celebrates rehabilitation and release of 350 animals

The National Aquarium has rehabilitated and released 350 animals since its rescue program began in 1991 with the recent release of 11 sea turtles off the coast of Cape Hatteras National Seashore in North Carolina. This was the second turtle release of 2022 for the aquarium.

"We are proud to share that with the help of our local, regional, and national partners, we have rehabilitated and released 350 animals back into their ocean homes," said Caitlin Bovery, National Aquarium rehabilitation manager, in an organizational release.[1]

"Each time we return an animal back... [to] its natural habitat, we are reinvigorated and motivated to continue this critical mission."

A total of 30 cold-stunned sea turtles, all named after musical instruments per the theme of the 2021-2022 season, were rescued by the institution. Among those returned to their natural habitat were Tuba, Trombone, Ukulele, Bell, Oboe, Cello, Didgeridoo, Tambourine, Triangle, Guitar, and Saxophone. They had not been healthy enough to be released earlier in the year but had completely healed since then.

According to the release,[1] these turtles were treated at the Animal Care and Rescue Center for pneumonia, dehydration, emaciation, shell and skin lesions, eye lesions, and blood infections. Tuba, a green sea turtle, arrived with a gash on the edge of its shell. Health team members assessed the injuries and developed an extensive treatment plan to heal the wounds. After months of topical wound care, bandage changes, cleaning and debriding the wound, and supportive therapies like antibiotics and fluids, Tuba made a full recovery.

REFERENCE

1. National Aquarium reaches milestone of 350 animals rehabilitated and released. News release. National Aquarium. May 5, 2022. Accessed May 9, 2022. https://aqua.org/contact-us/newsroom/press-releases/2022-05-05-national-aquarium-reaches-milestone-of-350-animals-rehabilitated-and-released

A sea turtle (photo courtesy of National Aquarium.)

Satu and his mom, Sara (photo courtesy of Gulf Breeze Zoo).

New baby orangutan calls Gulf Breeze Zoo home

Florida's Gulf Breeze Zoo welcomed Satu, a male orangutan whose name means fairy tale, on January 20, 2022. Being looked after by Sara, his mom, Satu is doing well, and the pair can often be spotted from the boardwalk overlooking the park's orangutan habitat.

According to an organizational release,[1] Satu is the second great ape born at the zoo during the past 6 months. The other was Isadora, a female born on September 11, 2021. She had to be raised by animal care specialists because of maternal problems. Nicknamed Izzy by caretakers, the young orangutan is healthy and reaching every milestone for her age.

"She is very curious about everything and everyone, especially the newest member of the orangutan congress, Satu," said zoo Director Jamie McMaster in the release.[1] "She's eating solids daily. She munches on the adults' primate biscuits and loves cucumber, carrot, sweet potato, and banana."

Gulf Breeze Zoo animal care specialists have been reintroducing Izzy to the other orangutans. She gets supervised time with them several times a week because it is vital that she knows she is an orangutan.[1]

"The births of Satu and Isadora in such a short time here are a really big deal for our zoo, and species conservation as a whole," said McMaster in the release.[1]

"These great apes are critically endangered and risk extinction in the wild, so we are trying to ensure future generations survive."

The zoo is currently home to 8 orangutans, a species that can live into their late 50s both in the wild and in captivity.

REFERENCE

1. Gulf Breeze Zoo welcomes baby orangutan, Satu. News release. Gulf Breeze Zoo. May 3, 2022. Accessed May 4, 2022. https://www.gbzoo.com/conservation/news/Gulf-Breeze-Zoo-Welcomes-Its-Newest-Orangutan-Satu

Protect canine synovial joints before significant damage occurs.

Prescribe FDA-approved Adequan® Canine (polysulfated glycosaminoglycan) at the first clinical signs of canine osteoarthritis (OA).

Using a disease-modifying osteoarthritis drug (DMOAD) prevents further joint damage and may help:[1]

- **Restore** joint lubrication
- **Relieve** inflammation
- **Renew** the building blocks of healthy cartilage

Adequan Canine®
polysulfated glycosaminoglycan

Visit **adequancanine.com** to discover if Adequan® Canine is right for your patients.

How Adequan® Canine works within the canine synovial joints:[1]

The specific mechanism of action of Adequan® in canine joints is not known.[1]

Adequan® Canine brand of polysulfated glycosaminoglycan (PSGAG)

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. **Caution:** Federal law restricts this drug to use by or on the order of a licensed veterinarian. For additional safety information, **please see Full Prescribing Information at adequancanine.com**.

1. Adequan® Canine Package Insert, Rev 1/19.

Education & industry

Merck Animal Health bestows $250,000 to ISU for new veterinary diagnostic laboratory

Artist's rendering of the first phase of the Iowa State University Veterinary Diagnostic Laboratory, under construction (photo courtesy of Merck Animal Health).

Merck Animal Health has donated $250,000 to Iowa State University (ISU) for its new veterinary diagnostic laboratory. "We're grateful for Merck Animal Health's support in assisting to build this state-of-the-art veterinary diagnostic lab, which will allow [ISU]to continue to develop innovative solutions for generations to come," said Dan Grooms, DVM, PhD, dean of veterinary medicine, in a Merck release. "The diagnostic lab has long played a key role in advancing animal and public health while ensuring the world's food supply is safe and plentiful." [1]

According to the release,[1] the donation will directly support the new "Science on Display" space that aims to improve educational opportunities for graduate students, scientists, diagnosticians, and practitioners.

"We are excited to continue our long-standing partnership with ISU and be a part of this new state-of-the-art facility," said Brent Meyer, DVM, MS, of Merck Animal Health.[1] "Our investment is part of our commitment to the veterinary profession and in advancing the future of animal health."

The facility is expected to open in 2023.

REFERENCE

1. Merck Animal Health donates $250,000 to Iowa State University for new veterinary diagnostic laboratory. News release. Merck Animal Health. May 5, 2022. Accessed May 5, 2022. https://www.merck-animal-health-usa.com/newsroom/merck-animal-health-donates-250000-to-iowa-state-university-for-new-veterinary-diagnostic-laboratory#:~:text=MADISON%2C%20N.J.%2C%20May%205%2C,the%20new%20Veterinary%20Diagnostic%20Laboratory

Cancer*Care* and Amie's Place Foundation partner to keep patients with cancer and their pets together

Amie's Place Foundation has gifted a 1-year-grant to Cancer*Care*'s Pet Assistance and Wellness Program to develop fact sheets, videos, and a discussion guide for pet owners undergoing cancer treatment. The materials, available on the Cancer*Care* website, provide patients with information on caring for themselves and their companion animals.

According to a Cancer*Care* release, the resources also enabled them to assemble a multidisciplinary panel of experts to create the resources.[1]

Initiated in 2019, the Cancer*Care* Pet Assistance and Wellness Program helps people with cancer keep pets when they may otherwise be forced to surrender them owing to the challenges of their illness. What's more, individuals undergoing cancer treatment can apply for assistance to cover such expenses as pet food, vaccinations, and visits to the veterinarian.

"We could not have been more delighted to work with Amie's Place Foundation to provide this unique and innovative education resource for people with cancer who have pets. I know firsthand how important a furry friend can be during a cancer diagnosis," said Patricia J. Goldsmith, Cancer*Care*'s CEO, who devised the initiative after receiving her own diagnosis.[1]

We learned that 34% of Cancer*Care* clients who received financial assistance from... [our] PAW Program report living alone with only their pet for support and companionship.

***—Patricia J. Goldsmith, CEO, Cancer*Care**

"Pets can clearly play a crucial support role to our clients as they undergo cancer treatment, and, in fact, we learned that 34% of Cancer*Care* clients who received financial assistance from... [our] PAW Program report living alone with only their pet for support and companionship. Thanks to Amie's Place Foundation, our organization has been able to create easy-to-understand educational materials using the expertise of our panel of dedicated experts to help people undergoing treatment for cancer... address... challenges related to caring for their pets."

The panelists involved in creating the resources include[1]:

Fumiko Chino, MD, radiation oncologist, Memorial Sloan Kettering Cancer Center; Camille DeSantis, executive vice president, group head, Corporate & Biotech, Edelman; Rachel Herman, executive director, PAWS NYC (Pets Are Wonderful Support); Haleigh Mistry, physician assistant, The University of Texas, MD Anderson Cancer Center; Sondra Oliver, DVM, Bayside Animal Medical Center; Victoria Puzo, LCSW, clinical supervisor and Online Support Group Program director, Cancer*Care*; Lidia Schapira, MD, professor of medicine, Stanford University School of Medicine; and Connie Wong, DMV, medical education librarian, Stanford University School of Medicine.

REFERENCE

1. Cancer*Care*® and Amie's Place Foundation announce innovative educational resources to help cancer patients and their pets stay safely together. News release. Cancer*Care*. May 2, 2022. Accessed May 6, 2022. https://www.cancercare.org/press/releases/226-2022_05_02

ONE STRAIN MAY NOT FIT ALL

PROVIABLE®-FORTE

MULTI-STRAIN PROBIOTIC FOR DOGS AND CATS

- Contains 10 billion colony forming units.
- Contains 7 strains of bacteria for a higher likelihood of colonization.
- Contains prebiotics to encourage growth of beneficial probiotics.

#1 VETERINARIAN RECOMMENDED SUPPLEMENT COMPANY*

nutramax® LABORATORIES VETERINARY SCIENCES, INC.

Contact your Nutramax Representative or visit VET-EZ-STORE.COM

*Source: Survey conducted among small animal veterinarians who recommended animal supplements.

010.1465.00

Speakers and Broadway performers at the Take C.H.A.R.G.E event.

Celebrating hope for the future of canine oncology with Take C.H.A.R.G.E.

By Julia Burke, Assistant Editor

The sun was shining in New York City's Madison Square Park as human and furry friends gathered for the launch of the Canine Cancer Registry and Cancer Care Index—Take C.H.A.R.G.E. (Canine Health And ReGistry Exchange)—by Jaguar Health. In honor of the occasion, and of the first National Canine Cancer Awareness Day, well-known veterinary oncologists and Broadway performers took to the stage.

According to Lisa Conte, CEO, president, and founder of Jaguar Health, the atmosphere at the gathering was uplifting despite the devastating disease that was its focus because the registry means hope for the future of veterinary oncology.

"A [registry] harnesses the power of a common experience of an entire community so that we can all take charge of our... animal's health should... canine cancer... pop up," Conte said.

Sue Ettinger, DVM, DACVIM, a member of the Take C.H.A.R.G.E. scientific advisory board and the *dvm360®* editorial board, and Theresa (Terry) W. Fossum, DVM, PhD, DACVS, cochair of the Take C.H.A.R.G.E. scientific advisory board, were on hand to provide advice and insight into veterinary oncology. They also discussed the Gallup survey and its implications to help the audience better understand dog cancer and so help them protect their pets from the disease.

"The Gallup was a survey of just under 6000 people, and 67% of them were pet owners. A couple of interesting things really stood out," Ettinger said in a *dvm360®* interview.

"The prevalence of cancer was about 3.4%, which is a little bit lower than we see in people. But what really stood out to me and what was interesting and scary was the incidence of newly diagnosed cancer in dogs, and that was 2.8%... 5 times what we're seeing in human cancer. So that is why this registry is so important, so we can really break down the cancer in dogs and understand it at a state level, by breed, by cancer, by age, and gender," she added.

Ettinger emphasized the importance of early detection and highlighted proactive strategies for pet owners during the event. "I strongly encourage everyone once a month—... when you're doing heartworm,... flea and tick preventive—to do a nose-to-tail lump-and-bump exam. If the mass is the size of a pea, which is the size of an M&M or a Skittle and [has] been there a month, you want to

Industry news

Gallup survey of dog owners

Other important results from the survey included[1]:

More than 8 in 10 dog owners were in favor of the development of a canine cancer registry.

The 10 most represented breeds in the survey were Labrador, Chihuahua, pitbull, golden retriever, German shepherd, Yorkshire terrier, dachshund, boxer, beagle, shih tzu.

92% of pet owners reported not having pet insurance at time of diagnosis.

68% decided not to treat their dog for cancer because of the animal's age (54%), treatment cost (39%), and treatment adverse effects (38%).

Canine cancer can cause owners to experience anxiety, depression, and lack of sleep, and to miss work and fail to fulfill other responsibilities.

The dog owners' ability to manage the pet's adverse effects from cancer treatment is the best predictor of the owner's well-being outcomes.

92% of dog owners with no canine cancer experience and 65% of those with canine cancer experience said they knew little or nothing about the adverse effects of cancer treatment.

Although 46% of dog owners "strongly agreed" with the statement that their dog received high-quality cancer care, they were less likely to feel satisfied with the information they received.

Some happy dog attendees in the audience.

From left to right: Glo Janata, JD, TogoRun president, CEO, and owner; Lisa Conte, CEO, president, and founder of Jaguar Health; Chelsea Rhoads, Ivee CEO and founder; and Sue Ettinger, DVM, DACVIM (Oncology).

Photos by Julia Burke

go to your veterinarian for a simple test called an aspirate," she said.

Cosponsored by TogoRun—a health care communications company—and Intelligent Veterinary Enhanced Experience (Ivee)—a software company that helps organize and standardize health care data—the Take C.H.A.R.G.E. initiative included presentations by Glo Janata, JD, TogoRun president, CEO, and owner, and Chelsea Rhoads, Ivee CEO and founder. Their companies united to help launch this important registry and event.

"I think [Take C.H.A.R.G.E.] will impact the animal health industry in a huge [number] of ways," said Rhoads in a *dvm360*® interview. "Understanding what's going on in the trends between breeds and gender and location is a game changer. There are so many ways this can grow and create a huge impact for veterinary medicine."

Canine cancer is "a topic that's close to so many people's hearts... so I think [my favorite part of the Take C.H.A.R.G.E. event was] just being able to see everyone out here at the park on such a wonderful day to celebrate National Cancer Canine Awareness Day for the first time and to learn about the registry," Janata added.

In addition, talented Broadway actors, singers, playwrights, and others performed. Their powerful voices were heard throughout the park as they sang popular songs—and even some spotlighting the one-of-a-kind love that dogs offer their human parents.

"I want to acknowledge how the Broadway community has dealt with the data and reality [surrounding canine cancer] to take charge of their art and bring Broadway back to all of us. We are so lucky to be able to hear the singers today," Conte said.

Lastly, there was a video presentation featuring all the Broadway performers accompanied by their dogs covering "It Had to Be You" for a heartwarming conclusion.

To help advance canine oncology research and support the initiative, dog owners and veterinary professionals can submit dog cancer records to the Take C.H.A.R.G.E. website.

REFERENCE

1. Gallup survey of dog owners. Jaguar Health Canine Cancer: Take C.H.A.R.G.E. Accessed May 24, 2022. https://takechargeregistry.com/about

Industry news

PetMeds and Vetster partner to improve access to telehealth

PetMed Express, Inc (PetMeds), a US-based online pet pharmacy, and Vetster, a veterinary telehealth and pet care marketplace, have collaborated to expand access to telehealth for pets and their owners.

According to an organizational release,[1] the partnership will expand telemedicine access to more than 70,000 veterinarians and over 2 million pet parents. Through the agreement, PetMeds becomes the exclusive e-commerce provider of pet medications for Vetster, and Vetster becomes the exclusive provider of telehealth and telemedicine services to PetMeds' customers.

The first-of-its-kind agreement will enable pet telemedicine on a mass scale.

"PetMeds pioneered the online pet medication business over 26 years ago, and this partnership with Vetster is an important step in establishing PetMeds' expanded strategy as the go-to expert in pet health," said Matt Hulett, CEO and president of PetMed Express.[1]

"Simply put, we love Vetster's business model, their team, and their technology, and we are excited for PetMeds' customers to benefit from Vetster's amazing telehealth and telemedicine services, available at their fingertips 24/7," Hulett said. "We are looking forward to a partnership that improves the lives of pets and pet parents for years to come."

PetsMeds' online pet pharmacy is licensed in all 50 states to dispense prescription medications. PetMeds dispenses only US FDA/EPA-approved medications.[2] Meanwhile, Vetster connects pet owners to thousands of licensed veterinarians available to provide online services through video chat appointments 24/7.[3]

"We're very excited about the partnership and investment from PetMeds, which we believe truly represents a win-win for pet parents and their beloved pets, as well as for veterinarians," said Mark Bordo, CEO and cofounder of Vetster. "Pet parents receive the affordability and convenience of telehealth, pets benefit from world-class health care without the stress of a trip to the vet, and veterinarians tap into incremental revenue streams while providing quality care anywhere and anytime."[1]

REFERENCES

1. PetMeds announces exclusive partnership with Vetster for pet telemedicine. News release. PetMed Express Inc. April 19, 2022. Accessed May 16, 2022. https://www.globenewswire.com/news-release/2022/04/19/2424404/10002/en/PetMeds-Announces-Exclusive-Partnership-with-Vetster-for-Pet-Telemedicine.html
2. About PetMeds. PetMed Express Inc. Accessed May 16, 2022. https://www.1800petmeds.com/company.html
3. On-demand online vet appointments. Vetster Inc. Accessed May 16, 2022. https://vetster.com/en-us

Penn Foster launches training program for veterinary telehealth

Penn Foster—an online training platform—announced its new Veterinary Team Telehealth Career Certificate program offering veterinary professionals training in key telehealth and virtual care skills. This is the first accredited training program specifically tailored for remote pet care, according to Penn Foster.[1] The course's stated objective is to equip veterinary technicians, assistants, and administrators with the ability to provide top-tier virtual care to their patients.

"The past 2 years have seen skyrocketing demand for remote care across the landscape of veterinary medicine, and advances in technology mean that telehealth can often be as effective as in-person visits," said Julie Legred,CVT, cofounder of Veterinary Advancements LLC and director of strategic veterinary relationships at Petzey, a network of virtual vet professionals. "We have been utilizing telemedicine without even thinking about it as such over the years, and with an understanding of this, we should be comfortable with many aspects of it. But we definitely have some room for improvement with the technology available."[1]

More than 23 million households adopted a new pet during the COVID-19 pandemic,[2] and this increase in pet ownership combined with the challenges of the pandemic has heightened demand for telehealth and virtual care.[3] This naturally puts pressure on veterinary professionals to supply these services.

"Many of our team members have the skill set already but need to be empowered and supported to move forward and be provided tools to gain confidence in bringing it into their day-to-day routine to provide the best patient care," Legred said.[1] "This first-of-its-kind program will help us address a critical training and development need to build confidence as we continue to adapt to the 'new normal' of pet care. This will provide additional options for access to pet care that may not necessarily be available today."

One option to help veterinary hospitals meet increased demand for telehealth and virtual care is to empower veterinary technicians to take on virtual routine appointments and checkups. Penn Foster's new certification program is designed to teach veterinary professionals how to seamlessly interact with technology to better serve clients and their pets.[1]

"While telehealth services can't completely replace in-person visits, a balance of the 2 can greatly improve care—making it all the more important to ensure that team members can access the training they need to provide thorough and effective remote support," said Megan Chadwick, CVT, director of veterinary academy at Penn Foster. "This new program responds to the needs of not only veterinary hospitals and care providers, but also the pet owners who are navigating a rapidly changing landscape as the industry continues to evolve."

REFERENCES

1. Penn Foster launches first-of-its-kind training program for veterinary telehealth. News release. Cision PR Newswire. May 10, 2022. Accessed May 18, 2022. https://www.prnewswire.com/news-releases/penn-foster-launches-first-of-its-kind-training-program-for-veterinary-telehealth-301545934.html
2. New ASPCA survey shows overwhelming majority of dogs and cats acquired during the pandemic are still in their homes. News release. American Society for the Prevention of Cruelty to Animals. May 26, 2021. Accessed May 12, 2022. https://www.aspca.org/about-us/press-releases/new-aspca-survey-shows-overwhelming-majority-dogs-and-cats-acquired-during
3. The ASPCA Pet Health Insurance program's data shows increased telemedicine usage. News release. Cision PR Newswire. July 27, 2021. Accessed May 12, 2022. https://www.prnewswire.com/news-releases/the-aspca-pet-health-insurance-programs-data-shows-increased-telemedicine-usage-301342421.html

Leading with pride

dvm360® Live!™ celebrates Pride Month

***Written by* BOB ALABURDA, SENIOR EDITOR**

In the latest episode of d*vm360® Live!™*, Adam Christman, DVM, MBA, put the spotlight on Pride Month. He was joined on set by his husband, Chris Zisko, and Banfield veterinarian Xander Simunek, DVM, BEc, and his husband, Andrew Kilbourn. Their discussion centered on inclusivity and representation within and without the veterinary profession.

WHAT DOES PRIDE MEAN TO YOU?

In recognition of Pride Month, Christman asked each guest to share what the term *pride* means to them. Zisko said, "Pride Month is just being able to share who you love with anybody, not trying to hide from it, [and] not pretending [to be] someone you're not. I mean, we've come a long way as a country [and as a] society over the years. Pride is to celebrate who you are."

"Pride means authenticity and acceptance," said Kilbourn. "I try not to take [it] for granted that I could be married to a man and not really think about it...Although sometimes...[I hear] 'Tell your wife happy Mother's Day' or whatever it may be, and in those moments, I can actually correct them and not feel embarrassed...So, pride is really about acceptance."

Commenting on how Banfield Pet Hospital supports Pride, Simunek said, "Banfield Pride means the freedom to...be myself, but also in a work environment where you feel secure and you don't have to put up any front. It really lets you focus on quality medicine and the important things in at task, rather than, you know... your orientation.

Christman added, "You shouldn't [have to] worry about the color of your skin and who you love while at work. It's nice to be in that inclusive environment."

THE BANFIELD EXPERIENCE

The panel continued on the topic of work environment, as Simunek explained the advantages of working for a large practice like Banfield.

"When you think about it, [Banfield has] better resources, and they actually utilize the data that they collect from all of our patients," he said. "With 1000 hospitals, you can imagine how many patients we see and the data that they can collect, and then utilize that to...better medicine [and] your quality of life."

Simunek also stressed the importance of coaching and networking opportunities, pointing out that they can play a major role for new graduates as they begin a successful career in veterinary medicine. "Preparing yourself is probably the best thing...[so] you can really develop into the veterinarian that you want to be," he said. "And then also really consider the financial aspects. You're going to be graduating and soon paying off your student loans, so to find something that has a student loan repayment program, again like Banfield, [you] could actually utilize that money to...offset your monthly costs. And then really go and see the practice and interact with the people that are going to be mentoring you [as you're] developing your new career."

FINAL THOUGHTS

The group closed the episode by showcasing a craft veterinary hospitals can engage in together to celebrate inclusivity this month. "I know a clinic that's doing a pride celebration planter month with our community," Christman said, and planting "a whole bunch of rainbow flower beds around their veterinary hospital to show inclusivity...You could do this at your veterinary clinic [to show] that representation matters." ◎

DETERMINING *the best* anesthetic protocol

The importance of using an individualized approach when incorporating an anesthetic protocol

Are you relying on a standardized anesthetic protocol for every case? Or are you individualizing protocols for each patient dependent on their American Society of Anesthesiologists (ASA) status, personality/temperament, and medical history? If you answered yes to the first question, I implore you to keep reading. If you answered yes to the second question, I still ask you to keep reading.

For most of us in general practice or even specialty hospitals, spending time to make an individualized protocol can add stress and time to our already busy day. So let's simplify the process a bit and reduce the mental load but also elevate the quality of anesthesia you provide. Better yet, develop a strong and trusting rapport with a few of your senior credentialed veterinary technicians to do that heavy lifting for you.

What's the issue with cookie-cutter, one-size-fits-all protocols? Depending on the patient's physiological status based on acute or chronic medical conditions (anesthetic risk; see ASA status definitions below), present pain score or anticipated pain score after a procedure, and mental well-being of the animal—potentially a lot. Using a cookie-cutter protocol may only partially or not at all cover 1 of these 3 areas, leaving your animal in a more compromised

written by

Stephen Cital, RVT, SRA, RLAT, CVPP, VTS-LAM

Cital is an anesthesia, pain management, and cannabinoid expert in San Jose, California. He coauthored the textbook *Cannabis Therapy in Veterinary Medicine: A Complete Guide*, released in 2021.

physiological status, poorly managed pain state, or psychological crisis. Twenty years ago, many of us were used to giving a sedative (or maybe not even that), a splash of pain medication, and then inducing the patient. Wake-ups were interesting and pain was considered acceptable.

Today we are more informed on the detrimental impacts that had on our patients' physiological and mental well-being. It also mentally broke some of us who assumed we could be doing better but didn't know how or were told not to worry about it. How do we get away from the one-size-fits-all mentality? We try, and by that I mean we can find that happy medium of not flipping the things we've always done on their head, although that is called for at times, but creating a thoughtful way to introduce new ways of thinking while using efficient strategies for busy practices that the staff is already used to. Instead of using 1 protocol for all patients all the time, consider making protocols to use based on the ASA status of the animal and even the species we most commonly see.[1]

While there are technically 6 ASA statuses used in human medicine, we use only 5 in veterinary medicine. Does that mean we need 5 protocols? Not necessarily. Given the seriousness of ASA statuses IV and V, we can often use the same protocol for both classifications, leaving us with 4 protocols to create but still consider individualized patients' needs. One of the emerging areas regarding patient comfort is not only appropriate pain management but also their psychological status. Recent research is showing us how sentient our patients really are and how our misunderstanding of their mental well-being impacts them acutely and chronically, particularly as it relates to stress and anxiety.[2] Mental well-being is only just now being looked at more seriously for humans and the stigma of medicating for psychological disorders is still prevalent.[3] Research is discovering that our patients, though evolved to be stoic and resilient, are also suffering. This is one of the major areas I hope we can start to focus on in addition to pain management and relying on multimodal protocols.

More specifically, studies have found that more extroverted dogs require more analgesics than their introverted counterparts.[4] Animals with traumatic experiences or poorly managed pain early in life also require more pain medications. Animals that are particularly anxious have more heightened pain experiences than those that are cool, calm, and collected in their daily affect.[5,6] These personality traits should not be ignored but instead listened to as a cue to adjust protocols for each patient. Anxiolytic medications should be used in a majority or our patients and event antidepressants are worth consideration for animals that seem to have a dull affect vs how the owner may describe their pet's personality at home.[7-9] A drug many hospitals already have is tramadol, which has been shown to be a poor pain medication in dogs but does have selective serotonin reuptake inhibitor and serotonin and norepinephrine reuptake inhibitor effects, reviving, in a sense, its relevance in daily practice.[10,11]

As more cognitive science is available, it demonstrates the intricate interactions and crossover between physical pain and emotion. Just because we don't understand animal emotion in its entirety, this should not be an excuse to not treat and consider more for our patients that enrich our lives as much as we enrich theirs. We know better now, so let's do better.

For current trends in anesthesia and pain management care, please consider these free resources:

- 2022 American Animal Hospital Association (AAHA) Pain Management Guidelines for Dogs and Cats
- 2022 International Society of Feline Medicine Consensus Guidelines on the Management of Acute Pain in Cats
- 2020 World Small Animal Veterinary Association Guidelines for Recognition, Assessment and Treatment of Pain
- 2020 AAHA Anesthesia and Monitoring Guidelines for Dogs and Cats

The ASA created a physical status scale that is often used in veterinary medicine to rate patients for potential anesthetic risk. The scale is as follows:

- ASA status I is a healthy patient.
- ASA status II is a patient with mild systemic disease with no functional limitations.
- ASA status III is a patient with severe systemic disease with functional limitations.
- ASA status IV is a patient with severe systemic disease that is a constant threat to life.
- ASA status V is a moribund patient that is not expected to survive 24 hours with or without surgery.
- E denotes an emergency.

REFERENCES

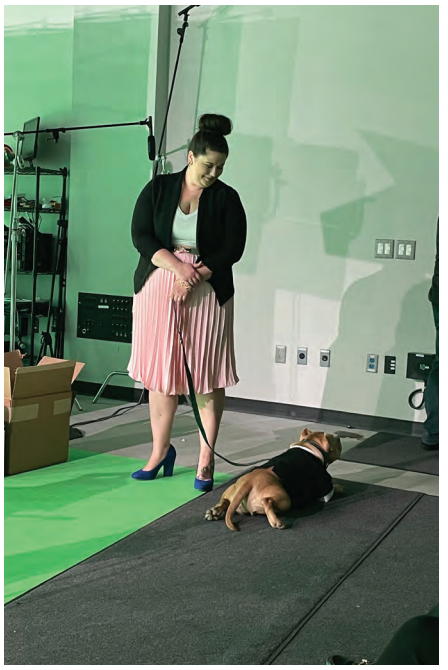
1. Keefe J. Special considerations in anesthesia (proceedings). *dvm360®*. April 1, 2010. Accessed April 18, 2022. www.dvm360.com/view/special-considerations-anesthesia-proceedings
2. Alleviating pain and distress in laboratory animals. American Association for Laboratory Animal Science. Accessed April 18, 2022. https://www.aalas.org/about-aalas/position-papers/alleviating-pain-and-distress
3. Stigma, prejudice and discrimination against people with mental illness. American Psychiatric Association. August 2020. Accessed April 18, 2022. www.psychiatry.org/patients-families/stigma-and-discrimination
4. Lush J, Ijichi C. A preliminary investigation into personality and pain in dogs. *J Vet Behav*. 2018;24:62-68. doi:10.1016/j.jveb.2018.01.005
5. Walker SM. Long-term effects of neonatal pain. *Semin Fetal Neonatal Med*. 2019;24(4):101005. doi:10.1016/j.siny.2019.04.005
6. Walker SM. Translational studies identify long-term impact of prior neonatal pain experience. *Pain*. 2017;158(suppl 1):S29-S42. doi:10.1097/j.pain.0000000000000784
7. Ijichi C, Collins LM, Elwood RW. Pain expression is linked to personality in horses. *Appl Anim Behav Sci*. 2014;152:38-43. doi:10.1016/j.applanim.2013.12.007
8. Litchfield CA, Quinton G, Tindle H, Chiera B, Kikillus KH, Roetman P. The 'Feline Five': an exploration of personality in pet cats (Felis catus). *PLoS One*. 2017;12(8):e0183455. doi:10.1371/journal.pone
9. Ley JM, McGreevy P, Bennett PC. Inter-rater and test-retest reliability of the Monash Canine Personality Questionnaire-Revised (MCPQ-R). *Appl Anim Behav Sci*. 2009;119(1-2):85-90. doi:10.1016/j.applanim.2009.02.027
10. Beakley BD, Kaye AM, Kaye AD. Tramadol, pharmacology, side effects, and serotonin syndrome: a review. *Pain Physician*. 2015;18(4):395-400
11. Osman M, Mustafa M. Tramadol-induced mood elevation in a patient with no previous psychiatric history. *Case Rep Psychiatry*. 2018;2018:9574395. doi:10.1155/2018/9574395

vetoquinol
ACHIEVE MORE TOGETHER

Putting dermatology *in the limelight*

The first episode of *dvm360® Live!™* explores the frontiers of veterinary dermatology with light therapy for wound healing.

WRITTEN BY BOB ALABURDA, SENIOR EDITOR



Lights. Camera. Action! Chief Veterinary Officer Adam Christman, DVM, MBA, pulled back the curtain on a new talk show for veterinary professionals—*dvm360® Live!™*. This exciting platform launched with an information-packed, fun-filled episode. Julia Miller, DVM, DACVD (and her adorable dog, Geno), joined Christman to discuss the latest technological advances in veterinary dermatology. Later, actress Linda Blair added some star power to the program, sharing her experience as the founder of a nonprofit rescue organization and touching upon her work in *The Exorcist.*

WHAT'S #TRENDING IN VET MED

The first episode of *dvm360® Live!™* kicked off with a look at the latest veterinary news, trends, and hot topics. Christman led with the results of a survey commissioned by the Human Animal Bond Research Institute (HABRI) and Zoetis that showed the human-animal bond is strong globally, that pets have a positive impact on their owners' health, and that stronger bonds are linked to improved veterinary care around the world.[1]

He then announced that a record-breaking number of veterinary school applications were submitted for the 2021-2022 school year, a positive sign for those concerned about the current shortage of veterinary workers.[2] At least one hospital network in Brooklyn, New York, commented that they are seeing an uptick in staffing,[3] and Christman told vet students, "If you're tuning in, get in here; we need you. We definitely need you."

SKIN IN THE GAME

Afterward, Christman introduced the episode's featured guest, Julia Miller, DVM, DACVD, who shared her unique path to becoming a board-certified dermatologist and the origin of her passion for the specialty.

"Dermatology is quite literally in my DNA," said Miller, whose father is also a veterinary dermatologist. "I'm really into...long-term case management...client communication, [and] you get to build off that. I always tell everybody [that] dermatologists are...like cooks and not bakers and that I don't necessarily have a formula to follow. I do a dash of this, a dash of that, [and] put it all together. It's different for every dog, and I really like that."

Miller also stressed the value of general practitioners leaning on dermatologists when they have difficult dermatologic cases: "You should throw in the towel and send it to me because you know you're busy...I understand that you might have a [cesarean delivery] and a parvo puppy and 3 diabetic dachshunds...and all sorts of other things that are happening during your day. So the fact that you're not an expert on immunotherapy for an allergic dog [is] totally understandable. You have a lot on your plate, so I think one of the big things is to use us dermatologists and use us early. Don't wait 5 years when the ship has already sailed...Encourage your clients to understand the benefit of the dermatologist."

HIT THE LIGHTS

In the following segment, Miller dove deeper into the topic, discussing some of the technological advances she is seeing. "Insect bite hypersensitivity is really big deal with horses, and they're coming out with a vaccine [anti-interleukin-5 (IL-5)]. There's some really nice epidermal barrier work that's being done...new topicals, sprays, and pour-ons that work great," she said, adding that "there's always some really cool stuff on the verge in dermatology because, you know, we're always trying to improve what we do and I'm really excited by anything new that comes out."

For instance, Phovia by Vetoquinol uses an LED lamp and chromophore gel to produce multiwavelength fluorescent light that can penetrate the skin to variable depths, she explained, going on to describe the product's indications and benefits and how associates and technicians can apply it in practice.

Exhibiting the handheld device, Miller explained, "This emits an LED light. You cover the patient's skin with a chromophore ointment, and this is what actually gets stimulated by the light. This will emit photoactive photons, and essentially what that does is it stimulates the mitochondria by increasing ATP [adenosine triphosphate], and that has a whole host of awesome [effects]. It's anti-inflammatory; it helps with angiogenesis; it's actually antimicrobial. So, there's a whole lot of different things that this can do, a lot of power in this little container."

In terms of indications, Miller said that Phovia can be used for perianal fistulas, interdigital furunculosis, deep pyoderma, and otitis externa (with an add-on tool). She also mentioned its use for postoperative surgical cases, saying, "I'm excited to use it for nonhealing wounds, for example. I think there's a lot of applications in the veterinary world that this one piece of equipment can actually serve."

One of Phovia's most valuable features for Miller is that it is pain-free: "I've had some wild dogs who you just give them a hug, you pet them, you can use the light therapy [for] 2 minutes, [and] feed them a couple of treats. [It is] very, very user-friendly, and my clients have actually really been excited about it."

Miller also explained the treatment process: "It is super easy the way we do it. [What] works out the best for my clients, because they come from a little further away, is I'll actually do 2 light cycles at once. I do the two-minute light cycle; we wipe off the gel with some saline, reapply another layer of that gel and then do another 2-minute cycle. So that's...how I've had the best chance of success with it. You can certainly spread out the treatments and do them 2 times a week instead." Both Christman and Miller commented that, with training, this procedure can be performed by technicians and assistants, freeing up valuable clinician time.

> "**There's always some really cool stuff on the verge** in dermatology because we're always trying to improve what we do, and I'm really excited for anything new that comes out."
>
> ***—Julia E. Miller, DVM, DACVD***

TO THE RESCUE

Episode 1 of *dvm360® Live!™* wrapped up with an interview with Linda Blair, best known for her Oscar-nominated role as Regan MacNeil in the 1973 horror film classic *The Exorcist.* These days, she prefers to be known for her role as the founder of the Linda Blair WorldHeart Foundation, an organization dedicated to the rescue and rehabilitation of abused and neglected animals.

Blair explained how she entered the rescue world: "In the '90s, one of the dogs I traveled with passed away from a double stroke...and then my mom died. And then a year later, my other dog died, and I was in a really bad place...I started walking to shelters and saving dogs from there. Then a big [pit bull] followed me home and changed my life forever. His name was Sonny Boy. I believe, really, all the work and my commitment to rescuing is because he helped me get through [the loss of my mother]."

In 2003, she founded the Linda Blair WorldHeart Foundation in California, which not only operates as a rescue facility, but also advocates for education on such important issues as pet overpopulation and dog fighting and lobbies against breed-specific bans. ◎

REFERENCES

1. New research confirms the strong bond between people and pets is a global phenomenon, 95% worldwide say pets are family. News release. HABRI and Zoetis. January 16, 2022.
2. Another solid increase in veterinary medical school applicants for 2021. News release. American Association of Veterinary Medical Colleges. October 14, 2021. Accessed May 2, 2022. https://www.aavmc.org/news/another-solid-increase-in-veterinary-medical-school-applicants-for-2021/
3. Brooklyn Animal Hospital sees staffing, workload improvements following record-breaking applications to veterinary schools amid worker shortage. News release. Veterinary Emergency & Referral Group. February 8, 2022.

JULIA E. MILLER, DVM, DACVD

A board-certified dermatologist, Julia Miller graduated from Cornell's College of Veterinary Medicine. After completing a large animal medicine and surgery internship at the University of Georgia, she went on to a mixed animal practice and later to a high-volume, high-quality surgery center before returning to her true love, dermatology. She completed a dermatology residency at Cornell and stayed on as a faculty member.

LINDA BLAIR

An Oscar-nominated actress known for her role in *The Exorcist*, Blair is the founder of the Linda Blair WorldHeart Foundation, a nonprofit organization that rehabilitates and rehomes abused and abandoned animals.

An overview of critical care fluid therapy types

The different intravenous solutions administered by veterinary professionals were discussed at a recent Fetch dvm360® conference

written by **Caitlin McCafferty, Associate Editor**

When it comes to fluid therapy, veterinary technicians are typically the primary caregivers and are responsible for venous access and monitoring fluid therapy. Because fluid therapy treats critically ill and emergency patients, understanding types of fluid therapies can be a crucial part of a technician's job.

At the recent Fetch dvm360® conference in Charlotte, North Carolina, Courtney Waxman, MS, CVT, RVT, VTS (ECC), veterinary nursing development manager at Veterinary Emergency Group in Fort Lauderdale, Florida, offered attendees a deeper dive into the different types of fluid therapy during her lecture.

FLUID THERAPY 101

According to Waxman, in a physiological sense, the patient's body is divided into 2 compartments: intracellular (ICF) and extracellular (ECF). These compartments comprise the body's total water, with the ICF compartment using 66% of the water and the ECF using 33%.[1]

"When we think of normal total body water, most of the patient's weight, just like most of us, is water," Waxman said during her presentation.

"The intracellular is [approximately] two-thirds that's taking up all the fluid in cells…we can't control that too much. The fluid in a cell is pretty finite and predetermined. We [can] control its extracellular fluid space, which is the remaining third of total body water. This is further broken down into the interstitial space, so the fluid around tissue and organ groups is not in the intravascular," Waxman continued.

The main type of fluid for treating critical patients is crystalloid fluids, which can be broken down into 3 categories: isotonic, hypertonic, and hypotonic solutions.

Isotonic crystalloids

Out of the 3 categories, the primary fluid type for treating critical patients is isotonic crystalloids, which are the most like a patient's ECF. According to Waxman,[1] 75% of isotonic crystalloid solutions leave the intravascular space within 1 hour of administration. The maintenance rate of crystalloids in the small animal patient is 40 to 60 mL/kg/day.

The shock volume of isotonic crystalloids is 60 to 90 mL/kg in the canine patient and 45 to 60 mL/kg in the feline patient. These doses should start in aliquots, such as one-fourth or one-half of the shock dose.[1]

Hypertonic crystalloids

Hypertonic fluids have a higher osmolarity than your patient's usual fluid composition. Even above the normal fluid composition, this solution can be lifesaving for emergency or critical patients because it offers a free water shift from the ICF to the ECF.

According to Waxman, the most common hypertonic solution is 7% to 7.5% sodium chloride (NaCl).[1] Hyper-tonic crystalloids can also use a much smaller volume to obtain the restoration you want in your intravascular volume effect. Hypotonic crystalloids include 5% dextrose in water (D5W) and 0.45% NaCl.[1]

CONCLUSION

Although the responsibility of fluid therapy typically falls on the veterinary technician, this opens the door for technicians to be more involved in a patient's fluid therapy plan. As veterinary technician roles continue to grow, the need for these professionals to understand all aspects of fluid therapy is crucial in continuing this growth.

REFERENCE

1. Waxman C. Welcome to the IV league: fluid therapy in critical care. Presented at: Fetch dvm360® Conference; April 22-24, 2022; Charlotte, NC.

GaiBru Photo/ Adobe stock

Credelio™ CAT (lotilaner)

Help them stay Credelio Close

With the first oral isoxazoline flea and tick product for cats

The love between your clients and their cats should never be disrupted. With an incredibly easy-to-administer pill, it doesn't have to be.

- **Palatable monthly chewable** with 99.5% successful administration by cat owners[1]
- **Starts to kill fleas within 6 hours**
- **Kills *Ixodes scapularis* ticks,** the most common tick in cats[2]
- **Contains lotilaner,** which was chosen from 1,000 other compounds during development for its efficacy and safety profile[3]

Talk to your Elanco sales rep

INDICATIONS

Credelio CAT kills adult fleas and is indicated for the treatment and prevention of flea infestations (Ctenocephalides felis) for one month in cats and kittens 8 weeks of age and older and weighing 2.0 pounds or greater.

Credelio CAT is also indicated for treatment and control of Ixodes scapularis (black-legged tick) infestations for one month in cats and kittens 6 months of age and older and weighing 2.0 pounds or greater.

IMPORTANT SAFETY INFORMATION

Lotilaner is a member of the isoxazoline class. This class has been associated with neurologic adverse reactions including tremors, ataxia and seizures. Neurologic adverse reactions have been reported in cats receiving isoxazoline class drugs, even in cats without a history of neurologic disorders. Use with caution in cats with a history of neurologic disorders. The safety of Credelio CAT has not been established in breeding, pregnant and lactating cats. The effectiveness of Credelio CAT against Ixodes scapularis in kittens less than 6 months of age has not been evaluated. The most frequently reported adverse reactions are weight loss, tachypnea and vomiting. For full prescribing information see Credelio CAT package insert.

[1]Chappell K, Paarlberg T, Seewald W, et al. A randomized, controlled field study to assess the efficacy and safety of lotilaner flavored chewable tablets (Credelio™ CAT) in eliminating fleas in client-owned cats in the USA. Parasite Vector. 2021;14:127.
[2]Little SE, Barrett AW, Nagamori Y, et al. Ticks from cats in the United States: Patterns of infestation and infection with pathogens. Vet Parasitol. 2018;257:15.
[3]Toutain C, Seewald W, Jung M. The intravenous and oral pharmacokinetics of lotilaner in dogs. Parasite Vector. 2017;10:522

Elanco

Stopping cat fleas *in their tracks*

Joseph Snock, DVM, an emergency department veterinarian from Mount Laurel Animal Hospital, touches on the uptick in flea cases he is noticing and how better to communicate adherence with clients

written by **Caitlin McCafferty, Associate Editor**

When clients think about flea prevention, they typically associate flea season with the summer months. The weather provides a warm environment for flea eggs to safely hatch outdoors, placing dogs or cats that spend time outside the home at a higher risk.[1] However, fleas pose a threat all year long, depending on what state you or your clients live in, and can affect their risk of infestation and treatment plan.

How do you get your clients to understand the risk and put their pets on the right path to prevent fleas? In an interview with *dvm360®*, Mount Laurel Animal Hospital emergency department veterinary Joseph Snock, DVM, discussed why prevention is crucial to help fight what appears to be an uptick in flea cases.

"I am certainly seeing more flea cases this year, particularly the larger number of flea cases in the winter. With a lot of the patients coming in, owners are not really sure why [their pets are] having itchy episodes or different [dermatotic cases], and so then we find the fleas want to get in," explained Snock.

PREVENTION

Stressing the importance of adherence in preventive care is crucial for veterinary professionals. According to the Companion Animal Parasite Council, every cat should be treated year-round and throughout their life with flea control products to limit infestations on the pet and prevent the establishment of a flea population in the owner's home.[2]

Adherence can be tricky for cat owners because their pet is an "indoor-only cat." Because the cat does not leave the house, there appears to be no risk, making it hard to achieve adherence. But Snock stressed that this is not the case.

Snock recommended year-round prevention as a treatment plan for cats. "A lot of people don't realize that the fleas are going to hitch [a ride such as on] the family dog or on people themselves, so they still get exposed that way," Snock said.

"The other thing that I would tell people is that a window, which has like a little crack in it, or like a little space at

Sornbhakkanut/ Adobe stock

the bottom of your door, doesn’t seem very big to you, but to fleas, it’s a football field,” he added.

TREATMENT

Because the life of fleas is quick and they reproduce fast, if not prevented early, it is important to then catch them early. Fleas, especially cat fleas, consume up to 15 times their body weight in blood daily and female fleas use that blood to produce up to twice their body weight in eggs daily.[3-5] With this very high turnaround, it does not take long for a flea infestation to get out of hand in the owner’s home. This can cause annoyance and less adherence with the pet owner because they will want a quick solution fast. For some owners, taking to the shelves of their local pet store or turning to Dr Google is unavoidable.

CLIENT EDUCATION

To help prevent infestations from getting larger or pet parents using products that are not helpful and could be harmful, Snock suggested recommending preventive and treatment products to clients.

“I do like the flea control medication, so a lot of the orals like Bravecto, for example…I think that they do rapid kill. They tend to kill very quickly and they can be relatively effective. Short of that, the topicals that I usually recommend would be things like Revolution,” said Snock. “And I do like the Seresto collar.”

Snock also urged pet parents to talk to their veterinarians about appropriate flea control.

“Don’t just go buy something off the shelf that you’re not sure what it is because there are a lot of products that are offered that weren’t effective, but then they’ll say they’re doing flea control, so a lot of pet owners say their pet is on flea and tick when they really are not,” said Snock.

REFERENCES

1. Meyers H. What is your state’s flea-and-tick season? American Kennel Club. March 2, 2022. Accessed May 24, 2022. https://www.akc.org/expert-advice/health/whats-your-states-flea-and-tick-season/
2. 2022 annual pet parasite forecasts. Companion Animal Parasite Council. Accessed May 24, 2022. https://capcvet.org/articles/2022-forecasts/
3. Rust MK, Dryden MW. The biology, ecology, and management of the cat flea. *Annu Rev Entomol*. 1997;42:451-473. doi:10.1146/annurev.ento.42.1.451
4. Blagburn BL, Dryden MW. Biology, treatment, and control of flea and tick infestations. *Vet Clin North Am Small Anim Pract*. 2009;39(6):1173-viii. doi:10.1016/j.cvsm.2009.07.001
5. Dryden MW. Host association, on-host longevity and egg production of Ctenocephalides felis felis. *Vet Parasitol*. 1989;34(1-2):117-122. doi:10.1016/0304-4017(89)90171-4

Cultivating the colon: Probiotics and prebiotics

The fertile gut of a dog or cat brims with benevolent bacteria. Various forces can ravage this delicate population, but these microorganisms can be reestablished

written by

Joan Capuzzi, VMD

Capuzzi is a small animal veterinarian and journalist based in the Philadelphia, Pennsylvania area.

The robust gastrointestinal tract—human, equine, feline, or canine—hosts a variety of microorganisms, including bacteria, viruses, fungi, and protozoa. These play a central role in maintaining the health and well-being of their host. In dogs, several hundred bacteria families populate the gut microbiome, but 99% of them belong to one of 5 main groups: *Bacteroides*, Firmicutes, Fusobacteria, Proteobacteria, or Actinobacteria.[1]

In kittens and puppies, this community of bugs begins forming even before young cats and dogs exit the birth canal and expands from there.[2] Research shows puppies have a unique microbiome during their first few weeks of life, which is when Proteobacteria reigns. Change sets in by age 9 weeks, as Proteobacteria numbers drop to give way to *Faecalibacterium* species and *Clostridium hiranonis*. An adult dog's environment, including other household members,[3] can impact its gut microbiome, which becomes stable over time.[4]

Bacteria groups vary with geography along the intestines. The small intestine houses a mix of aerobes and facultative anaerobes, whereas the colon harbors anaerobes almost exclusively.[5] In healthy dogs,[6] the total bacterial load ranges between 10^{12} and 10^{14}, with higher numbers in the colon than in the small intestine.[1,6,7]

The gut microbiota outcompetes pathogens, fuels the immune system,[8] directs metabolic functions involved in health metrics (eg, weight control),[9,10] and has other broad-ranging physiologic effects in the body.[11] For instance, altered intestinal microbiota have been linked to chronic kidney disease,[8] and populations of *Streptococcus* and *Lactobacillus* have been correlated with the insulin sensitivity index, suggesting a relationship between the intestinal colonies and insulin response.[8,12]

Studies have also connected joint stability, energy levels, and mood to gut health.[8] A "gut-brain axis" revolves around neurotransmitter production: Serotonin originates primarily in the intestines[13,14] and its assembly is partially controlled by resident bacteria. These microorganisms also manufacture the neurotransmitter, γ-aminobutyric acid.

However, the major job of the microbiome is to process nutrients in the gut, and the key players vary between carnivores and omnivores. The cat, for instance, relies more on Eubacteriaceae and Peptostreptococcaceae to digest crude protein.[15] For the dog, however, crude protein digestibility is strongly hitched to Clostridiaceae. One particular species, *C hiranonis*, converts primary bile acids into secondary bile acids,[16] which have local and systemic anti-inflammatory effects, suppress potential enteropathogens (eg, *Clostridiodes difficile*, *Clostridium perfringens*, and *Escherichia coli*), and activate receptors in other organ systems.[17]

In omnivores like the dog, who must also process carbohydrates, Bifidobacteriaceae, Lactobacillaceae, and Faecalibacteriaceae produce carbohydrate fermentation products that are converted into the short-chain fatty acid (SCFA), butyrate, which is the preferred energy source of colonocytes.[4,18-20] So too, different diets etch their own unique microbial stamps on the gut.[19] For instance, Peptostreptococcaceae have been found to flourish in greater abundance in cats fed canned food than in those on kibbled diets. Likewise, *Megasphaera* and *Blautia* were shown to be more prevalent in those on kibbled vs canned meals.[21]

ROCKING THE BACTERIA BOAT

The gastrointestinal microbiome mirrors the overall wellness of an animal. Although stable in health, this community of microorganisms can be jolted by age, diet, environmental factors, and disease states. These shifts can result in gut dysbiosis, which is defined as alterations in the microbiota that result in functional changes in bacteria numbers, bacteria diversity, and metabolites. Dysbiosis leads to bile acid dysmetabolism and the intestinal inflammation that follows.

"Dysbiosis is a marker of underlying disease processes," said Jan Suchodolski, MedVet, DrVetMed, PhD, DACVM, professor and associate director of the Gastrointestinal Laboratory at Texas A&M University in College Station. Suchodolski and his colleagues developed a Dysbiosis Index (DI) for dogs in 2017,[2] as well as for cats just recently. This polymerase chain reaction–based assay quantifies the abundance of 7 bacterial groups and enables veterinarians to flag any changes in the composition of an animal's fecal microbiota. The higher the DI—which is a better marker for characterizing chronic vs acute diarrhea—the greater the departure from the normal bacteria profile and the more protracted the malabsorption. "Severe dysbiosis is a negative predictor for being sick for a long time," he said.

However, sickness isn't limited to diarrhea. Recent work has tied dysbiosis with metabolic diseases, obesity, autoimmune maladies, cancer, and neurologic dysfunction in both dogs and humans.[9-11,22] In dogs, dysbiosis is commonly marked by spikes in the number of facultative anaerobes of the Enterobacteriaceae family.[23] This disproportion has various underlying factors.

Diversity of gastrointestinal microbes in many animals was found to drop with age. For example, older cats are prone to microbiome alterations that are thought to slow gastrointestinal transit time and lower nutrient digestibility. One study revealed a rise in *Faecalibacterium* species in cats at aged 5 years, and another showed a fall in these species in cats over aged 10 years.[24-26]

Proton pump inhibitors (ie, omeprazole), antibiotics, and chronic or acute stress (such as seen in kennel boarding) can also throw the gut into microbial imbalance. Broad-spectrum antibiotics often cause rapid and deep drops in taxonomic richness and balance that are rarely restored to their initial composition even after drug discontinuation.[23,27]

The main assault on the gut microbiome is gastrointestinal dysfunction. Both acute and chronic diarrhea interrupt the normal flora, chipping away at SCFA-producing bacteria.[28] This can begin a continuous loop, as these shifts in bacteria taxa compound intestinal inflammation that culminates in architectural changes such as villous atrophy, which produce more diarrhea and further efflux of healthy bugs.[23] Dogs with acute diarrhea and hemorrhagic gastroenteritis have been shown to have reduced numbers of the beneficial bacteria (Ruminococcaceae and *Faecalibacterium*), enabling the pathogenic bacteria (*C perfringens*) to take up residence.[7,29] >>

Hill's
Transforming Lives

Shouldn't nutrition conversations be a little easier?

YOUR TIME IS VALUABLE, that's why we're creating more ways to support your nutrition recommendation so your patients get the care they deserve.

1. Redesigned packaging with easy-to-explain benefits
2. Hill's Quick Recommendation tool offers quick personalized nutrition plans
3. Our best taste technology ever so you can recommend with confidence

See all the ways we're ready to support you better than ever at **PrescriptionDiet.com/BetterThanEver**

Nutrition

PROBIOTICS TO THE RESCUE

Probiotics are exogenous sources of live microorganisms that inoculate the intestines with good bacteria and yeasts, which crowd out the pathogenic bacteria. These beneficial floras produce SCFAs and antimicrobial metabolites, or bacteriocins, that enhance functionality of the epithelial barrier and modulate the immune response.

The primary groups included in probiotics for cats and dogs are lactic acid bacteria, particularly lactobacilli, bifidobacteria, and enterococci. They ferment sugars into organic acids that lower the gut pH and inhibit the growth of pathogenic bacteria.

Probiotics have made some impressive rescues, according to studies.[30] One strain of *Enterococcus faecium* sped recovery in diarrheic shelter cats, improved diarrhea in owned cats, and enhanced stool quality in cats with intractable diarrhea. In dogs, this strain improved the benefits of metronidazole alone in decreasing the prevalence of diarrhea. Additionally, a multistrain probiotic eased clinical signs in dogs with inflammatory bowel disease (IBD).[31]

In a study of dogs with IBD, those receiving a probiotic had not only increased numbers of healthy bacteria in adherent mucus but also demonstrated better tight junction protein expression, suggesting favorable effects on mucus homeostasis in the intestines. Another trial found a multistrain probiotic to be a successful alternative to treatment with a combination protocol of metronidazole/prednisone in dogs with IBD.[32] Probiotics don't just shut the fecal fountain; they have also been shown to ameliorate feline constipation, which, in some cases, stems from colonic microflora imbalances.

Because the common triggers of acute diarrhea are well established, probiotics can be used to prevent or minimize diarrhea when administered preemptive to stressful events. If probiotics are given prior to, for example, kenneling, car travel, or even planned food changes, Suchodolski recommends starting the regimen a week before such events as it takes a few days for the probiotic bacteria to colonize.

When antibiotics must be given for an unrelated condition, animals can also benefit from simultaneous administration of a probiotic. This especially applies to cats, because the feline gastrointestinal tract is particularly sensitive to antibiotics, Suchodolski noted.

Canine gut heath has an added interplay between microflora and gastrointestinal sensitivity. Because the intestinal scaffolding for the microbiome is smaller, relatively speaking, for large dogs vs small dogs (approximately 2% vs 7%), the former are more prone to developing loose stool.

However, Suchodolski does not recommend routine use of probiotics in healthy animals. Research shows probiotic bacteria are generally unable to colonize the gut well because of competition from a sturdy and well-established microbiome in these animals. For acute diarrhea, a probiotic treatment duration of 7 to 14 days is usually sufficient, but chronic disease may require many months of probiotic therapy, Suchodolski explained.

PROBIOTIC CHOICES

To function as a viable probiotic, the bacteria—suspended in a state of hibernation within capsules, powders, and pastes—must be able to survive the acid and bile found in the gastrointestinal tract, adhere to the intestinal cells, and coaggregate to achieve balanced microflora populations. It must also be safe, noninvasive, noncarcinogenic, and nonpathogenic.[33]

As nutraceuticals, probiotics are less regulated than medications and often contain a single strain of bacteria. For example, Purina's FortiFlora consists of *E faecium* strain SF68. Iams' Prostora, which has been discontinued, contained *Bifidobacterium animalis* strain AHC7. Nutramax Laboratories' Proviable, available in both capsules and paste for dogs and cats, uses 7 types of bacteria, in keeping with the idea that individual animals—even puppies within the same litter—have a slightly unique set of gut microbiota. Likewise, Visbiome Vet (ExeGi Pharma) contains 8 unique bacterial strains.

Probiotic concentration is measured in colony-forming units (CFUs) and, generally speaking, patients should receive 1 billion to 10 billion CFUs daily. Probiotic formulations also contain yeasts and other enzymes, vitamins, and minerals. However, their live content restricts shelf life to a few months, so quality control is extremely important.

PREBIOTIC NUTRIENTS

These new colonies of probiotic organisms thrive on high-fiber diets that are rich in fruits and vegetables. Soluble fiber, which Mother Nature packages in foods such as sweet potatoes, oats, asparagus, apples, barley, soybeans, chicory root, and pumpkin, is commercially available as prebiotics.[20]

Prebiotics contain minimally digestible complex carbs called oligosaccharides, which are fermented by the gut bacteria to produce nutritive SCFAs. The soluble fiber in prebiotics also aids in treating and preventing diarrhea by absorbing moisture, thereby slowing intestinal movement and preventing spikes in blood sugar.

Another advantage of prebiotics is their ability to alter gut pH and their healing effect on the intestines, both of which enhance absorption of minerals such as calcium.

As a food source for the microbiome, prebiotics are a useful additive to probiotic therapy. Veterinary prebiotic-probiotic combos, known as synbiotics,[34] are available in different formulations, including FortiFlora SA Synbiotic Action and Proviable Kits that consist of prebiotic paste and probiotic capsules.

Although prebiotics and probiotics are beneficial on their own and can be given by themselves, every therapy should be evaluated on a case-by-case basis.

NEW HORIZONS

Although a single dose of the most full-bodied probiotic offers over 7 bacterial strains in a quantity of billions, Suchodolski cautioned that probiotics are generally not enough to bring back the full microbiome. However, there is a newcomer that can deliver 100 different strains in concentrations that run 1000 times greater than even the densest probiotic.

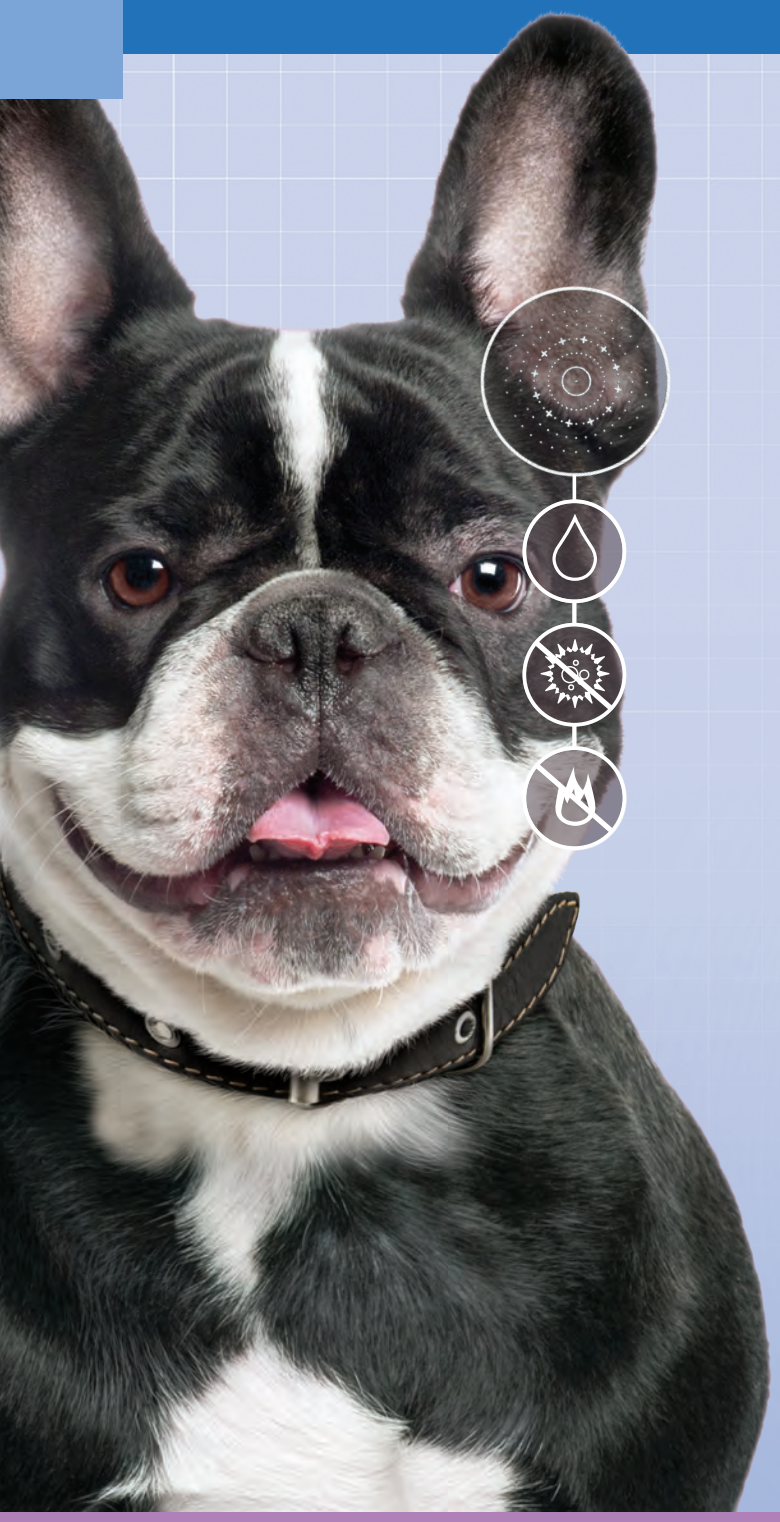
This new therapy, fecal microbiota transplantation (FMT), is the transfer of stool from a healthy donor to the gut of a recipient in order to treat intestinal dysbiosis. For repopulating the gut, FMT far outpaces probiotics. "Why plant a rose bush in the jungle when you can replant the whole forest?" Suchodolski said.

Although FMT has a high success rate in treating humans infected with *C difficile*, it's an emerging therapy in dogs and cats with few published studies. Recent data in dogs show that FMT may help restore *C hiranonis* numbers and bile acid metabolism, which is a particular boost for patients infected with *C difficile* or *C perfringens*.[31,35,36] FMT also fast-tracked the resolution of diarrhea when added to the standard antimicrobial treatment protocol in puppies with parvovirus.[37]

FMT can be delivered by capsule or enema but it is now used by very few veterinary practices. Suchodolski and his colleagues have formed an FMT consortium to develop best practices. Although FMT is not the solution for every animal, he explained, it could help young animals with antibiotic-induced dysbiosis and chronically ill animals who are only partially responsive to corticosteroids and diet changes. "In 5 years, every vet should know how to use FMT," Suchodolski said.

Now what we know is this: The microbiome is as complex as it is delicate, so reversing dysbiosis often involves a multimodal approach. "When we consider antibiotics, probiotics, and fiber, it's important to remember that each addresses different disease processes," Suchodolski said.

For references, visit dvm360.com.



easOtic®

(hydrocortisone aceponate, miconazole nitrate, gentamicin sulfate)
Otic Suspension For Dogs

Effective. Innovative. Easy.

Contains 3 hard-working ingredients shown to provide rapid and sustained treatment of otitis externa[1–5]

1. **Hydrocortisone aceponate (HCA):** a new-generation diester steroid with potent anti-inflammatory effects and positive benefit/risk ratio[1,4]
2. **Gentamicin:** a first-line, broad-spectrum antimicrobial[6]
3. **Miconazole:** a trusted anti-fungal

A canine otitis externa treatment your clients can count on in an easy-to-dose delivery system that improves compliance.[3]

TO ORDER, CONTACT YOUR VIRBAC REPRESENTATIVE OR CALL 1-844-4-VIRBAC (1-844-484-7222).

Important Safety Information

EASOTIC® (hydrocortisone aceponate, miconazole nitrate, gentamicin sulfate) Otic Suspension for Dogs: For otic (ear) use in dogs only. Humans with known or suspected hypersensitivity to hydrocortisone, aminoglycoside antibiotics, or azole antifungals should not handle this product. Contraindicated in dogs with known or suspected hypersensitivity to corticosteroids, imidazole antifungals, or aminoglycoside antibiotics. Do not use in dogs with known tympanic membrane (ear drum) perforation. The safe use of EASOTIC Otic Suspension in dogs used for breeding purposes has not been evaluated. Do not administer orally. For full prescribing information, contact Virbac at 1-800-338-3659 or visit **us.virbac.com**.

Please see full prescribing information on page 36.

References: 1. Rigaut D, Sanquer A, Maynard L, Rème C-A. Efficacy of a topical ear formulation with a pump delivery system for the treatment of infectious otitis externa in dogs: a randomized controlled trial. *Intern J Appl Res Vet Med.* 2011;9(1):15-28. 2. Rey-Grobellet X, Rigaut D, Maynard L, Rème C-A. Persistence of antimicrobials in the ear canal of dogs treated once daily for 5 days with 1 ml of a topical ear formulation. Virbac SA, Carros, F-06511 France; 2010. 3. Boda C, Liège P, Rème C-A. Evaluation of owner compliance with topical treatment of acute otitis externa in dogs: a comparative study of two auricular formulations. *Intern J Appl Res Vet Med.* 2011;9(2):157-165. 4. Schackert C, Korting HC, Schäfer-Korting M. Qualitative and quantitative assessment of the benefit/risk ratio of medium potency topical corticosteroids in vitro and in vivo. *BioDrugs.* 2000;13(4):267-277. 5. Schäfer-Korting M, Korting HC, Kerscher MJ, Lenhard S. Prednicarbate activity and benefit/risk ratio in relation to other topical glucocorticoids. *Clin Pharmacol Ther.* 1993;54(4):448-456. 6. Lyskova P, Vydrzalova M, Mazurova J. Identification and antimicrobial susceptibility of bacteria and yeasts isolated from healthy dogs and dogs with otitis externa. *J Vet Med A Physiol Pathol Clinical Med.* 2007;54(10):559-563.

Shaping the future of animal health

Virbac

Earlier dermatology referral rewards primary care practice (part 2): boosting client perceptions

Survey data from the American College of Veterinary Dermatology show that dermatology referrals have a major impact on clients' confidence in the quality of care they receive

Part 1 of this article series introduced survey data from the American College of Veterinary Dermatology (ACVD) and discussed how earlier dermatology referrals may impact client satisfaction, client costs, patient care, and revenue for the practice. Part 2 seeks to further examine this survey data and explore key takeaways that clinicians can put into practice.

BOOSTING CLIENT SATISFACTION

The American College of Veterinary Dermatology survey illustrated that 87% of clients have high confidence in a veterinary dermatologist's diagnosis and 80% are highly satisfied with their pet's treatment results provided by a veterinary dermatologist (**Figures 1 and 2**).

The survey also revealed that 82% of clients said they would have felt better about their primary care veterinarian if they had been referred to a veterinary dermatologist earlier, and 58% said they are more satisfied with and confident in their primary care veterinarian when they are referred to a board-certified veterinary dermatologist.

Thus, although the survey didn't specifically explore this, perhaps even when clients choose to forgo referral, it's reasonable to expect that simply offering referral confers a positive lasting impact for the primary care veterinarian. In addition, it's helpful to note that 39% of survey participants reported they were aware of board-certified veterinary dermatologists before visiting their primary care veterinarian, which suggests clients know of the potential for referral, but they may not ask about it.

COLLABORATIVE CARE REWARDS

Collaborative care—wherein primary care veterinarians and specialists work together effectively to provide optimal pet care options—can help pets achieve longer, healthier lives and therefore confer benefits to their owners and to primary care practitioners.[1,2]

In a separate retrospective study, dogs with chronic otitis had better long-term outcomes when primary care veterinarians collaborated with a board-certified veterinary dermatologist within 6 months of treatment.[2] The longer a patient with chronic otitis externa was treated by a primary care veterinarian before referral, the more recurrences and longer the episodes of otitis, which results in more patient discomfort, more patient and owner distress, and higher owner expenses. The authors concluded that referral to or consultation with a veterinary dermatologist should be considered for canine patients with persistent or quickly recurring (within 30 days) otitis over 6 months. The otitis study also revealed that 18% of clients stopped visiting their primary care veterinarian and chose to visit a new primary care veterinarian because their dogs were not referred for specialist treatment sooner.[3] That percentage coincides with the 15% of clients in this ACVD survey who reported they had stopped visiting their primary care practice altogether after reaching the tipping point of frustration.

TAKE-HOME CONSIDERATIONS

The limitations of this survey include its reliance on observations made by clients who are not trained medical professionals and a lack of medical record and invoice review to verify case management and expenses. Nonetheless, these

Figure 1. Client Satisfaction (%) With Treatment and Confidence in Diagnosis

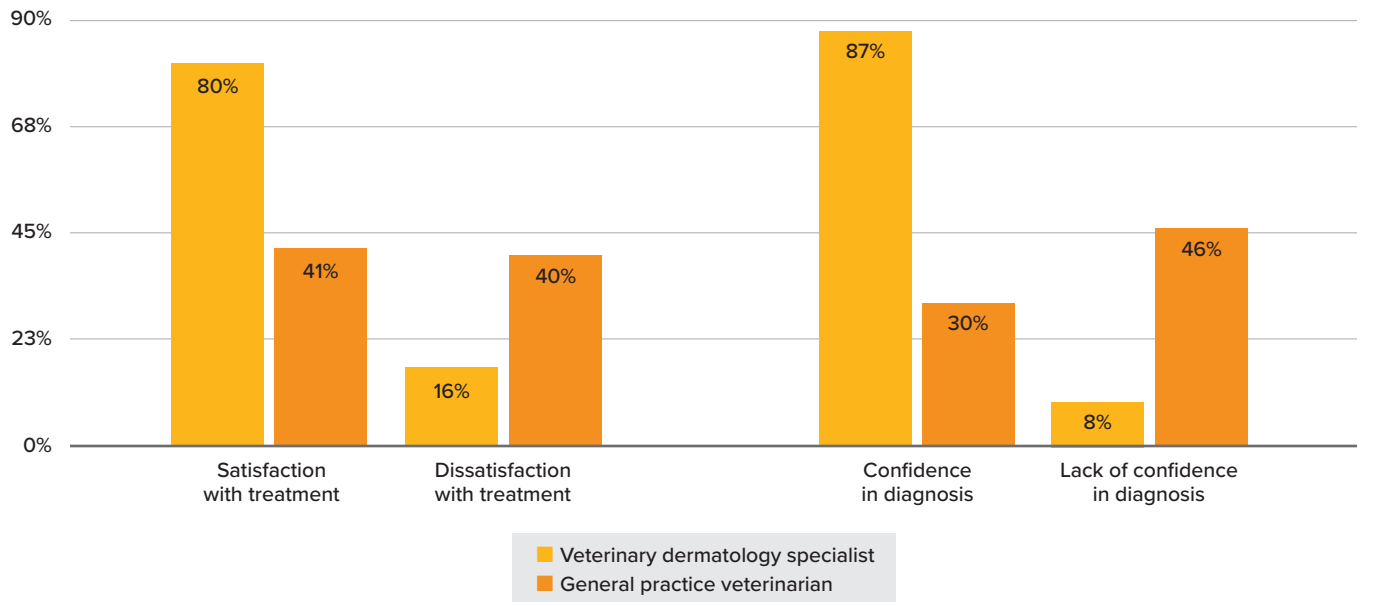
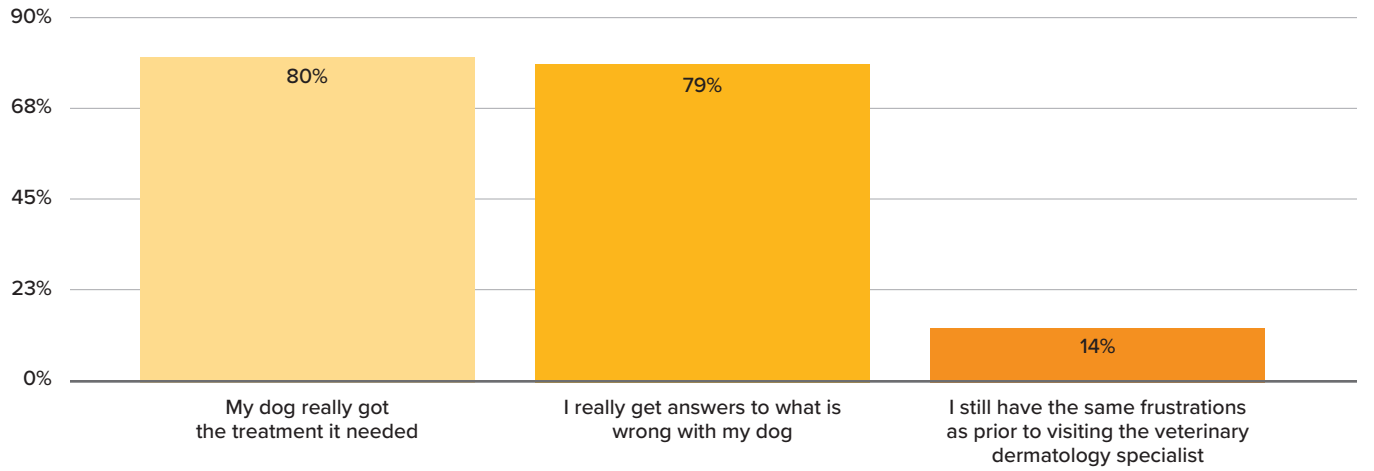


Figure 2. Client Satisfaction (%) With Dogs' Treatment Results Provided by a Veterinary Dermatologist



survey results are valuable because the data reveal clients' real-world perceptions about their experiences with veterinary medical care for their dogs with skin disease.

In summary, this survey illustrated that primary care practitioners should talk with clients about referral to a veterinary dermatology specialist on or before a patient's third visit for evaluation of a dermatologic condition. The results demonstrated that earlier dermatology referral could boost patient care efficiency and save clients 25% in veterinary care costs, improve client confidence in their primary care veterinarian's level of care, and support client retention to preserve primary care practice revenue. Given that retaining clients and garnering positive online practice reviews and word-of-mouth recommendations are vital to the financial and emotional health and growth of veterinary practices and veterinary health care professionals, it's reasonable to anticipate that collaborating earlier and effectively with board-certified veterinary dermatologists can help protect and support primary care practices.

Most veterinary primary care and referral centers are operating at full capacity in relation to the COVID-19 pandemic and to veterinary workforce shortages. Wait times for referral appointments have increased substantially and wait times for nonurgent appointments may be weeks to months.[3,4] Therefore, discussing referral with clients earlier in a patient's disease process has perhaps become even more important for primary care practitioners.

Clients ultimately decide what and how much veterinary care to pursue. Keep in mind that client caregiver burden can increase when their pet's treatment is ineffective or when clients have inadequate understanding of their pet's disease and the expected efficacy of treatment. Increased client caregiver burden can contribute to increased veterinary team workload and stress. By presenting clients with the facts about a range of veterinary health care options available—without judgment—primary care veterinarians and specialists can offer clients opportunities for the care for their pets that best matches up with their financial, emotional, physical, and time resources.

REFERENCES

1. Lefbom BK, Peckens NK. Impact of collaborative care on survival time for dogs with congestive heart failure and revenue for attending primary care veterinarians. *J Am Vet Med Assoc.* 2016;249(1):72-76. doi:10.2460/javma.249.1.72
2. Logas D, Maxwell EA. Collaborative care improves treatment outcomes for dogs with chronic otitis externa: a collaborative care coalition study. *J Am Anim Hosp Assoc.* 2021;57(5): 10.5326/JAAHA-MS-7167. doi:10.5326/JAAHA-MS-7167
3. Salois M, Golab G. Are we in a veterinary workforce crisis? JAVMA News. September 15, 2021. Accessed October 15, 2021. www.avma.org/javma-news/2021-09-15/are-we-veterinary-workforce-crisis
4. Sinclair J. Vets in crisis: the perfect storm. Vet Times. September 15, 2021. Accessed October 15, 2021. www.vettimes.co.uk/vets-in-crisis-the-perfect-storm/

written by

Brad Hanna

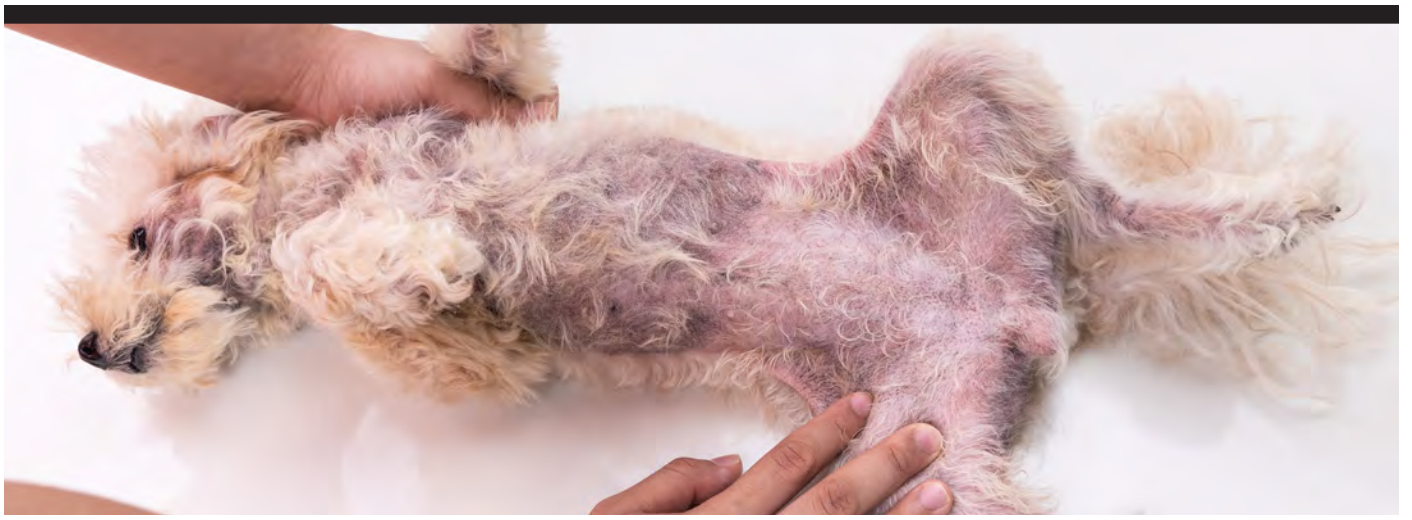
Brad Hanna is the executive vice president, director of business strategy, at Barkley, one of the leading marketing and insight firms in the US.

82%
of clients said they would have felt better about their primary care veterinarian if they had been referred to a veterinary dermatologist earlier.

Acknowledgments
The author thanks Theresa Entriken, DVM, and David Senter, DVM, DACVD, for their writing and editorial assistance with this article.

Funding
The ACVD funded this research and received no financial support for the research, authorship, and/or publication of this article.

Dermatology



Responsible dermatology *in general practice*

Using appropriate diagnostics and creating a treatment plan maximize client compliance and facilitates good antimicrobial stewardship and treatment success

written by

Kate Boatright, VMD

Boatright, a 2013 graduate of the University of Pennsylvania School of Veterinary Medicine, is a practicing veterinarian and freelance speaker. She is passionate about mentorship, education, and addressing common sources of stress for veterinary teams and recent graduates. Outside clinical practice, Boatright is actively involved in organized veterinary medicine at the local, state, and national levels.

If you're in general practice, you are likely seeing dermatology cases on an almost daily basis. These cases can be frustrating and often require antimicrobials as part of the treatment. But are we using these antimicrobials in a responsible way?

"It's a legitimate concern—multidrug resistance in our world," said Julia Miller, DVM, DACVD, an assistant clinical professor, section of dermatology in the Department of Clinical Sciences at Cornell University's College of Veterinary Medicine in Ithaca, New York. At the recent Fetch dvm360® conference in Charlotte, North Carolina, Miller presented a practical approach to dermatology cases in general practice with the intention of maximizing antimicrobial stewardship.

KEY CONCEPTS IN ANTIMICROBIAL STEWARDSHIP

According to Miller, the 4 pillars of antimicrobial stewardship are drug, duration, dose, and time. All these pillars must be accurately addressed when using antimicrobials responsibly, according to Miller.

"I don't like thinking of antimicrobial stewardship as just 'Don't use this drug, do use this drug,'" Miller said. "It's more complicated than that because if you choose the appropriate antibiotic—but you do not choose the right dose and you don't give it long enough—that's bad antimicrobial stewardship."

Multidrug-resistant (MDR) infections are well-known threats to both human and animal health. They have been named a top global public health concern by the World Health Organization. As part of their responsibility to uphold public health, veterinarians must be judicious in using antibiotics.

Additionally, some consequences of MDR infections are unique to veterinary medicine. "When we develop multidrug resistance, we are talking about increased costs for treatment," Miller said. "Now we have to use big-gun antibiotics that cost an awful lot more money. That's going to take more visits. It's going to take cultures and susceptibilities to make sure we've got it right."

Higher costs for treatment and more visits may also increase the stress on owners, especially in cases of limited finances. The emotional impact on the client can be even larger in severe cases, which sometimes result in euthanasia.

RIGHT TIME: IS AN ANTIBIOTIC REALLY NEEDED?

"The first step in good antimicrobial stewardship is to make sure that you need an antibiotic," Miller said. *Staphylococcus pseudintermedius,* the most common cause of superficial bacterial folliculitis in dogs, is the No. 1 reason antimicrobials are used in canine dermatology cases. Other species of *Staphylococcus* occur in canine patients at lower frequencies.

Many skin patterns that are consistent with *Staphylococcus* species infection can be observed on physical examination; however, proof of infection requires cytology. "You don't treat liver disease without blood work, so stop treating [*Staphylococcus*] without cytology," Miller said. For example, a patient with pustules could have a *Staphylococcus* species infection, but pemphigus and other autoimmune disease, contact hypersensitivity, and drug reactions are each a differential diagnosis requiring distinct treatments.

Miller noted that some classic *Staphylococcus* species lesions can be difficult to collect cytology samples from because of their dry nature. Patients with epidermal >>

Dermoscent®
LABORATOIRE

GET RED-Y FOR HYDRATION!

NEW

ATOP 7® HYDRA SPRAY

1st natural mist

Hydrating ingredients combined with a unique pre+probiotic complex

PRE+PROBIOTIC COMPLEX

ATOP 7® RANGE

to help soothe and repair allergic skin

NATURAL INGREDIENT BASED

Made in France by LDCA

For more information:
contactUS@dermoscent.com
www.dermoscent.us

collarettes, excessive scale, or a moth-eaten hair coat in short-coated breeds such as bulldogs are highly suspicious for *Staphylococcus* species infection. Combining cytologic and physical examination findings is the best way to approach these cases and determine if antibiotic treatment is warranted.

RIGHT DRUG: CHOOSING BETWEEN TOPICAL AND SYSTEMIC ANTIBIOTICS

When it comes to superficial *Staphylococcus* infections, veterinarians have a variety of treatment options, including topical and systemic antimicrobials. "Superficial [*Staphylococcus*] can almost always be treated topically," Miller said.

However, successful treatment requires owner compliance in bathing or application of topical medications. Miller acknowledged that not all owners will be compliant with topical treatment, making oral medications the better choice in some cases. "The No. 1 thing for antimicrobial stewardship is getting the treatment done," she said.

Miller encouraged practitioners to treat cases of superficial bacterial folliculitis topically when possible. When discussing treatment plans with clients, keep the plan simple. Veterinarians or technicians should have an honest conversation about the owner's ability to treat topically. Asking clients if they can do the baths or apply the topical products as prescribed can save time and frustration for both the client and veterinary team. If the answer is no, consider systemic options.

In some cases, systemic antimicrobials are preferred from the beginning. For Miller, these cases include the presence of furunculosis, which is characterized by red, palpably thickened skin; folliculitis that is nonresponsive to appropriate topical therapy; patients with immune compromise; and when owner compliance is a concern.

When using systemic antimicrobials, empirical antibiotic selection can be appropriate in many cases, especially in patients presenting with a first-time infection. First-tier antimicrobials in dermatology include clindamycin, cephalexin, cefpodoxime, cefovecin, amoxicillin clavulanate, and trimethoprim with sulfadiazine or sulfamethoxazole.[1,2] Without culture and sensitivity, doxycycline and minocycline may be considered as second-tier choices.[1,2]

RIGHT DOSE AND DURATION: EMPIRICAL ANTIBIOTIC USE IN DERMATOLOGY

When choosing among first-tier antibiotics, Miller encourages veterinarians to consider several factors, including patient size (this affects which medications can be dosed appropriately in their commercially available formulations), historical use of antimicrobials, history of adverse effects, and the effect of dosing frequency on client compliance.

Although cephalexin is known by many veterinarians as a first-line agent for treating bacterial pyoderma, Miller stressed that the minimum effective dose is 22 mg/kg by mouth twice daily. Higher doses up to 30 mg/kg can be used but are more likely to have gastrointestinal adverse effects. "If it's not the drug that fits the weight [of the pet], then it's not the right drug," Miller said. In cases when appropriate dosing of cephalexin is not possible, consider other first-tier agents.

Miller also cautioned veterinarians when choosing clindamycin empirically. She shared that although it can be an excellent first-line antimicrobial for dermatology cases, resistance develops quickly. Even if the pet has never been treated with clindamycin, resistance can develop if there is a long history of using other antimicrobials.[3] Additionally, if selecting clindamycin based on culture and susceptibility testing, veterinarians should ensure that the bacteria is also sensitive to erythromycin. Clindamycin resistance can be induced in bacteria that have already developed erythromycin resistance.

When considering the duration of treatment, continuing 7 days past clinical resolution is recommended. Although lesions may appear visually resolved after only a week of treatment, deeper infection may still be present. Thus, standard recommendations are to dispense a 21-day course of antimicrobials in cases of superficial bacterial folliculitis.[1]

Culture and susceptibility testing is never wrong. It should be utilized in cases in which treatment with multiple antimicrobials has failed, multiple antimicrobials have been previously used at short durations (< 10 days), and there is a history of fluoroquinolone use.[4] Cytology should always be performed in these cases to confirm the presence of bacteria and aid in interpretation of results. Fluoroquinolones, chloramphenicol, and rifampin should be reserved for use based on culture and susceptibility testing.[1,2]

TAKE-HOME POINTS

Although it may be tempting in dermatology cases to treat empirically based on the clinical appearance of the dog, practitioners should confirm the presence of a bacterial infection through cytology. Therapeutic choices should be made collaboratively with the client to maximize compliance, and when antimicrobials are chosen, practitioners should ensure they choose the right drug at the right time and prescribe it at the appropriate dose and duration.

General practitioners "are the front line of good antimicrobial stewardship," Miller said.

> The first step in good antimicrobial stewardship is **to make sure that you need an antibiotic."**
>
> ***—Julia Miller, DVM, DACVD***

REFERENCES

1. Hillier A, Lloyd DH, Weese JS, et al. Guidelines for the diagnosis and antimicrobial therapy of canine superficial bacterial folliculitis (Antimicrobial Guidelines Working Group of the International Society for Companion Animal Infectious Diseases). *Vet Dermatol.* 2014;25(3):163-e43. doi:10.1111/vde.12118
2. Hnilica KA, Patterson AP. *Small Animal Dermatology. A Color Atlas and Therapeutic Guide*. Elsevier; 2017.
3. van Damme CMM, Broens EM, Auxilia ST, Schlotter YM. Clindamycin resistance of skin derived Staphylococcus pseudintermedius is higher in dogs with a history of antimicrobial therapy. *Vet Dermatol.* 2020;31(4):305-e75. doi:10.1111/vde.12854
4. Faires MC, Traverse M, Tater KC, Pearl DL, Weese JS. Methicillin-resistant and -susceptible Staphylococcus aureus infections in dogs. *Emerg Infect Dis.* 2010;16(1):69-75. doi:10.3201/eid1601.081758

The danger of nonanesthetic dentals

These procedures are harmful and do not meet the standard of care set by the American Animal Hospital Association

Murphy is a beautiful 8-year-old goldendoodle that needed a second opinion regarding his mouth. From the moment we met, it was obvious that Murphy was very well cared for and that his owners thought he was an important part of the family. Unfortunately, his mouth showed all the signs of advanced and painful periodontal disease.

Like many pets, Murphy had suffered in silence for years because of the inappropriate care provided by nonanesthetic dentals. He had gingival recession, swollen and red gums, halitosis, mobile teeth, pockets greater than 3 mm, and exposed tooth roots (see **Figure**). These alarming findings had been documented on a recent nonanesthetic dental and discharge report whose instructions included "consider scheduling an anesthetic dental in 6 months."

The client realized that something wasn't right and did not want to delay appropriate care for her beloved best friend. She did not hesitate to schedule a professional anesthetic dental cleaning (dental prophylaxis and dental x-rays) with our team, which allowed Murphy's advanced disease to be appropriately assessed and treated.

Murphy's owner had not been educated on the importance of routine professional dental care and dental home care. Murphy needed extensive oral surgery with 16 extracted teeth. This could have been prevented if the client had been properly educated on disease progression.

The American Animal Hospital Association (AAHA) does not certify practices that offer nonanesthetic dentals for good reason: They are harmful to pets and do not meet the organization's standards of care. As veterinarians, we must make sure pets don't suffer.

In the past, I myself was led to believe that nonanesthetic dentals were a benefit to pets. I now realize that, like many other veterinarians in general practice, I used to be part of a problem that continues to plague pets around our country.

Periodontal disease is a common illness that affects many pets, and nonanesthetic dentals are advertisements for pet parents that make false promises. They lead to further deterioration of the oral health of animals.

As veterinarians, we must be united in our stance against nonanesthetic dentals as we share the responsibility of providing complete care for pets. By offering procedures like nonanesthetic dentals at our practices, we discredit our profession and provide inadequate care that puts pets in harm's way.

We must eliminate this "service" at all animal hospitals. If someone lacks the ability to take and correctly interpret dental x-rays and perform appropriate oral surgery, they should consider taking continuing education classes or referring such cases to dental experts.

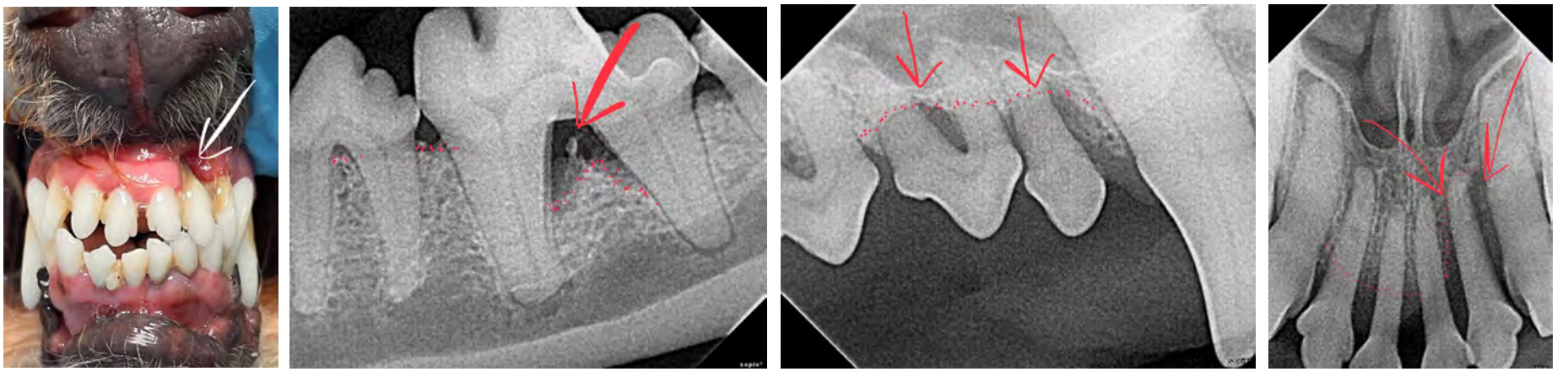
Our common goal should be to put nonanesthetic dental businesses out of business. Unfortunately, many of these procedures are being offered outside of animal hospitals. However, the time has come for us to stand together and live up to the oath we took as veterinarians to make a difference for pets everywhere.

written by

Boaz Man, DVM

Man is the owner and medical director of Boca Midtowne Animal Hospital, an American Animal Hospital Association—accredited facility in Boca Raton, Florida, and a Fear Free–certified professional.

The AAHA **does not certify practices that offer nonanesthetic dentals** for good reason.



Jon Klarsfeld, DVM, practice limited to veterinary dentistry

Figure. Intraoral Dental X-rays of Murphy, Showing Examples of Bone Loss, Bone Destruction, and Bone Infection

Laverdia™-CA1

(verdinexor tablets)

Conditionally approved by FDA pending a full demonstration of effectiveness under application number 141-526

Antineoplastic Tablets

For Dogs Only

CAUTION: Federal (USA) law restricts this drug to use by or on the order of a licensed veterinarian. Use only as directed. **It is a violation of the law to use this product other than as directed in the labeling.**

BRIEF SUMMARY (for full prescribing information, see package insert)

DESCRIPTION: Laverdia-CA1 (verdinexor tablets) is a selective inhibitor of nuclear export (SINE) that blocks chromosome region maintenance 1 (CRM1).

INDICATION: Laverdia-CA1 is indicated for the treatment of lymphoma in dogs.

CONTRAINDICATIONS:
Do not use in dogs that are pregnant, lactating or intended for breeding. Laverdia-CA1 is a possible teratogen and can affect female and male fertility.

WARNINGS: NOT FOR USE IN HUMANS. KEEP THIS AND ALL MEDICATIONS OUT OF THE REACH OF CHILDREN. CHILDREN SHOULD NOT COME INTO CONTACT WITH LAVERDIA-CA1. Children should not come in contact with the feces, urine, vomit, or saliva of treated dogs.

Pregnant women, women who may become pregnant, and nursing women should not handle or administer Laverdia-CA1 or come in contact with the feces, urine, vomit, or saliva from Laverdia-CA1-treated dogs.

Laverdia-CA1 may cause birth defects and can affect female fertility based on animal studies.

Wear protective disposable chemotherapy resistant gloves when handling Laverdia-CA1 to avoid exposure to drug.

Wear protective disposable chemotherapy resistant gloves to prevent direct contact with moistened, broken, or crushed Laverdia-CA1 tablets and prevent direct contact with feces, urine, vomit, and saliva during treatment and for **3 days** after the dog has received the last treatment. Place all waste material in a plastic bag and seal before general disposal. Wash hands immediately and thoroughly with soap and water if contact occurs with the feces, urine, vomit, or saliva from Laverdia-CA1 treated dogs.

Any items that come in contact with feces, urine, vomit, or saliva should not be washed with other laundry during treatment and for **3 days** after the last treatment with Laverdia-CA1.

Wear protective disposable chemotherapy resistant gloves when handling the dog's toys, food bowl, and water bowl. Wash food and water bowls separately from other items during treatment and for **3 days** after the dog has received the last treatment.

If Laverdia-CA1 is accidentally ingested, or if there is significant contact with feces, urine, vomit or saliva of dogs during treatment or within **3 days** after the last treatment without proper precautions, seek medical advice immediately. It is important to show the treating physician a copy of the package insert, label, or client information sheet.

Special instructions for handling and administering the product
It is recommended that Laverdia-CA1 by administered under the supervision of, or in consultation with, a veterinarian experienced in the use of cancer therapeutic agents.

Do not store near food, in or near a food preparation area, or with medications intended for use in humans.

Skin contact
In case of contact with the skin, wash the affected area immediately and thoroughly with soap and water.

Accidental eye exposure
Rinse the eyes with large amounts of tap water (use eyewash station if present) for 10 minutes while holding back the eyelid.

Remove contact lenses.

Seek medical advice immediately and show the package insert or label to the physician.

Accidental oral exposure or ingestion
Seek medical advice immediately and show the package insert or label to the physician.

Animal Safety Warnings

Laverdia-CA1 can cause severe anorexia. Patients should be carefully monitored for inappetence, vomiting, diarrhea and dehydration, and supportive care should be provided as clinically indicated. Keep Laverdia-CA1 in a secure location out of reach of dogs, cats, and other animals to prevent accidental ingestion or overdose.

PRECAUTIONS: Safe use of Laverdia-CA1 has not been evaluated in dogs with concurrent serious infections; concurrent renal, cardiovascular, or hepatic disease; in dogs with diabetes mellitus; in dogs with clinically relevant hypercalcemia; in dogs with concurrent malignancy or dogs younger than 7 months of age.

Laverdia-CA1 can cause hematologic and serum chemistry abnormalities. Dogs should be frequently monitored for evidence of hematologic and serum chemistry abnormalities when initiating and maintaining treatment with Laverdia-CA1 (see ADVERSE REACTIONS).

The safety and effectiveness of Laverdia-CA1 has not been evaluated in conjunction with other chemotherapeutic agents or other treatment modalities for lymphoma.

ADVERSE REACTIONS: The most common adverse events reported during the course of a US field study supporting reasonable expectation of effectiveness were lethargy, fever, weakness, generalized pain, anorexia, vomiting, diarrhea, polyuria, polydipsia, hematuria, proteinuria, elevated liver enzymes, bilirubinuria, cough/dyspnea, weight loss, blood cell abnormalities, subcutaneous edema, and pyoderma. Less common adverse reactions seen were protein losing nephropathy, urinary incontinence, hepatomegaly, elevated bilirubin, icterus, heart murmur, arrhythmia, heart block, blood protein abnormalities, prolonged prothrombin time, seizure, tremor, disorientation, corneal opacity, skin bruising, redness, loss of hair, nasal discharge, epistaxis, lymphadenitis and platelet abnormalities.

To report suspected adverse events, for technical assistance or to obtain a copy of the SDS, contact Dechra Veterinary Products at 1-833-264-8483. 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/reportanimalae.

DISTRIBUTED BY:
Dechra Veterinary Products
7015 College Boulevard, Suite 525
Overland Park, KS 66211 USA

Conditionally Approved by FDA under application number 141-526

Laverdia™ is a trademark of Dechra Limited.

R 02 2022

14BR-LAV22005-0222

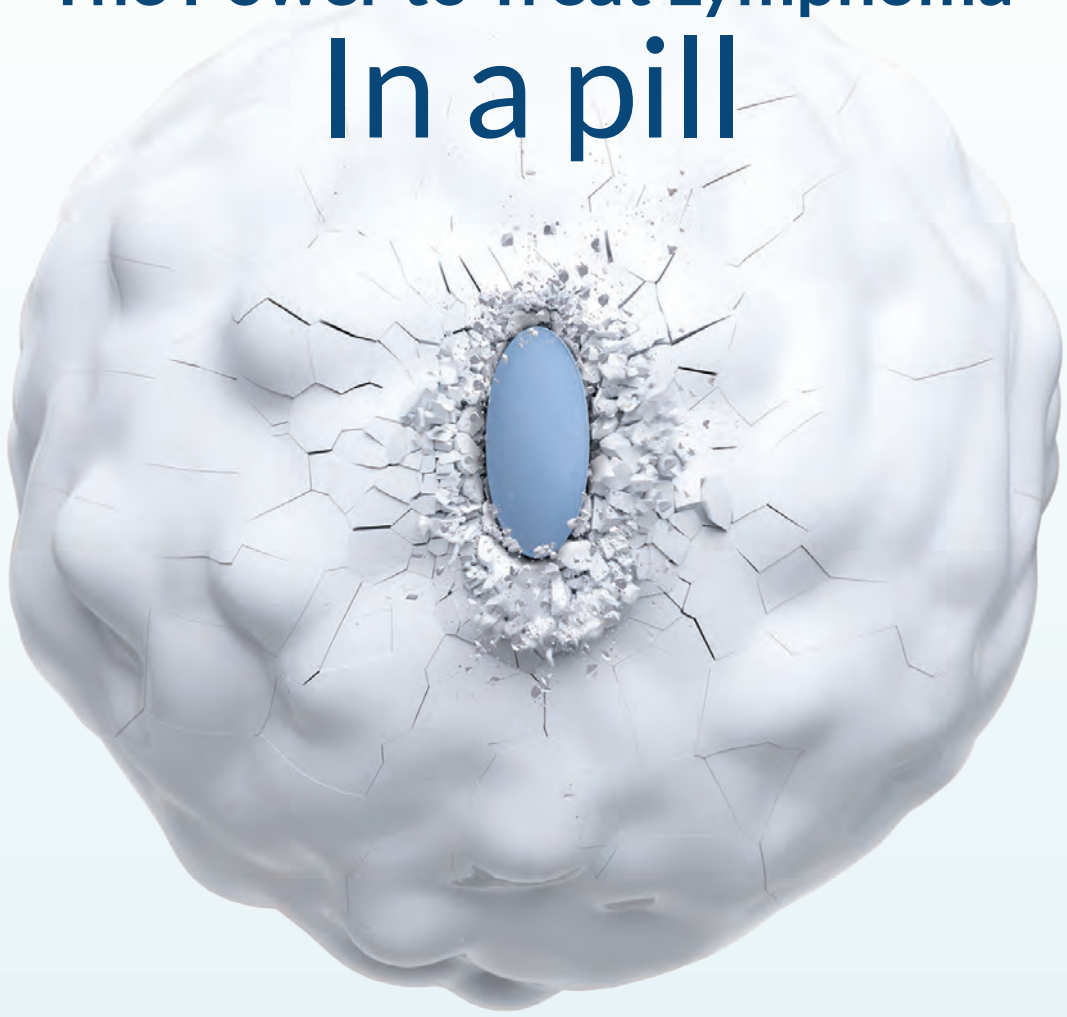
Dechra

Dechra

LAVERDIA™-CA1
(verdinexor tablets)

LAVERDIA™-CA1 is conditionally approved by FDA pending a full demonstration of effectiveness under application number 141-526.

The Power to Treat Lymphoma
In a pill



A novel treatment option for canine lymphoma patients

Important Safety Information
For use in dogs only. Laverdia™-CA1 (verdinexor tablets) is conditionally approved for the treatment of lymphoma in dogs. NOT FOR USE IN HUMANS. KEEP THIS AND ALL MEDICATIONS OUT OF THE REACH OF CHILDREN. CHILDREN SHOULD NOT COME INTO CONTACT WITH LAVERDIA-CA1. Pregnant women, women who may become pregnant, nursing women and children should not handle or administer Laverdia-CA1 or come into contact with the feces, urine, saliva, or vomit of treated dogs for **3 days** following treatment. Laverdia-CA1 can affect male fertility based on animal studies and studies in humans. Wear protective disposable chemotherapy resistant gloves when handling Laverdia-CA1 to avoid direct exposure to moistened, broken or crushed tablets or biological waste from the treated dog (feces, urine, saliva, or vomit). Do not use in dogs that are pregnant, lactating or intended for breeding. Laverdia-CA1 is a possible teratogen and can affect female and male fertility. Dogs should be frequently monitored for hematologicand serum chemistry abnormalities. The most commonly reported adverse reactions in dogs include anorexia, weight loss, vomiting, diarrhea, lethargy, polyuria, polydipsia, elevated liver enzymes and thrombocytopenia. **For product label, including complete safety information, visit go.dechra-us.com/laverdia-pi or scan the QR code below.**

CAUTION: Federal (USA) law restricts this drug to use by or on the order of a licensed veterinarian. Use only as Directed. It is a violation of Federal Law to use this product other than as directed in the labeling.

Treatment options *for* canine lymphoma

Assessing traditional and recently approved therapies for canine lymphoma

written by

CHRISTINE MULLIN, VMD, DACVIM (ONCOLOGY)

A board-certified veterinary oncologist, Mullin received a VMD from the University of Pennsylvania School of Veterinary Medicine, completed an internship in small animal medicine and surgery, and pursued a 3-year residency in medical oncology. During her residency, she conducted bench top research in osteosarcoma at the Pediatric Oncology Branch of the NIH National Cancer Institute, for which she received the 2014 Most Outstanding Resident Basic Science Research award from the Veterinary Cancer Society. She has authored/coauthored multiple journal articles and book chapters.

written by

CRAIG A. CLIFFORD, DVM, MS, DACVIM (ONCOLOGY)

Clifford received a DVM from Mississippi State University College of Veterinary Medicine and an MS in animal science/virology from the University of Delaware. After completing an internship and medical oncology residency, he became a diplomate of the American College of Veterinary Internal Medicine (Oncology). He is a medical oncologist at BluePearl Malvern and the director of BluePearl Science. He is a member of the Anivive advisory board.

Lymphoma, a cancer that originates in white blood cells, is one of the most common cancers in canines. Most dogs diagnosed with lymphoma have the intermediate or high-grade form of the disease, but given recent advances in molecular diagnostics, other previously underrecognized subtypes, like indolent lymphoma, are being more frequently diagnosed.

Upon diagnosis or suspicion of lymphoma, patients typically undergo a series of staging tests, including lab work (complete blood cell count and chemistry panel), fine needle aspiration cytology and/or biopsy, imaging (ultrasound and/or thoracic radiographs), and molecular diagnostics (immunohistochemistry, immunocytochemistry, polymerase chain reaction for antigen receptor rearrangement, flow cytometry, and genomic profiling) to determine the nature and extent of disease. This allows them to be categorized by disease stage (I-V), substage (a or b), cell size/grade (large cell, intermediate grade, high grade, or small cell/low-grade/indolent), and immunophenotype (B cell or T cell). Most patients present with at least stage III disease, with generalized peripheral lymphadenopathy. Stage IV involves hepatosplenic involvement, and stage V refers to the presence of bone marrow infiltration or involvement of extranodal sites like the kidneys, lungs, CNS, or eyes. Clinically ill (substage b) dogs and dogs with advanced (stage V) disease typically have a poorer long-term prognosis. Of additional importance is immunophenotype, which can provide prognostic information and guide therapy. B cell is the most common intermediate to high-grade form, whereas T-cell lymphoma is less common but more frequently seen in breeds like boxers, golden retrievers, and Siberian huskies. T-cell disease is associated with certain anatomic forms, including cutaneous, mediastinal, hepatic, and gastrointestinal.[1]

TREATMENT

For many years, the standard of care for most canine lymphomas has been doxorubicin-based combination chemotherapy, or CHOP. The acronym comprises the names of the 4 drugs that make up the protocol: cyclophosphamide, hydroxydaunorubicin (doxorubicin), Oncovin (vincristine), and prednisone.[2] There are well over a dozen published protocols that differ in the number of drugs used and the timing of each drug. Typically, protocol length varies from 12 weeks to more than 2 years and is often driven by efficacy, cost, and owner

convenience. These authors currently treat dogs with a 16-week protocol that is broken down into four 4-week cycles. After, patients are monitored every 4 to 8 weeks. Because T-cell lymphoma has a poorer response to doxorubicin-based chemotherapy, many oncologists will modify the protocol by substituting it with alkylating agents.[3] To date, no prospective head-to-head studies have demonstrated what protocol performs best for T-cell lymphoma.

In select cases, less intensive alternatives to standard CHOP-based chemotherapy may be chosen: single-agent doxorubicin or lomustine (CCNU) +/- L-asparaginase, and prednisone for palliative care. Several rescue protocols exist and can be employed in the event of a relapse during or following CHOP-based chemotherapy.

WHAT'S NEW?

Tanovea

Tanovea (rabacfosadine for injection; Elanco) became the first fully FDA-approved drug for canine lymphoma in 2021. It is indicated for the treatment of lymphoma without specification as to immunophenotype, anatomic site, stage/substage, or degree of pretreatment. It is not a substrate for P-glycoprotein and therefore should not be subject to the multidrug resistance that commonly develops in dogs treated with doxorubicin-based chemotherapy.

Tanovea is given as a 30-minute IV infusion once every 3 weeks at a dose of 1 mg/kg for up to 5 consecutive doses. Common adverse effects include gastrointestinal and hematologic changes similar to those seen with other chemotherapy agents. Incremental dose reductions or dose delays may be used to manage adverse reactions. There are 2 toxicities specific to Tanovea: a cumulative dermatopathy characterized by local superficial erythema and pruritus, most often in the periauricular region, dorsum, and inguinal region. This typically resolves with drug discontinuation and supportive therapies. A small number of dogs (~4%) have developed pulmonary fibrosis as a late complication (months after study completion, while in remission), so careful monitoring with thoracic radiographs has been recommended.[4-6] Based upon its high response rate and duration of response, Tanovea is an excellent first rescue drug, particularly for B-cell lymphoma.[6] Furthermore, the data from a study that alternated Tanovea and doxorubicin in previously untreated patients is compelling, and this may be a viable first-line option for owners who make treatment decisions partly based on the number of visits.[7]

Laverdia-CA1

Laverdia-CA1 (verdinexor tablets; Dechra) is the first oral treatment for dogs with lymphoma conditionally approved by the FDA. Verdinexor is a selective inhibitor of nuclear export (SINE) and thus can induce apoptosis and enhance antiproliferation of cancer cells, sensitize cancer cells to chemotherapeutic agents, and reverse drug resistance in some cases.[8] Verdinexor is not cytotoxic or myelosuppressive and is relatively targeted to neoplastic cells. Like Tanovea, it is not a substrate for P-glycoprotein and should not lead to multidrug resistance.

Laverdia-CA1 comes in 2.5-mg, 10-mg, and 50-mg tablets and is conveniently administered orally by the owner twice a week. The majority of adverse effects are low-grade, with the most common being anorexia, weight loss, lethargy, and diarrhea. Doses can be modified to manage adverse events and enhance/maintain clinical response.[9]

Clinical data on the use of Laverdia-CA1 in dogs is limited, but its efficacy as a single-agent treatment for multiple types of canine lymphoma has demonstrated in multiple clinical scenarios, including B-cell, T-cell, naïve, and first relapse lymphomas following either single or multiagent protocols. In a phase 2 study, its overall clinical benefit rate was 55%, with a median duration of benefit of 71 days (range, 21-273 days). T-cell lymphoma, traditionally more refractory to conventional treatment, was associated with a clinical benefit rate of 71%, regardless of whether the lymphoma was naïve or relapsed.[10] The pivotal trial for Laverdia-CA-1 to obtain full approval is ongoing at several US sites. Researchers think this SINE may be worth investigating when[11]:

- Owners elect against referral and want to do more than prednisone alone.
- Patient is to be referred, but referral is several weeks away.
- Patient has failed standard-of-care chemotherapy, and owner elects against other chemotherapy protocols.
- Patient has failed multiple protocols, and owner is only looking for more time.
- Patients have recently completed CHOP, have many poor indicators, and there is a concern they may relapse early.
- Epitheliotropic lymphoma relapses, or the owner elects against CCNU.
- Indolent lymphoma progresses.
- Lymphoma is atypical (small cell, null cell, intermediate-grade, etc).

SUMMARY

The future is bright for dogs with lymphoma, as our industry partners are bringing in new and more novel therapies for patients with the disease. The ultimate place for these agents is still under investigation, but we now have a more options for the treatment of canine lymphoma. ◎

The future is bright for dogs with lymphoma, as our industry partners are bringing in new and more novel therapies for patients with the disease.

REFERENCES

1. Vail DM et al. Hematopoietic tumors, section a: canine lymphoma and lymphocytic leukemias. In Vail DM, Thamm D, Liptak J. Saunders, eds. *Withrow and MacEwen's Small Animal Clinical Oncology*. 6th ed. Elsevier;2019:688-712.
2. Garrett LD, Thamm DH, Chun R, Dudley R, Vail DM. Evaluation of a 6-month chemotherapy protocol with no maintenance therapy for dogs with lymphoma. *J Vet Intern Med*. 2002;16(6):704-709. doi:10.1892/0891-6640(2002)016<0704:eoacpw>2.3.co;2
3. Regan RC, Kaplan MS, Bailey DB. Diagnostic evaluation and treatment recommendations for dogs with substage-a high-grade multicentric lymphoma: results of a survey of veterinarians. *Vet Comp Oncol*. 2013;11(4):287-295. doi:10.1111/j.1476-5829.2012.00318.x
4. Weishaar KM, Wright ZM, Rosenberg MP, et al. Multicenter, randomized, double-blinded, placebo-controlled study of rabacfosadine in dogs with lymphoma. *J Vet Intern Med*. 2022;36(1):215-226. doi:10.1111/jvim.16341
5. Saba CF, Clifford C, Burgess K, et al. Rabacfosadine for naïve canine intermediate to large cell lymphoma: Efficacy and adverse event profile across three prospective clinical trials. *Vet Comp Oncol*. 2020;18(4):763-769. doi:10.1111/vco.12605
6. Saba CF, Vickery KR, Clifford CA, et al. Rabacfosadine for relapsed canine B-cell lymphoma: efficacy and adverse event profiles of 2 different doses. *Vet Comp Oncol*. 2018;16(1):E76-E82. doi:10.1111/vco.12337
7. Thamm DH, Vail DM, Post GS, et al. Alternating rabacfosadine/doxorubicin: efficacy and tolerability in naïve canine multicentric lymphoma. *J Vet Intern Med*. 2017;31(3):872-878. doi:10.1111/jvim.14700
8. London CA, Bernabe LF, Barnard S, et al. Preclinical evaluation of the novel, orally bioavailable selective inhibitor of nuclear export (SINE) KPT-335 in spontaneous canine cancer: results of a phase I study. *PLoS One*. 2014;9(2):e87585. doi:10.1371/journal.pone.0087585
9. Laverdia-CA1. Package Insert. Anivive Lifesciences; 2020.
10. Bergman, PJ, Clifford CA, Thamm D, Johannes C. Clinical integration of Tanovea® and Laverdia™-ca1 for canine lymphoma. Presented at: 2022 ACVIM Forum; June 23-25; Austin, TX.
11. Sadowski AR, Gardner HL, Borgatti A, et al. Phase II study of the oral selective inhibitor of nuclear export (SINE) KPT-335 (verdinexor) in dogs with lymphoma. *BMC Vet Res*. 2018;14(1):250. doi:10.1186/s12917-018-1587-9

otsphoto/ Adobe stock

Iatrogenic hypothyroidism *in cats*

What is gained from certain treatments and what we miss in patients receiving them

Hyperthyroidism is not just one if the most common endocrinopathy conditions but is also one of the most prevalent geriatric feline diseases in general.[1,2] Thyroid hormone has an enhancing effect on renal function (glomerular filtration rate [GFR]) by delivering more blood to the kidneys.[3] Treating hyperthyroidism decreases the GFR and may unmask underlying chronic kidney disease (CKD) and azotemia.[4-7] Hyperthyroid cats with preexisting CKD have shorter survival times than nonazotemic cats.[8]

Iatrogenic hypothyroidism (IH) results when treatment for hyperthyroidism causes suppression of total thyroxine (T4) below normal levels. Azotemia is more common in cats with IH,[9] which can result from surgical thyroidectomy, radioactive iodine (I-131), or oral methimazole treatment.[9-11] The overall prevalence of IH in cats treated for hyperthyroidism is estimated to be around 1 in 5 cases whereas the prevalence in methimazole-treated cats may be as high as 50% of cases.[9-11]

Although large studies are lacking, the combination of IH and CKD decreased the survival time of cats by nearly 50% compared with that of their nonazotemic counterparts—from 905 days to 456 days.[9] In methimazole-treated cats with IH, restoring thyroid status resulted in improved creatinine in all cases and resolved the azotemia in about half the cases.[10]

TESTING AND DIAGNOSIS

Current pitfalls in our ability to recognize IH in cats include the clinical signs of hypothyroidism; weight gain, declining appetite, and decreased activity are considered normal with treatment for hyperthyroidism. Further, most cats undergo routine T4+/– free T4 monitoring although documentation of IH requires both a low or low-normal T4+/– free T4 level and the complementary finding of an elevated or high-normal thyroid stimulating hormone (TSH) level.

The current commercially available canine TSH (cTSH) assay lacks sensitivity for cats but a feline-specific assay is not yet available for routine use.[12,13] As a result, we are likely missing IH in cats being treated for hyperthyroidism using current monitoring trends.

Practically speaking, cats that are being treated for hyperthyroidism should be monitored for the development of IH and this requires routine monitoring of both T4 and TSH. This is especially important when azotemia is present, as management of IH may resolve some or all the azotemia.

We do not have a reliable test to predict which hyperthyroid cats might develop azotemia with treatment. Older studies evaluating urine specific gravity, urea, and creatinine levels often failed to find associations.[6-9] We now know that symmetric dimethylarginine (SDMA) is a better marker for CKD in hyperthyroidism than creatinine.[14,15] Nonetheless, SDMA is a specific but not sensitive marker for the prediction of azotemia with treatment. Although pretreatment SDMA elevations predicted posttreatment azotemia with nearly 98% confidence, most hyperthyroid cats had a normal SDMA level before treatment. Therefore, a normal pretreatment SDMA level does not rule out the possibility that azotemia may develop.[14] Additional studies looking at alternative methods for azotemia prediction, such as algorithm enhanced machine learning, are already under way.

DRUG TREATMENTS

Clinically, if IH is documented in a stable cat being treated with oral methimazole, the dose should be decreased by at least 25%. This may be achieved most easily by dropping the dose in 1.25-mg to 2.5-mg increments.[11] T4, TSH, and SDMA levels should be rechecked in 2 to 4 weeks and the process continued until T4 and TSH levels normalize.

In cases having been treated with surgical thyroidectomy or I-131, thyroid hormone supplementation should be initiated (levothyroxine, 100-200 µcg/cat/day)[16] with the same recheck plan.

In people with CKD who develop spontaneous hypothyroidism, early oral thyroid supplementation delayed the progressive decline of kidney function that is typical of CKD and improved the GFR.[17,18] Spontaneous hypothyroidism is rare in cats, but results of a small study showed that 4 of 4 cats had their azotemia resolve with levothyroxine treatment.[16]

CONCLUSION

Although it appears that not all cats with hyperthyroidism and azotemia have IH to blame, the hope is that by recognizing and restoring normal thyroid status, kidney function will be preserved and potentially restored in a specific subset of at-risk cats. As diagnostic capabilities continue to expand, the story here is likely to evolve as well.

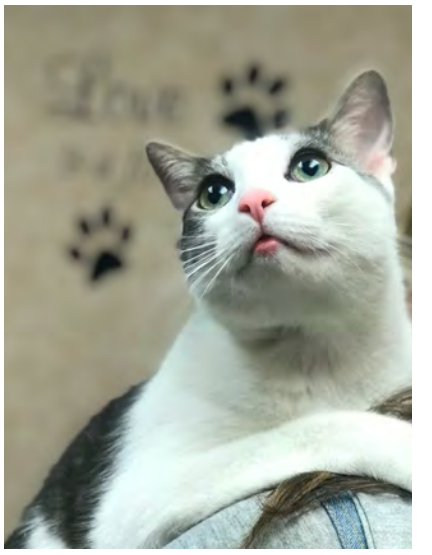
REFERENCES

1. Peterson ME. Animal models of disease: feline hyperthyroidism: an animal model for toxic nodular goiter. *J Endocrinol*. 2014;223(2):T97-114. doi:10.1530/JOE-14-0461
2. McLean JL, Lobetti RG, Schoeman JP. Worldwide prevalence and risk factors for feline hyperthyroidism: a review. *J S Afr Vet Assoc*. 2014;85(1):1097. doi:10.4102/jsava.v85i1.1097
3. Adams WH, Daniel GB, Legendre AM. Investigation of the effects of hyperthyroidism on renal function in the cat. *Can J Vet Res* 1997;61(1):53-56.
4. Brown CA, Elliott J, Schmiedt CW, Brown SA. Chronic kidney disease in aged cats: clinical features, morphology, and proposed pathogeneses. *Vet Pathol*. 2016;53(2):309-326. doi:10.1177/0300985815622975
5. Syme HM. Cardiovascular and renal manifestations of hyperthyroidism. *Vet Clin North Am Small Anim Pract*. 2007;37(4):723-743, vi. doi:10.1016/j.cvsm.2007.05.011
6. Boag AK, Neiger R, Slater L, Stevens KB, Haller M, Church DB. Changes in the glomerular filtration rate of 27 cats with hyperthyroidism after treatment with radioactive iodine. *Vet Rec*. 2007;161(21):711-715. doi:10.1136/vr.161.21.711
7. Peterson ME, Nichols R, Rishniw M. Serum thyroxine and thyroid-stimulating hormone concentration in hyperthyroid cats that develop azotemia after radioiodine therapy. *J Small Anim Pract*. 2017;58(9):519-530. doi:10.1111/jsap.12695
8. Milner RJ, Channell CD, Levy JK, Shaer M. Survival time for cats with hyperthyroidism treated with iodine 131, methimazole, or both: 167 cases (1996-2003). *J Am Vet Med Assoc*. 2006;228(4):559-563. doi:10.2460/javma.228.4.559
9. Williams TL, Elliot J, Syme HM. Association of iatrogenic hypothyroidism with azotemia and reduced survival time in cats treated for hyperthyroidism. *J Vet Intern Med*. 2010;24(5):1086-1092. doi:10.1111/j.1939-1676.2010.0566.x
10. Williams TL, Elliott J, Syme HM. Effect on renal function of restoration of euthyroidism in hyperthyroid cats with iatrogenic hypothyroidism. *J Vet Intern Med*. 2014;28(4):1251-1255. doi:10.1111/jvim.12359
11. Aldridge C, Behrend EN, Martin LG, et al. Evaluation of thyroid-stimulating hormone, total thyroxine, and free thyroxine concentrations in hyperthyroid cats receiving methimazole treatment. *J Vet Intern Med*. 2015;29(3):862-868. doi:10.1111/jvim.12575
12. Peterson ME, Guteri JN, Nichols R, Rishniw M. Evaluation of serum thyroid-stimulating hormone concentration as a diagnostic test for hyperthyroidism in cats. *J Vet Intern Med*. 2015;29(5):1327-1334. doi:10.1111/jvim.13585
13. Wood A, Ryder M, Harmon I. Truforma point-of-care canine and feline thyroid-stimulating hormone (TSH) assay. Accessed May 17, 2022. https://zomedica.com/wp-content/uploads/2022/04/TRUFORMA-TSH-White-Paper.pdf
14. Peterson ME, Varela FV, Rishniw M, Polzin DJ. Evaluation of serum symmetric dimethylarginine concentration as a marker for masked chronic kidney disease in cats with hyperthyroidism. *J Vet Intern Med*. 2018;32(1):295-304. doi:10.1111/jvim.15036
15. Szlosek D, Robertson J, Quimby J, et al. A retrospective evaluation of the relationship between symmetric dimethylarginine, creatinine and body weight in hyperthyroid cats. *PLoS One*. 2020;15(1):e0227964. doi:10.1371/journal.pone.0227964
16. Peterson ME, Carothers MA, Gamble DA, Rishniw M. Spontaneous primary hypothyroidism in 7 adult cats. *J Vet Intern Med*. 2018;32(6):1864-1873. doi:10.1111/jvim.15239
17. Shin DH, Lee MJ, Kim SJ, et al. Preservation of renal function by thyroid hormone replacement therapy in chronic kidney disease patients with subclinical hypothyroidism. *J Clin Endocrinol Metab*. 2012;97(8):2732-2740. doi:10.1210/jc.2012-1663
18. Hataya Y, Igarashi S, Yamashita T, Komatsu Y. Thyroid hormone replacement therapy for primary hypothyroidism leads to significant improvement of renal function in chronic kidney disease patients. *Clin Exp Nephrol*. 2013;17(4):525-531. doi:10.1007/s10157-012-0727-y

written by

Heather Kvitko-White, DVM, DACVIM

Kvitko-White is founder of KW Veterinary Consulting and The Pragmatic Professor.



Hyperthyroidism is one of the most prevalent geriatric feline diseases.

Weight gain, declining appetite, and decreased activity are clinical signs of hypothyroidism in cats.

Photos credit: New Africa / Adobe stock, Adam Christman

Vetted™
Because practice ain't perfect.
FINANCE

written by

Jeff Rothstein, DVM, MBA

Jeff Rothstein, DVM, MBA, is the founder and copresident of Mission Veterinary Partners, headquartered in Novi, Michigan, which operates more than 250 veterinary hospitals in more than 30 states. He is a frequent presenter at veterinary conferences and veterinary schools and can be contacted at jeff.rothstein@mvetpartners.com.

How unnecessary expenses hurt the bottom line *and what to do about it*

Identify the main culprits eating away at profits and start pulling them in line

How profitable is the hospital where you work? Surprisingly enough, it is not uncommon for practice owners and their management *not to know* the profit of the business they run.

Oftentimes, leadership is more concerned with day-to-day issues and providing pet care than focusing on the bottom line. And the problem can be compounded by clinics' use of accountants who are not familiar with the veterinary industry.

Certified public accountants often provide only an annual profit and loss (P&L) statement and not a monthly one, which doesn't allow for course corrections during the year. And rarely do they provide statements that consider a variety of add backs that impact the profit of the business. On top of this, P&L statements tend to collect dust rather than be thoroughly reviewed by owners, many of whom are complacent and forgo looking at the business' financials because they feel that they're paying the bills and making a good living. The reality is that many have little business training and are not accustomed to deciphering financial statements. They may think they are doing the best they can and that it won't make a difference.

This is unfortunate because there is a significant difference in profit among veterinary practices, often ranging from 5% to 25%. Such a sizeable difference not only impacts the value of the business but also its overall well-being.

Practice profit, or EBITDA (earnings before interest, taxes, depreciation, and amortization), is important to everyone: owners, team members, clients, pets, and the community in which they reside. The more profitable hospital is better positioned to offer higher compensation and benefits to the team, have a nicer facility, and practice higher quality medicine. And yes, its value is also enhanced. Take-home messages: Profit is important, profit can be planned for, and profit matters now.

Profit matters now for many reasons. A big motivator for owners to enhance profitability is that practice value is based on EBITDA. We're all familiar with the saying, "A penny earned is a penny saved." However, in the veterinary business, every dollar saved increases the company's value by a factor of 5 to 10, so a mere $10,000 in savings could increase value by $100,000 or more, and a $100,000 savings by $1 million or more. That is a great motivator to start cutting expenses ASAP.

What accounts for the sizable gap in profit between veterinary hospitals? Simply put, it comes down to expenses. Hospitals that control their expenses are typically far more profitable than those that don't. To improve and increase profit, management needs to take a close look at expenses. A convenient way to look at costs and profit is to categorize them: staff payroll, DVM payroll, COGS (cost of goods sold, such as drugs and medical supplies), G&A (general and administrative, or day-to-day, expenses, including rent), and practice profit. Ideally, each category equals approximately 20% of expenses. A long-term standard for the profession is to have a profit of 20% or higher. Of course, that's easier said than done, but those that strive for it are often successful.

Traditionally, practice management consultants have advised animal practices that if they focus on growing the business, then expenses will fall into line. Although this can happen, it is often not the case; therefore, to be most profitable, emphasis on growing a practice and controlling or monitoring expenses is advised. Managing costs begins with measuring practice expenses regularly. As the adage goes, "What gets measured gets managed." You will quickly notice that if you keep your payroll and COGS in line, much of your work is done because these should account for nearly 60% of practice expenses. This leaves just G&A for review. This category, however, is made up of many of the fixed expenses: facility costs (approximately 10%) and things like utilities, office supplies, professional fees, and marketing, over which you may not have much control.

So your job is to play detective and search for unnecessary expenses. You're looking for any thing or service for which you're overpaying, are spending too much on, or don't need. For instance, you may be able to get better pricing on a specific heartworm preventive, or you may be able to drop a whole product line because it is not

tanyabosyk/ Adobe stock

essential and can be ordered from your online pharmacy. And you may also look at your budget and determine that you will keep only $15,000 of heartworm preventive in stock rather than the $30,000 currently on the shelves.

It is the combination of a few large and many small items that can lead to a significant saving. Start by prioritizing the big-ticket items, such as vaccines and heartworm, flea, and tick preventives. As time permits, move on to less pricey items or services, such as radiation badges, oxygen tanks, and medical waste removal. Making a list of tier A, B, and C expenses can help you approach this job.

The COGS category, which includes inventory and supplies, is a problem for many clinics, and this percentage can vary widely from one practice to another. Depending on what you include in COGS, it should range between 20% and 24%, but it is not unusual to see it in the 28% to 30% range. Some clinics struggle with payroll expense, but this is pretty straightforward. If it is much greater than 40%, it will be difficult for the hospital to achieve a 20% profit.

Here are some of the culprits that limit profits and suggestions on how to pull them into line.

1 **Pharmacy expenses:** Run the pharmacy a profit center, not a convenience center. Focus on carrying essential items that you routinely use: 2 or 3 ear medications, nonsteroidal anti-inflammatory drugs, and preventives—not 5 or 6. Have the medical team decide jointly on what to carry, and order the rest for clients via your online pharmacy. Carry as few sizes of a product as you can, and small sizes rather than large containers. Most products can be received within just a few days of ordering, so focus on just-in-time ordering, not on stockpiling products. Avoid promotions that require you to buy large quantities of a product all at once.

2 **Prescription diets:** Carry a limited and essential supply and train clients to purchase them from your online store or supplier. Getting these on auto-ship is ideal and makes you competitive with retailers.

3 **Laboratory:** Lab expenses typically comprise 4% to 5% of clinic revenue. But there is a large disparity between what hospital A and hospital B pay for the same service. Do your homework before making selections. Reference laboratory pricing is often more cost-effective and competitive than that of an in-house lab. Shop around for best pricing and consider joining a buying group, which can often achieve prices comparable to those of large group practices. Take advantage of special panel pricing. Most labs will have excellent pricing on select panels, often including wellness screening, preanesthesia, sick, and senior screenings.

4 **Imaging:** There are a lot of nice pieces of equipment out there, and many are essential to practice high-quality medicine and attract top talent. Compare and contrast not only the equipment, but also maintenance cost, cloud storage fees, and contracts. Imaging should be a profit center but can quickly be a profit drain if maintenance and storage costs are taken into account. With a little research, you can find a package that fits your needs and budget. Do not overspend or overcommit.

5 **Vendors/distributors:** It is OK to have your vendors and sales representatives of choice, but demand best pricing and compare with other providers. Do an annual review to keep everyone "honest." What was once reasonable pricing may no longer be. The goal is to worry about the college fund of your children and the team's children, not that of the vendor's friendly representative or CEO.

6 **Marketing:** From a budgetary standpoint, about 1% of revenue is OK to allot to marketing, but marketing has changed. There are no more big phone book ads. Today, it is much harder to navigate your cyber presence and determine the impact of marketing dollars. However, since the COVID-19 pandemic, many clinics are maxed out or even turning clients away; if that is the case, you may be fortunate enough not to have a marketing expense.

7 **Tier C expenses:** Although these individually may be small players, they are often overlooked. As a practice owner, I have overpaid significantly for radiation badges, bank fees, trash removal, medical waste removal, oxygen tanks, floor cleaning, snow removal, and so much more. Yes, it is hard to babysit these small spends, but they add up over time to thousands of dollars that fly out the door because you did not take the time to price shop or take advantage of your local Veterinary Medical Association-preferred vendor list.

8 **Services not charged for:** Yes, this happens! So put on that sleuth cap and brainstorm a little: For example, are you itemizing and charging specifically for the suture used for surgical and dental procedures? Do you just automatically trim toenails for free or do you have it as an optional client fee? Most clients will happily pay for this service. And do you charge any type of fee for euthanasia? Maybe you don't charge anything for euthanasia for "good" clients. We want to be fair to our clients but we must realize that these freebies become an expense that cuts into the bottom line. It is really the team that is subsidizing these costs.

9 **Contracts that lock you into what seems like good pricing:** Having the freedom to change vendors as desired is invaluable, and frequently a better deal or product line comes along and your hands are tied. And many times, contracts renew if you don't give notice a month or 2 in advance and now that 5% to 10% increase per year is not good pricing. Avoid anything longer than a year. At the end of the day, vendors want your business and you will find appropriate fees without being locked in.

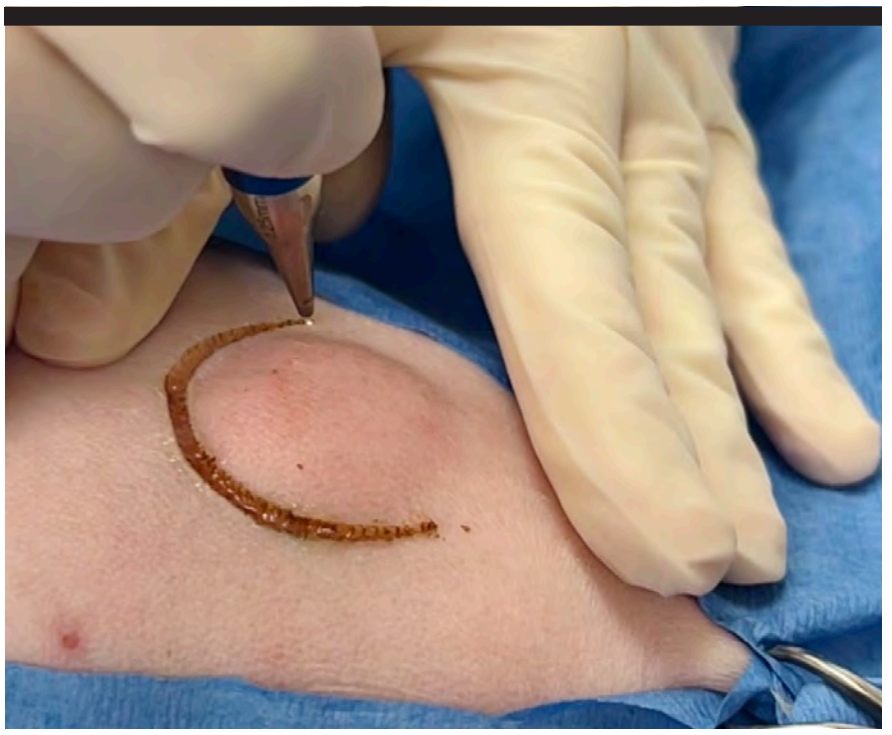
10 **Pricing:** You have done your investigating and found expenses that can be reduced; however, you may be still struggling to get beyond a 10% to 12% profit. If so, take a close look at your pricing. If both your payroll expense and COGS are hard to keep in check, then your pricing may be out of line. You may decide to simply increase prices accordingly or consider using a service like Profit Solver or working with a practice consultant who specializes in profitability.

Simply put, your practice deserves to be reasonably profitable. The idea is not to be frugal but to be informed about where your dollars are going. You need to decide what battles to fight. You may feel that having snack food at the clinic for the team is a morale booster and well worth $100/month. But you might decide it is more effective and cost-efficient for the team to do a quick end-of-the-day clean-up versus the luxury of having an outside janitorial service come in every night.

No one wants to nickel-and-dime every little expense. The key is that many veterinary practices can improve their bottom line by closely monitoring where dollars are being spent. This is critical when you realize that the dollars saved can go to improving the quality of life of the practice owners and team. Additionally, and not to be overshadowed, it is what also leads to better overall pet care.

Vetted™
Because practice ain't perfect.

TECHNOLOGY



Advanced laser surgery, and digital cytology *elevate pet care*

Modern tools allow animals to be examined, given diagnoses, and treated all in the same visit, while also having them heal quicker

The family pet in today's world has many opportunities to live a better life and benefit from health care options that were previously unavailable. The human-animal bond has driven innovation and advances in medical research and specialized care that have allowed pets to live longer, enjoying healthier, pain-free lifestyles.

Today, pet parents have become used to "Amazon speed" instant gratification and immediate test results for their pets.

We can now thank technology. Our pets have gained excellent care provided by services such as digital cytology and high-power carbon dioxide (CO_2) laser surgery.

If you had asked me years ago whether a lump or bump could be evaluated by a pathologist within minutes through digital cytology and then be removed by a surgeon at my practice the same day, I never would have believed it possible. If you had told me I could have a blood smear, ultrasound-guided fine needle aspirate of an organ, or bodily fluid evaluated by a pathologist within minutes, I also would have been in disbelief.

CLIENT SATISFACTION

Nowadays, pet parents are using technology that gets them the most information in the shortest amount of time. They have developed bonds with their pets that override any potential issue regarding cost of care. They know that when they come to our practice and have x-rays taken, they will have a radiology report within minutes so we can discuss the findings and best treatment options.

By incorporating our medical knowledge and clinical experience with the latest veterinary technology available, we can leave no stone unturned. Pet parents not only want but demand "concierge veterinary care." They want to know immediately that their pet's vital organs are working as they should, and they are prepared for the costs because they see the value behind the information they receive and the beneficial outcome for their fur baby.

A MODERN SURGICAL TOOL

When it comes to surgery, pet owners want a short anesthetic time and quick recovery. Laser technology has changed and improved over the years, and we have learned that high-power surgical CO_2 lasers provide optimal care for our furry best friends. In my practice, a state-of-the-art high-power 40-W surgical laser unit from Aesculight has allowed us to provide exactly what pet owners have been looking for.

This laser stops bleeding by contraction of the collagen on the endothelial wall of the blood vessel. It reduces pain by sealing nerve endings and reduces swelling by sealing lymphatics, giving veterinarians more control over the surgical field. The laser superpulse mode also stops collateral thermal damage to surrounding tissue, which allows a quick, minimally invasive incision. This allows tissue to be exposed to less laser light, reducing tissue trauma.

CO_2 lasers minimize tissue trauma, postsurgical pain, bleeding, and swelling, and accelerate healing. The precision offered by CO_2 lasers makes many procedures easier and cleaner. Postsurgical scarring is reduced as well. With CO_2 laser surgery, hospitalization time will be shorter and the patient will not require as many bandages or rechecks, saving your team and your clients time and money.

CONCLUSION

Veterinary practices can use social media to share videos of real pet stories that demonstrate technology such as digital cytology and high-power lasers and show the value of these services. For your animal hospital to provide excellent care and the latest technology in veterinary medicine, pet owners seeking such care will need to see it in action.

Written by

Boaz Man, DVM

Boaz Man, DVM, is owner and medical director of Boca Midtowne Animal Hospital, an American Animal Hospital Association–accredited facility in Boca Raton, Florida, and a Fear Free–certified professional.

Veterinary practices can use social media to share videos of real pet stories that demonstrate technology.

Kim/ Adobe stock

How to diversify your client base

A fine-tuned marketing strategy is essential for the success of a veterinary practice

GeniusVets

written by

David Hall

A cofounder of GeniusVets, David Hall was named a "Top 100 Marketing and Advertising Influencer" by MARsum in 2021 and invited by *Forbes* to join its prestigious Agency Council. He now works with veterinary practices across the country to help them achieve their business goals. David can be reached via david@geniusvets.com.

What types of clients do you want to have? What animal species does your practice care for? What services do you provide? Do you serve a mix of urban, suburban, and rural clients? Are you in an area where socioeconomic diversity ranges from lower to higher incomes? It's important to remember that you can't be all things to all people. However, that doesn't mean that you can't serve a diverse client base.

Once you have identified the species you will care for and the services you'll provide, the next important question to answer is about the socioeconomic status of the clients you want to work with. This decision will have a significant impact on the language and imagery you use to effectively connect with your target audience.

For example, residents of lower-income areas may be more drawn to language that references responsible services and affordable pricing, along with simple photos of staff members interacting with clients and taking care of patients. Upper-income communities, on the other hand, respond better to the idea of best-in-class services and images that depict idyllic, "Instagram-worthy" settings. This is an important area to consider and will set the standard for your website content, social posts, and all client communications. Once you have a good sense of the language and imagery that will best connect with the communities you serve, you must understand the steps potential clients will take to learn about, consider, and engage your services.

Today, pet care begins online. When pet parents have a question, they turn to Google first. They get information from websites and blogs and look for advice and recommendations on social networks. They compare the websites of several local vets and read online reviews for multiple providers. If they then feel that your practice is the one best aligned with their needs, they'll schedule an appointment.

Although it is crucial that your practice support every step along this path, you must focus on the first one, the Google search. Most small animal clinics offer more than 50 different services and care for a variety of species. Pet owners have many questions about every single one of your services. As an expert in search engine optimization, I can tell you that there are dozens to hundreds of specific questions and phrases people type into Google every month about the services veterinarians provide. Many topics get millions of searches per month, and Google has built its algorithms to give preference to answers from veterinary websites. The catch is that to show up at the top of Google search results, your website must offer the information people are looking for.

As a veterinarian, you answer pet care questions every day during your entire career. If you take the time to answer them once on your website, you will begin meeting the needs of today's pet parents. The key is doing this for every type of pet, stage of life, and service you offer. Do this, and you ensure that the language and imagery you use are designed to connect with the sensibility of your intended audience. You will find your practice attracting all the right people (and pets) from all the right places, giving you a well-diversified, yet perfectly targeted, client base.

It's important to remember that you can't be all things to all people. However, that doesn't mean that you can't serve a diverse client base.

melita/ Adobe stock

PulseVet®

Advancing Veterinary Shock Wave Therapy Through Evidence-Based Medicine

Over 15 YEARS of Unmatched and Ongoing Clinical Research

Sedation-free, noninvasive healing for your patients.

Canine Treatment Areas

The PulseVet® shock wave technology has been clinically proven to enhance the quality and speed of healing in various musculoskeletal indications, such as:

- Ligaments • Tendons
- Osteoarthritis • Lick Granulomas
- LS Disease • Non-Union Fractures

SCAN ME

To learn more about the PulseVet system or set up a demo, call or click

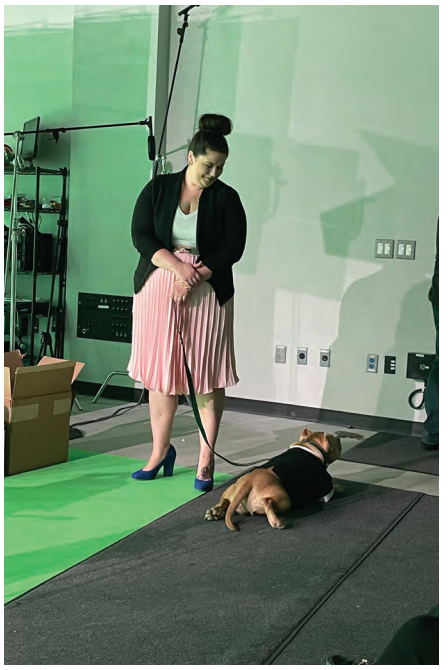
Zomedica.com/pulsevet | info@zomedica.com | 800.245.4417

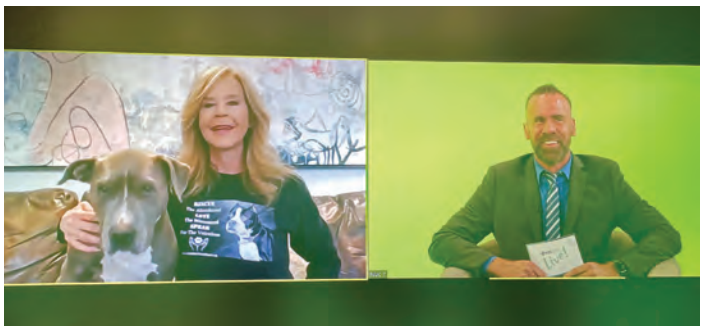
ZOMEDICA®

Putting dermatology *in the limelight*

The first episode of *dvm360® Live!™* explores the frontiers of veterinary dermatology with light therapy for wound healing.

WRITTEN BY BOB ALABURDA, SENIOR EDITOR





Lights. Camera. Action! Chief Veterinary Officer Adam Christman, DVM, MBA, pulled back the curtain on a new talk show for veterinary professionals—*dvm360® Live!™*. This exciting platform launched with an information-packed, fun-filled episode. Julia Miller, DVM, DACVD (and her adorable dog, Geno), joined Christman to discuss the latest technological advances in veterinary dermatology. Later, actress Linda Blair added some star power to the program, sharing her experience as the founder of a nonprofit rescue organization and touching upon her work in *The Exorcist.*

WHAT'S #TRENDING IN VET MED

The first episode of *dvm360® Live!™* kicked off with a look at the latest veterinary news, trends, and hot topics. Christman led with the results of a survey commissioned by the Human Animal Bond Research Institute (HABRI) and Zoetis that showed the human-animal bond is strong globally, that pets have a positive impact on their owners' health, and that stronger bonds are linked to improved veterinary care around the world.[1]

He then announced that a record-breaking number of veterinary school applications were submitted for the 2021-2022 school year, a positive sign for those concerned about the current shortage of veterinary workers.[2] At least one hospital network in Brooklyn, New York, commented that they are seeing an uptick in staffing,[3] and Christman told vet students, "If you're tuning in, get in here; we need you. We definitely need you."

SKIN IN THE GAME

Afterward, Christman introduced the episode's featured guest, Julia Miller, DVM, DACVD, who shared her unique path to becoming a board-certified dermatologist and the origin of her passion for the specialty.

"Dermatology is quite literally in my DNA," said Miller, whose father is also a veterinary dermatologist. "I'm really into...long-term case management...client communication, [and] you get to build off that. I always tell everybody [that] dermatologists are...like cooks and not bakers and that I don't necessarily have a formula to follow. I do a dash of this, a dash of that, [and] put it all together. It's different for every dog, and I really like that."

Miller also stressed the value of general practitioners leaning on dermatologists when they have difficult dermatologic cases: "You should throw in the towel and send it to me because you know you're busy...I understand that you might have a [cesarean delivery] and a parvo puppy and 3 diabetic dachshunds...and all sorts of other things that are happening during your day. So the fact that you're not an expert on immunotherapy for an allergic dog [is] totally understandable. You have a lot on your plate, so I think one of the big things is to use us dermatologists and use us early. Don't wait 5 years when the ship has already sailed...Encourage your clients to understand the benefit of the dermatologist."

HIT THE LIGHTS

In the following segment, Miller dove deeper into the topic, discussing some of the technological advances she is seeing. "Insect bite hypersensitivity is really big deal with horses, and they're coming out with a vaccine [anti-interleukin-5 (IL-5)]. There's some really nice epidermal barrier work that's being done...new topicals, sprays, and pour-ons that work great," she said, adding that "there's always some really cool stuff on the verge in dermatology because, you know, we're always trying to improve what we do and I'm really excited by anything new that comes out."

For instance, Phovia by Vetoquinol uses an LED lamp and chromophore gel to produce multiwavelength fluorescent light that can penetrate the skin to variable depths, she explained, going on to describe the product's indications and benefits and how associates and technicians can apply it in practice.

Exhibiting the handheld device, Miller explained, "This emits an LED light. You cover the patient's skin with a chromophore ointment, and this is what actually gets stimulated by the light. This will emit photoactive photons, and essentially what that does is it stimulates the mitochondria by increasing ATP [adenosine triphosphate], and that has a whole host of awesome [effects]. It's anti-inflammatory; it helps with angiogenesis; it's actually antimicrobial. So, there's a whole lot of different things that this can do, a lot of power in this little container."

In terms of indications, Miller said that Phovia can be used for perianal fistulas, interdigital furunculosis, deep pyoderma, and otitis externa (with an add-on tool). She also mentioned its use for postoperative surgical cases, saying, "I'm excited to use it for nonhealing wounds, for example. I think there's a lot of applications in the veterinary world that this one piece of equipment can actually serve."

One of Phovia's most valuable features for Miller is that it is pain-free: "I've had some wild dogs who you just give them a hug, you pet them, you can use the light therapy [for] 2 minutes, [and] feed them a couple of treats. [It is] very, very user-friendly, and my clients have actually really been excited about it."

Miller also explained the treatment process: "It is super easy the way we do it. [What] works out the best for my clients, because they come from a little further away, is I'll actually do 2 light cycles at once. I do the two-minute light cycle; we wipe off the gel with some saline, reapply another layer of that gel and then do another 2-minute cycle. So that's...how I've had the best chance of success with it. You can certainly spread out the treatments and do them 2 times a week instead." Both Christman and Miller commented that, with training, this procedure can be performed by technicians and assistants, freeing up valuable clinician time.

> "**There's always some really cool stuff on the verge** in dermatology because we're always trying to improve what we do, and I'm really excited for anything new that comes out."
>
> ***—Julia E. Miller, DVM, DACVD***

TO THE RESCUE

Episode 1 of *dvm360® Live!™* wrapped up with an interview with Linda Blair, best known for her Oscar-nominated role as Regan MacNeil in the 1973 horror film classic *The Exorcist.* These days, she prefers to be known for her role as the founder of the Linda Blair WorldHeart Foundation, an organization dedicated to the rescue and rehabilitation of abused and neglected animals.

Blair explained how she entered the rescue world: "In the '90s, one of the dogs I traveled with passed away from a double stroke...and then my mom died. And then a year later, my other dog died, and I was in a really bad place...I started walking to shelters and saving dogs from there. Then a big [pit bull] followed me home and changed my life forever. His name was Sonny Boy. I believe, really, all the work and my commitment to rescuing is because he helped me get through [the loss of my mother]."

In 2003, she founded the Linda Blair WorldHeart Foundation in California, which not only operates as a rescue facility, but also advocates for education on such important issues as pet overpopulation and dog fighting and lobbies against breed-specific bans. ◎

REFERENCES

1. New research confirms the strong bond between people and pets is a global phenomenon, 95% worldwide say pets are family. News release. HABRI and Zoetis. January 16, 2022.
2. Another solid increase in veterinary medical school applicants for 2021. News release. American Association of Veterinary Medical Colleges. October 14, 2021. Accessed May 2, 2022. https://www.aavmc.org/news/another-solid-increase-in-veterinary-medical-school-applicants-for-2021/
3. Brooklyn Animal Hospital sees staffing, workload improvements following record-breaking applications to veterinary schools amid worker shortage. News release. Veterinary Emergency & Referral Group. February 8, 2022.

JULIA E. MILLER, DVM, DACVD

A board-certified dermatologist, Julia Miller graduated from Cornell's College of Veterinary Medicine. After completing a large animal medicine and surgery internship at the University of Georgia, she went on to a mixed animal practice and later to a high-volume, high-quality surgery center before returning to her true love, dermatology. She completed a dermatology residency at Cornell and stayed on as a faculty member.

LINDA BLAIR

An Oscar-nominated actress known for her role in *The Exorcist*, Blair is the founder of the Linda Blair WorldHeart Foundation, a nonprofit organization that rehabilitates and rehomes abused and abandoned animals.

Post redesign of Lincoln Square-Veterinary Hospital

Richard Fried, VMD

Nate Berkus redesigns an NYC animal hospital *in collaboration with* Amex and Dell

The enhanced interior and technical infrastructure of Lincoln Square Veterinary Hospital provide a better client, patient, and staff experience

written by **Julia Burke, Assistant Editor**

Richard Fried, VMD, (left) and Nate Berkus (right)

Lincoln Square-Veterinary Hospital before redesign

American Express and Dell Technologies

Designer and HGTV personality Nate Berkus, founder of Nate Berkus Interiors, recently collaborated with American Express and Dell Technologies to renovate Lincoln Square Veterinary Hospital, a small clinic in New York, New York. Its waiting area was reimagined and its technology upgraded.

"I've always believed in the power of design, and the Lincoln Square Veterinary Hospital has always had an amazing reputation, with clientele and staff that have been there for years," Berkus commented in a press release from American Express.[1]

"To create an environment that inspires the staff and makes both long-term and new clients feel welcome, it was important to translate the personality of the business while understanding that... small businesses need to consider the internal... systems they use to support growth and expansion," he added.

The redesign also came at a time when Lincoln Square Veterinary Hospital—like many other such clinics—had been suffering from such repercussions of the COVID-19 pandemic as staff shortages and a higher influx of patients.

When updating the reception area, Berkus' team incorporated modern, chestnut-colored seating with plush decorative pillows for pets and their owners. They also adorned the space with plants in vases and creative murals depicting the furry patients that visit the practice.

"There's something that just feels... much more personal and much more energized about [the waiting area,] and I'm excited for you to start welcoming everybody back," Berkus said in an American Express video.[1]

Clinic owner and medical director Richard Fried, VMD, was pleased with the redesign.

"This is beautiful... it's so warm and inviting. In the 22 years since we've been open, I've never seen it look so good," he said in the video. "Talking about it, it all sounded good, the mock-ups looked good, but seeing it, it's really phenomenal.... Everybody will be really invigorated to have such a welcoming space, and I know all the clients are going to love it."

A tech specialist from Dell Technologies also consulted with Fried about the systems in place and the problem areas so they could determine what measures needed to be implemented. They developed a plan to incorporate a system enabling seamless tasks, and the company provided Lincoln Square Veterinary Hospital with the latest in monitors, desktop computers, and printers. According to Fried, now when patients enter the exam rooms, their records, lab work, and x-rays are right in front of him and easily accessible.

"Through the redesign, we're able to make connections with our patients in a warm and welcoming space," said Fried, in the press release.[1] "With the new technology, we can seamlessly, securely, and reliably manage our data-heavy workflow and medical and financial record keeping. Simply put, we can better serve our ever-increasing client base and the community at large."

REFERENCE

1. Nate Berkus teams up with American Express and Dell Technologies to reimagine small business design. News release. American Express. March 23, 2022. Accessed May 12, 2022. https://about.americanexpress.com/newsroom/press-releases/news-details/2022/Nate-Berkus-Teams-Up-with-American-Express-and-Dell-Technologies-to-Reimagine-Small-Business-Design/default.aspx

Leadership training, part 1 of 3: take your team higher

Follow these steps to improve team cohesion, well-being, and efficiency

Over the years, I have led, been part of, or observed teams that have succeeded and failed, and through these experiences, I have discovered a few approaches that leaders often use to get the most out of their teams. In the next few paragraphs, I will discuss how to take your team higher.

HIRING

The first step in creating a great team is to fill your positions with the right candidates. In many cases, this means interviewing numerous individuals to hire the right one. In others, it can mean identifying the experts or people who are ready for growth within your practice. Either way, it's important to talk to these candidates to understand their skills, personalities, and career goals. It's also a good idea to reach out to their coworkers and leaders to understand how they perform. Remember, you're looking for teammates who bring knowledge and a desire to succeed to the group and match its social dynamic.

INSTRUCTION

Part of being a leader is being a teacher to your team. Even if you have filled your team with experts rather than growth candidates, you will need to instruct them on your function, program, or processes. There are always aspects that are unique to your team, and ensuring you communicate this to new employees is fundamental to success.

Instruction can also be broader and more basic if you have team members who are looking to grow within the organization. In that instance, you'll need to guide them and teach them a bit more about the fundamentals of their new role. Although the amount of time this entails can be intimidating, I am happy to say that I have found some of my best team members this way. Most important, leverage your network and the rest of the team. If you connect your team member with experts you know and trust, they can help you and enhance the training.

GOALS

Now that you've gathered your team and started them on an educational path, it's time to set goals. Teams will fall apart if they don't know what they're working toward. Without guidance, they will be running in different directions and doing tasks that undermine each other, a bit like a soccer team that doesn't know which goal is theirs. Well-defined goals circumvent this problem. A good way to verify that your goals work is to check whether they are SMART: specific, measurable, achievable, relevant, and time-bound.

ACCOUNTABILITY

Accountability is important for you and for your team. This means meeting deadlines and communicating about obstacles that may result in delays. It does not mean screaming over every mistake or missed target time. When errors occur, and they will, identify the root cause. Do not engage in a blame game, but do look for ways to address the situation. It is important for the person who made the mistake to understand it and be involved in correcting it, but it is more important to move forward. Dwelling on errors or pointing fingers won't erase mistakes; it will merely make the team scared, and their fear can stop their progress.

EMPOWERMENT

After you have assembled a team of accountable experts comes the most important—and difficult—part: empowering them. Again, you are not an expert in every field; that is why you've surrounded yourself with those who are. You cannot possibly understand every detail or make every decision. Give your team the power to decide and act within their area of responsibility. Show them you trust them by supporting their choices and actions. Will everything they do be perfect? No, but that is why you hold each other accountable.

Now is when your team's ability to get things done, to impact and inspire, begins to take shape. Unfortunately, it is also the time when many leaders begin to fall apart. They feel that it is their responsibility to question every decision and approve every action. Avoid this at all costs: It causes productivity to grind to a halt. Trust begins to crumble, and resentment creeps in. Don't forget the steps you took to get here and stay focused. Believe in your team and, in turn, they will believe in you.

RELIANCE

You have built a council of trusted advisers. So when you are presented with challenges or difficult decisions, take them to your council. Ask for their thoughts, concerns, and advice. Make sure you understand the implications, consequences, and benefits of their advice. Collect all the information, and make a well-rounded, intelligent decision. If you don't know, turn a problem or question over to your teammate(s). Answering a question incorrectly undermines your credibility far more than letting someone else answer. Even saying "I don't know but I will find out" can be an answer.

These leadership behaviors don't always come naturally, so if you find your team falling apart, come back to this article and hit reset. Pick a step to focus on and keep practicing.

written by

Alyssa Mages, BS, CVT

Alyssa Mages, BS, CVT, is the chief visionary officer of Empowering Veterinary Teams (EVT), where she oversees the content development, clinical skills training, and overall vision of the company. She cofounded EVT to provide training programs, materials, and coaching and learning opportunities for veterinary practices, as well as content development and training directives for veterinary industry service providers. She has 18 years of veterinary experience and has worked in numerous sectors of the industry.

Don't stop trying and don't give up on yourself or your people. Keep going and remember that none of us are in this alone.

havel's®

OVER 40 YEARS
Of Quality and Innovation

Over 40 Years of Quality and Innovation, Now Available to Your Veterinary Practice

Havel's Inc. has a variety of veterinary products for your practice. Our affordable echogenic needles, developed by Hakko Medical for use during Ultrasound Guided Procedures, use Corner Cube Reflectors (CCR) or Micro Laser Etching (MLE) to reflect sound waves back to the transducer to illuminate the needle and improve success rates. Havel's also has a large selection of quality surgical blades and sutures at competitive prices. Please call today for your free samples.

Get a free sample today:

John Barrett
1-800-638-4770, ext. 13
jbarrett@havels.com

Preventive medicine *for* miniature pet pigs

Experts describe care of this increasingly popular pet

Miniature pet pigs have an average life expectancy of 15 to 18 years but can live as long as 20 to 25 years. Boars reach puberty at 3 months and gilts at 3.5 to 4 months. Their estrous cycle averages 21 days (17-25 days).

Table 1. Biological and Physiological Data of Adult Miniature Pigs

Parameter	Value
Respiratory rate	13-18 beats per minute
Heart rate	70-80 bpm
Rectal temperature	99.7-102.2 °F
Weight	75-200 lb (34-91 kg)
Gestation length	112-116 days
Litter size	2-15 piglets

Adapted from Carpenter JW. *Exotic Animal Formulary*. 5th ed. Elsevier Health Sciences; 2018.

VACCINATION

The vaccination of pet pigs is a controversial topic. Whereas there are standardized vaccination protocols for food-producing pig populations, no such protocols exist for pet pigs. Different authors recommend different vaccines, and recommendations depend on the region where the patient lives (exposure risk), the number of pigs in a household, exposure to wildlife, and whether it is kept indoors or allowed outdoors. Deciding what to recommend to clients can therefore be challenging.

In addition to the lack of standardized vaccination protocols, there is also the use of off-label vaccines, such as those for rabies. Rabies is extremely rare in pigs in the United States but has been reported in miniature pigs kept as pets.

If you choose to vaccinate pig patients against rabies, use inactivated vaccines. These vaccines have not been scientifically evaluated in pet pigs, and their efficacy cannot be guaranteed. State or local public health authorities should always be contacted for guidance in case exposure has occurred. For more information about endemic areas and risk of exposure, refer to the CDC website.

Table 2. Suggested Miniature Pet Pig Vaccination

Vaccine	Time
Erysipelas	8-12 weeks of age, repeat in 3-4 weeks; semiannual or annual booster
Leptospirosis	8-12 weeks of age, repeat in 3-4 weeks; semiannual or annual booster
Rabies (off-label but recommended if there is a risk of exposure)	14-16 weeks of age; annual booster

ANTHELMINTIC TREATMENT

As part of a preventive medicine plan, it is important to perform regular fecal tests (every 6-12 months) and administer anthelmintic treatments as needed.

HOOF AND TOOTH CARE

Pigs have a diphyodont, heterodont, and brachydont dentition. Their decidual dental formula is 2(i 3/3, c 1/1, p 3/3), and their permanent dental formula is 2(I 3/3, C 1/1, P 4/4, M 3/3). However, it is important to note that male canine teeth (tusks) are aradicular, hypsodont, and elodont. Because they will grow throughout the animal's life, they may become very long and sharp, potentially damaging the adjacent soft tissue and even inflicting injury to owners or other pets. Tusk removal is not recommended; instead, tusk trimming can be performed as needed, usually at 6- to 12-month intervals.

The procedure requires sedation or anesthesia. The cutting blade of a rotary tool or a high-speed dental tool can be used. Always trim perpendicular to tusk growth, not parallel with the gingival margin. The use of a tongue depressor behind the tusk to be trimmed is recommended to protect surrounding soft-tissue structures. To avoid the pulp cavity, it is crucial that the tusks be trimmed 3 to 4 cm above the gingival margin. The use of a rotary tool's sanding stone is also recommended to round out the edges.[1] Neither cutters nor other crushers should be used because they can lead to fractures.[2] Potential complications include damage >>

Written by

Laila Proença, DVM, MV, PhD, MSc, DACZM

Founder and CEO of VETAHEAD, Proença has always been passionate about veterinary medicine. She is the first South American to become a diplomate of the American College of Zoological Medicine, with an emphasis on zoological companion animals. She is the coeditor of the 2015 Exotic Endoscopy issue of *Veterinary Clinics of North America* and has been actively participating in the zoological medicine community, leading wet labs and giving national and international lectures, courses (including on endoscopy), and masterclasses.

Written by

Clarissa Machado de Carvalho, MV, MSc

VETAHEAD's manager of operations, Carvalho completed a residency in zoological medicine and a master's in animal sciences, with an emphasis on veterinary ophthalmology, at the University of Brasília, in Brazil. She is currently developing research on maned wolves and other wild carnivores as an associate researcher of the nonprofit organization Jaguaracambé.

NEW BODY, NEW DIET.

After a spay or neuter procedure, dogs and cats experience hormonal changes that increase appetite and decrease metabolism.

VETERINARY HPM® Spay & Neuter Diets are designed to optimize the health and wellness of spayed and neutered pets in all life stages.

- Enriched with fiber to aid in satiety
- High protein formula helps support metabolism
- Promotes healthy muscles

Scan here to learn more about VETERINARY HPM Spay & Neuter Diets

VETERINARY HPM®

TAILORED NUTRITION FOR SPAYED & NEUTERED PETS

Virbac Shaping the future of animal health

to the adjacent soft tissue, abnormal growth pattern of the teeth, root abscess after short trims, and pain.[3] A complete oral examination can be performed at the same time, with any dental problems addressed as needed.

Overgrown hooves also need to be trimmed. The frequency with which this is done will depend on the surface on which the pig is kept, and sedation will likely be necessary. A good strategy is to advise owners to train pets to allow their feet to be manipulated because some well-trained pigs will accept conscious hoof trimming.

Trimming, including of the dewclaw, can be performed with small hoof trimmers or rotary tools, and afterward they can be made smooth and shaped with a sanding disc.[1] The hoof vasculature can extend into the hoof wall of extremely overgrown hooves, so it's important to be familiar with the procedure and stop before reaching the vasculature.[1]

ELECTIVE SPAYS

Although uterine smooth muscle neoplasms are uncommon in most domestic mammals, they are highly prevalent in potbellied pigs. Because these pigs are rarely or never bred and typically have a lifespan of 10 to 15 years, continuous long-term ovarian cycling may predispose the animals to estrogen-responsive neoplasms.

A retrospective study evaluating spontaneously occurring uterine tumors in potbellied pigs found uterine neoplasia in 17 of 106 (16%) females. Uterine leiomyoma was diagnosed in 11 cases, leiomyosarcoma in 1, and undifferentiated sarcoma in 1.[4]

In another study, the uteri of 32 miniature pet pigs that underwent ovariohysterectomy (OVH) at 4 months to 19 years were submitted for gross and histologic evaluation. Fourteen pigs (43.7%) aged 5 to 19 years had smooth muscle tumors in the uterus or broad ligament. Neoplastic cells had strong expressions of estrogen and progesterone receptors.[5] A second retrospective study showed that 34 of 298 (11.4%) potbellied pigs presented with uterine neoplasia, with pigs aged at least 6 years more likely to present with uterine lesions.[6]

kobeza/ Adobe stock

A retrospective study conducted on 108 animals of the Suidae and Tayassuidae families kept in a zoo, including Vietnamese potbellied pigs and domestic cross pigs, found that 32 (30%) had leiomyoma, 4 (4%) had leiomyosarcoma, and 13 (12%) had endometrial carcinoma.[7] The Vietnamese pot-bellied pig was among 3 species in the study with the greatest diversity of uterine lesions and the highest prevalence of reproductive tract lesions.[7]

In all studies, leiomyoma and leiomyosarcoma were the most common uterine neoplasia. Additional studies are necessary to elucidate the role of estrogen and progesterone in the development of uterine lesions in miniature pet pigs.

Early spaying should be recommended to prevent these tumors and other lesions in female miniature pigs. There are no studies evaluating or comparing the long-term benefits or consequences of ovariectomy (OVE) versus OVH in these animals. In canines, however, it has been shown that there is no increased risk for uterine pathology in bitches spayed by OVE versus OVH.[8] Because cystic endometrial hyperplasia, pyometra, and benign tumors are all hormone-dependent, their development can be prevented by OVE and OVH.

A retrospective study evaluating OVE by electrothermal bipolar vessel sealing and OVH by hand-tied ligatures in pet pigs found OVE to be the superior technique.[9] Compared to the OVH group, the pigs undergoing OVE had reduced morbidity, with rapid resumption of normal appetite and activity levels. Furthermore, complications like substantial hemorrhage were encountered only in the OVH group. The sealing device in the OVE group was an invaluable tool for controlling hemorrhage, especially given the tortuous nature of the female porcine reproductive system. Reduced anesthetic and surgical time, shorter incision length, and decreased tissue handling leading to decreased postoperative morbidity are significant benefits of OVE.

Currently, there are insufficient data to determine significant long-term benefits or consequences of OVE in pigs. Because studies show that uterine lesions occur only in older female pet pigs,[4,5] and extrapolating from canine studies, OVE may be a safe alternative to OVH in young female pet pigs. However, OVH should be considered in older females, and the organ should be submitted for histopathologic evaluation.

POTENTIAL ZOONOTIC DISEASES

Pet pigs can carry many pathologic agents, and some have zoonotic potential. They include rabies, tuberculosis, ectoparasites, balantidiasis, giardiasis, *Erysipelothrix* species, influenza, *Streptococcus* group D, *Ascaris suum*, leptospirosis, and brucellosis.

REPORTABLE DISEASES

Any swine reportable disease and/or condition must also be reported if occurring in a pet pig. Consult the code of regulations of your state food and agriculture department for more information about reportable diseases and conditions. Additional information can be found at the US Department of Agriculture website.

PROHIBITED DRUGS

Despite being kept as pets, pigs are still considered food-producing animals. Consequently, when prescribing medications, care must be taken to avoid drugs that are prohibited in such animals. Some prohibited drugs include chloramphenicol; clenbuterol; diethylstilbestrol; dimetridazole; ipronidazole and other nitroimidazoles; furazolidone; nitrofurazone; fluoroquinolones; glycopeptides; and cephalosporins (except cephapirin). For detailed current information, consult the FDA and Food Animal Residue Avoidance Databank websites.

REFERENCES

1. Tynes VV. Potbellied pig husbandry and nutrition. *Vet Clin North Am Exot Anim Pract*. 1999;2(1):193-208. doi:10.1016/s1094-9194(17)30147-0
2. Becker HN. Surgical procedures in miniature pet pigs. In: Reeves DE, ed. *Care and Management of Miniature Pet Pigs: Guidelines for the Veterinary Practitioner*. Veterinary Practice Pub. Co; 1993:67-76.
3. Asseo L. Tusk trims in miniature pigs. LafeberVet. August 4, 2020. Accessed May 10, 2022. https://lafeber.com/vet/tusk-trims-in-miniature-pigs/
4. Mozzachio K, Linder K, Dixon D. Uterine smooth muscle tumors in potbellied pigs (Sus scrofa) resemble human fibroids: a potential animal model. *Toxicol Pathol*. 2004;32(4):402-407. doi:10.1080/01926230490440880
5. Ilha MRS, Newman SJ, van Amstel S, et al. Uterine lesions in 32 female miniature pet pigs. *Vet Pathol*. 2010;47(6):1071-1075. doi:10.1177/0300985810382522
6. Cypher E, Videla R, Pierce R, et al. Clinical prevalence and associated intraoperative surgical complications of reproductive tract lesions in pot-bellied pigs undergoing ovariohysterectomy: 298 cases (2006-2016). *Vet Rec*. 2017;181(25):685. doi:10.1136/vr.104294
7. Goblet CC, Moresco A, Garner MM, et al. Retrospective characterization of reproductive tract lesions in relation to age, parity, and contraception in captive suidae and tayassuidae. *Theriogenology*. 2019;127:137-144. doi:10.1016/j.theriogenology.2019.01.012
8. DeTora M, McCarthy RJ. Ovariohysterectomy versus ovariectomy for elective sterilization of female dogs and cats: is removal of the uterus necessary? *J Am Vet Med Assoc*. 2011;239(11):1409-1412. doi:10.2460/javma.239.11.1409
9. Biedrzycki A, Brounts SH. A less invasive technique for spaying pet pigs. *Vet Surg*. 2013;42(3):346-352. doi:10.1111/j.1532-950X.2012.01084.x

nutramax LABORATORIES VETERINARY SCIENCES, INC.

#1 VETERINARIAN RECOMMENDED SUPPLEMENT COMPANY*

WELACTIN®

OMEGA-3 SUPPLEMENT

For Dogs

#1 VETERINARIAN RECOMMENDED OMEGA-3 SUPPLEMENT BRAND*

OMEGA 3'S
SKIN & COAT HEALTH

SOURCED FROM WILD-CAUGHT COLD-WATER FISH

BETA GLUCANS
IMMUNE SYSTEM HEALTH

MULTIVITAMINS
OVERALL HEALTH

NEW
SOFT CHEWS FOR DAILY USE

Order now from your Nutramax representative, authorized distributor, or visit vet-ez-order.com.
Visit **www.welactin.com**

★ Survey conducted among small animal veterinarians who recommended omega-3 supplements
*Source: Survey conducted among small animal veterinarians who recommended animal supplements.

010.1472.00

Products+Services360

The latest products and innovative technology in veterinary medicine

FELINE CALMING PROBIOTIC SUPPLEMENT, CBD PET SHAMPOO, VIRTUAL TELEHEALTH TRAINING PROGRAM

Purina Pro Plan Veterinary Supplements Calming Care for Felines

These supplements contain a strain of beneficial bacteria to help pets stay calm and cope with changes in routine and location while promoting positive behaviors, including playing and seeking out social contact. It also helps reduce the sneezing associated with the herpes virus in cats and supports a healthy immune system. Comes with 45 sachets.

proplanveterinarydiets.ca/consumer/products/calming-care-feline-probiotic-supplement

CBD Living Pet Shampoo

CBD Living Pet Shampoo uses natural ingredients and a 250-mg dose of broad-spectrum CBD. Its proprietary skin retention technology enables nutrients to penetrate skin layers and remain on the skin longer, providing long-term relief. It is 100% cruelty-free, non-GMO, soy-free, pH balanced, THC-free, and made in the USA. It uses 100% organic hemp sourced from state-licensed farms in Oregon and Colorado.

cbdliving.com/products/cbd-living-pet-shampoo-250mg

Veterinary Team Telehealth Career Certificate Program

This online Veterinary Team Telehealth Career Certificate Program offers veterinary technicians, assistants, and administrators the opportunity to develop telemedicine skills. It provides insight on best practices for tele-triage, evaluating and addressing emergencies, and navigating state laws and regulations surrounding telehealth. The self-paced program can be completed in as little as 1 month.

pennfoster.edu/programs/veterinary/veterinary-telehealth-certificate

SUSTAINABLE PET PRODUCT COMPANY, NATURAL DOG TREAT LINE, DOG WEIGHT LOSS SUPPLEMENTS

Anipal

Anipal is an veterinarian-founded Australian company that recycles postconsumer plastic bottles into pet products. It offers tasty, nutritious, carbon-positive treats, including hypoallergenic seaweed and insect protein, and a line of recycled plastic collars and leashes that honor threatened Australian species. Proceeds go toward supporting threatened species projects.

anipal.com.au

Good Dog by Wellness

The Good Dog by Wellness line targets canine health and specific training needs. All are formulated with premium natural ingredients to offer functional benefits and support good behavior. Available in 3 varieties to meet unique needs: Happy Puppy, Training Rewards, and Tender Toppers.

gooddogbywellness.com/products

SlimPaws Weight Loss Soft Chews

With a special active ingredient that inhibits the conversion of food to fat, these weight loss soft chews have been clinically proven to decrease canine body fat. The proprietary Fat Fighter Blend reduces fat buildup, supports lean muscle mass, improves metabolism, burns fat, and enhances glucose distribution. For dogs of all sizes and available in a 60-count container.

myslimpaws.com/products/slimpaws-weight-loss-supplements-for-dogs

fetch

dvm360® CONFERENCE

@dvm360

the future of veterinary medicine starts in Kansas City!

Join us live and in person for actionable education, endless inspiration and FUN!

- 40+ Educational tracks
- 53 Thought leaders nationwide
- 160+ Hours of RACE-approved continuing education credit hours
- 100+ Exhibitors

Register before July 11 and save BIG with early bird pricing!

Scan QR code or register now at fetchdvm360.com

AUG. 26-28, 2022 | Kansas City, MO

Medical World News®

A first-of-its-kind 24-hour online program for health care professionals, by health care professionals

firstline
The best read veterinary team journal.

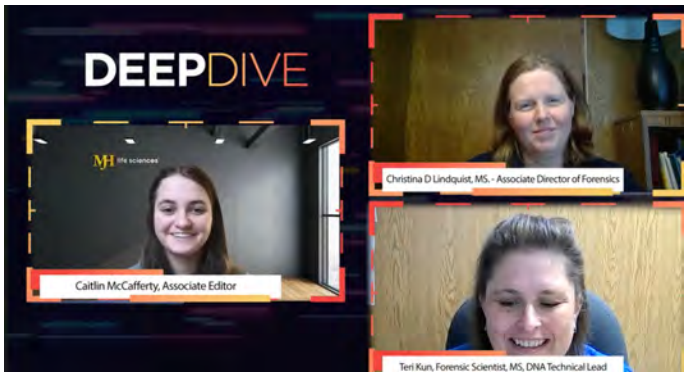
dvm360® on Medical World News®

As the latest season ends and season 7 approaches, here are some highlights from our video programs

Written by **Caitlin McCafferty, Associate Editor**

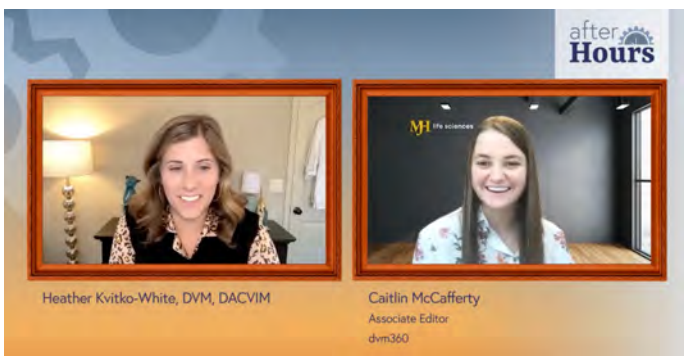
WELLBEING CHECKUP™: TOXIC WORK ENVIRONMENTS AND MENTAL WELL-BEING

In this episode of *Wellbeing Checkup*™, *dvm360*®'s Assistant Editor Julia Burke was joined by Bridget Rollins, vice president of operations at Thrive Pet Healthcare, to discuss her dissertation on the high rates of suicide in veterinary medicine. Rollins also explains the impact toxic workplaces have on the mental health of veterinary professionals.



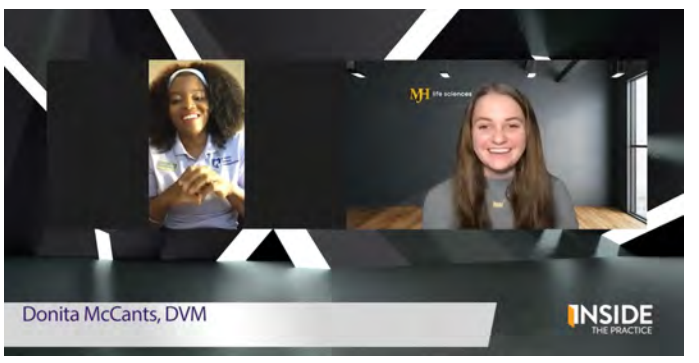
DEEP DIVE™: VETERINARY GENETICS TESTING

This episode of *Deep Dive*™ takes a look at the Veterinary Genetics Testing lab at the University of California, Davis, as 2 members of the lab team explain how they discovered what happened to pets by solving a murder case via dog feces. This episode will serve as a reminder to always watch where you walk.



AFTER HOURS™: VET ON ICE

Fetch dvm360® conference regular Heather Kvitko-White, DVM, DACVIM, talks about her love of figure skating and how it led her to play in a recreational hockey league.



INSIDE THE PRACTICE™: INSIDE A VETERINARY CLINIC ON WHEELS

On this episode of *Inside the Practice*™, Donita McCants, DVM, sat down with dvm360® to discuss her veterinary clinic on wheels, Dr Donita's Veterinary Concierge Services. Donita explores how she came to open this unique clinic and the benefits she is noticing it to have on her patients and their owners.

All veterinary professionals possess specialized knowledge or a skill that enables them to perform their daily jobs. Be it through news of medical advances, advice on promoting a better culture at the clinic, or tips on relaxation, Medical World News® stories give viewers the chance to learn and laugh as they get to know colleagues outside their practice.

For your viewing pleasure, we share some of the stories from this season of Medical World News®.

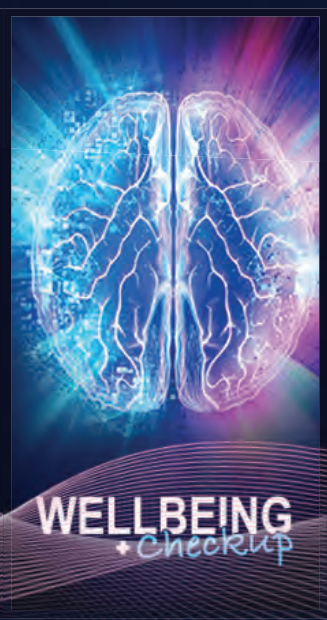
Go to the programs

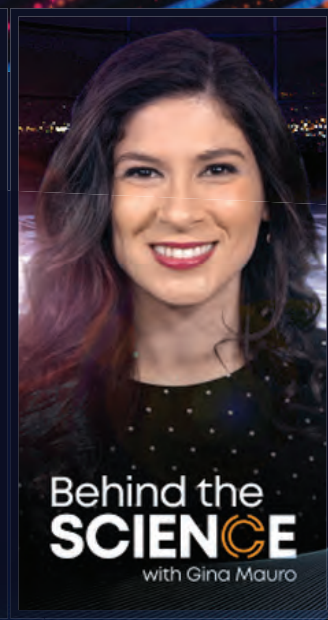
Scan the QR code

dvm360® website

Medical World News®

powered by MJH life sciences®





A 24-hour streaming program

For Health Care Professionals, By Health Care Professionals

Streaming the new season now!

www.medicalworldnews.com

Steve Dale, CABC

"*Hello, I Must Be Going*": Groucho joins the family

The purportedly hypoallergenic Devon rex breed is known for being trainable and mischievous

I was about to name our 14-week-old kitten Barney Fife, but my wife, Robin, said, "I can only think about that purple dinosaur, and our cat isn't purple." In fact, this Devon rex kitten is a rare seal point with a mustache, and a funny-looking moustache at that. I needed a better name.

Groucho Marx, of course!

As the philosophical comedian once said, "If a black cat crosses your path, it signifies that the animal is going somewhere."

I'm a fan of the Marx brothers—I even own a bow tie once owned by Groucho.

Groucho famously loved dogs, although I'm not sure how he felt about cats. He once said, "Cats are like many of the women in my life; you never know what they're thinking. And if you did know, you'd be better off not knowing."

Roxy, our 19-year-old Devon rex, died just 3 weeks before we picked up Groucho. When Roxy passed away, the hole in my heart was more like a crater. Although Lap of Love made the ending gentle, I was broken. We've all been there. Working in the profession doesn't make loss any less hurtful.

My wife and I have had Devon rex cats in the past. Ricky was a famous cat in his day. He played the piano and loved going out into the world to perform recitals. Back before YouTube, training a cat was unheard of. Ricky became a TV star, from *National Geographic Explorer to Pets: Part of the Family* on PBS, and even FOX News. When Ricky died very young of feline hypertrophic cardiomyopathy (HCM), I initiated The Ricky Fund[1] with the Winn Feline Foundation (now EveryCat Health Foundation, a nonprofit organization that helps fund cat health studies) to learn more and ultimately manage HCM. To date, we've raised more than $300,000 and have funded many studies. As a result, a genetic test was created to determine if a gene defect for HCM exists for 2 feline breeds, and more studies are under way.[2]

When Ricky died, we brought another Devon rex, Ringo, into our lives. It's not something I can talk about easily because he died of feline infectious peritonitis as a kitten. We were, of course, heartbroken.

Roxy followed and lived to the ripe old age of 19. But she had lymphoma and severe osteoarthritis. Her quality of life was pretty good, given her age and medical issues, but it was still work to care for her, which we gladly did.

Kittens bring joy, and we were elated that Whiskerbreak, a cattery just outside of Chicago, Illinois, had one available. I had asked around about the breeder and put them through a barrage of questions—but this is what all potential buyers *should* do. Via FaceTime, we saw the cattery before going there in person. It was spotless, the owner doesn't breed the cats often, and his responses to our questions were honest.

My niece, who is allergic to cats, motivated us to originally check out the Devon rex. The breed was created from a spontaneous mutation in Devonshire, England, and is known for its presumed hypoallergenic properties. Devon rex cats do have a single curly coat, not to be confused with the follicly challenged sphynx cat, which has very little hair, or the sleek Cornish rex with a similar coat to the Devon. The 3 are different and distinct breeds. What we know is that although allergies may perhaps be less severe among these breeds (no evidence, solely anecdotal), no breed is truly hypoallergenic.[3]

In fact, humans are allergic to Fel d 1, a protein found primarily in all cats' saliva, as well as in their anal glands, sebaceous glands, skin, and fur. Cats groom themselves, and then when they shed or rub up against a wall or sleep on the sofa, the protein sticks.[4] Purina Pro Plan LiveClear contains an antibody that neutralizes the Fel d 1 protein, which then inhibits the sneezing, wheezing, and other cat allergy discomforts in humans.[5]

Devon rex cats tend to be attached at the hip of their owners. Some will sit on your shoulder and instruct you on how to shave or apply your makeup. They are active, affectionate, and trainable. The Cat Fanciers' Association breed description calls the Devon rex cat "a cross between a cat, a dog, a monkey, and Dennis the Menace."[6]

When we took out the cardboard carrier at the breeder's home, our new cat instantly jumped inside. He purred and perhaps sang to himself that Groucho tune "Hello, I Must Be Going."

Still, I am terrified, paranoid, and nervous. Once you've had a kitten with FIP, you never really get over it. We weigh our little kitty twice daily and watch carefully to ensure he's eating and playing.

When Groucho met our 13-year-old Chihuahua/terrier mix, Hazel, he hissed. Hazel looked the other way as if to say, "What cat? I don't see a cat." He's a confident little dude.

References available online at dvm360.com

Nickolas Titkov_Flickr

engler engineering corporation VETERINARY DENTAL, ANESTHESIA & OXYGEN EQUIPMENT

Download all product details, brochures and more from our support website at:
engler411.com

Wall Mount included Optional Stand Available

Mini Scale-Aire High Speed Dental Air Unit
Easily connects to a regulated nitrogen tank or external compressor

All in one miniature air unit Introductory Price **$2675**

Wall Mount included Optional Stand Available

Our Most affordable High Speed at only **$1385**

Drill-Aire High Speed Dental Air Unit
For Clinics in need of highspeed capability. Includes a highspeed handpiece and Air-Water Syringe

Wall Mount included Optional Stand Available

Very affordable High Speed at only **$1875**

Drill-Aire Plus High Speed Dental Air Unit
Includes a highspeed handpiece, low speed handpiece and Air-Water Syringe

SCALE-AIRE HIGH SPEED
Ultrasonic scaler / Highspeed / Low speed / Air-Water syringe

Our Most Popular High Speed at only **$4995**

Never pay for Oxygen again with one 5L Oxygen concentrator you can run 1 traditional anesthesia machine. Visit www.engler411.com to view all our brochures.

A.D.S. 2000
Electronic positive pressure Anesthesia Machine/Ventilator

Visit our support website for all our brochures, manuals and how to videos www.engler411.com

EZ-Breathe.com
Veterinary Ventilator

Electro-Son Electrosurge Unit
Mono & Bipolar LCD Touch Screen

$1335
5 LPM

EverFlo 5 LPM
Oxygen Concentrator

All Engler Dental Table top units comes with a SIX YEAR WARRANTY & LIFE TIME LOANER SERVICE - Visit our support website for brochures, Manuals, Videos Etc... for complete details

Son-Mate II Ultrasonic Scaler/Polisher
At the touch of the switch, alternate from scaling to polishing plus a variety of other operations. You can perform curettage, deep scaling of heavy calculus and stain removal. Optional drilling & cutting accessories available

Sonas II Ultrasonic Dental Scaler
The Sonus II ultrasonic scaler is a reliable, powerful and rugged unit that has a proven track record. As with all our table top dental units it is supplied with our super 6 year warranty, lifetime loaner service and proudly made in the USA.

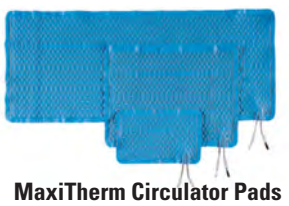
TriMate - Scaler, Polisher & Electrosurgery
A three in one unit that offers a high quality, high powered, fully automated scaler, polisher and general purpose electrosurgery unit. (***An Engler Exclusive!!!***)

Dynax Stretcher & Gurney
The Dynax Gurney is a tubular frame construction with unique connectors creating a means of supporting the Dynax stretcher and the larger canine patient, up to 200 pounds.

The "Original" Cat Grabber
The CAT-GRABBER is the safest means of controlling the fractious cat, humanely.

CIRCULATOR PAD PROTECTION
A washable antimicrobial pouch into which a circulator pad is inserted to prevent punctures or chewing damage. Available in S, M & L.

dynaxusa.com for more information.



MaxiTherm Circulator Pads
Why pay more? Adapts to all circulator warmers. Our pads are less expensive, better quality and will last longer than any other circulator pad. We also offer our Fleece Bags to protect our pads from punctures and provides patient comfort. Engler's innovative products provide more for less $$$.
See www.dynaxusa.com for more details.

Engler Engineering Corp / Dynax

1099 East 47th Street • Hialeah, Florida 33013 USA
Toll Free 800-445-8581 • Tel: 305-688-8581 / Fax: 305-685-7671
Email: info@englerusa.com • dynax@englerusa.com
Web: www.englerusa.com • www.dynaxusa.com
Download Brochures, Manuals, Videos, How to Pages and much more at:
Support website: www.engler411.com

engler engineering corporation
DYNAX

ENGLER ENGINEERING CORP. In Business Since 1964 QUALITY & EXCELLENCE

Proudly made in the U.S.A.

Marc Rosenberg, VMD

Where's the money?

A veterinarian's desire to help a staff member leads to a tough business lesson.

Editor's note: All names and businesses in this dilemma case are fictitious, but the scenario is based on real occurrences.

Dr Lee Rad owned a successful small animal practice, and during his 18-year career he had gained the respect of his clients, staff, and the community at large. He practiced progressive veterinary medicine while striving to maintain personal contact with and be available for clients, pet patients, and employees. The practice had 3 doctors, 6 technicians, 5 receptionists, and an administrator. He was on a first-name basis with his staff, celebrated with them at social events, and counted many of his clients among his friends.

Dr Rad encouraged staff members to speak to him about any assistance they might need, even if it involved a personal issue not related to their job. He felt that gestures of this nature were both decent and a way of cementing loyalty and respect. The assistance in question might involve extended paid leave, help with uncovered medical needs, or a loan, with the understanding that it would be repaid.

Not long ago, a technician asked Dr Rad for a loan of $1500 for an unexpected car repair (the car was essential to her being able to generate income). She said that she could pay him back within a reasonable amount of time. Dr Rad was willing to help; this was an example of the comfort level he had worked to establish with staff members. There was no doubt about the urgency of the request, and it was also clear that the employee intended to repay him. Dr Rad lent her the money, knowing that in the unlikely event that it was not repaid, he could deduct small sums from her salary.

Eight months later, the technician still had not made any attempt at repayment. When Dr Rad asked her about it, she said she didn't have any money to spare. He then mentioned that he would begin to take a small amount from her biweekly paycheck to reduce her obligation.

The technician said that she was working very hard at her job and performing well. He agreed. She apologized and pointed out her financial straits once again. She also said that docking her paycheck without permission was a workforce violation, repeated her intention to eventually repay the debt, and said that if he felt strongly about immediate repayment, a legal response would be her only option. Although he did not show it, Dr Rad was flabbergasted. He told the technician that he understood her position and would think about the issues involved before letting her know his decision.

Dr Rad was annoyed and immediately thought that, indeed, "no good deed goes unpunished." When he calmed down, he realized that the loan his technician had signed said nothing about an exact payback date or collection options. He also did not wish to terminate the technician because she was a skilled worker and such an action would appear punitive. He concluded that this was truly a live-and-learn situation.

As generous as one might choose to be with staff, workplace parameters must not be forgotten. Signed agreements, be they contracts or simple loans, must have specific, mutually agreed upon terms. Finally, where money is concerned, all bets are off. Never approach the subject casually because it is very serious.

malerapaso/iStock

Rosenberg's response

The days of taking an informal approach to running a veterinary practice are gone. Comments like "Just take care of that invoice when you get a chance" or "I will think about giving you a raise a little later this year" or "Would you drop this medication off at Mrs Thompson's on your way home?" can lead to unintended complications. Veterinary medicine has become big business. To avoid a situation like that of Dr Rad, never neglect workplace etiquette, always act in a professional, businesslike manner, and always be aware that, sadly, money changes everything.

Marc Rosenberg, VMD, is director of Voorhees Veterinary Center in Voorhees, New Jersey. Although many of the scenarios Rosenberg describes in his column are based on real-life events, the veterinary practices, doctors, and employees described are fictional.

vetoquinol
ACHIEVE MORE TOGETHER

Acute canine diarrhea: is it time to rethink our treatment approach?

Examining the impact of antibiotic use on the gastrointestinal microbiome

written by

BRETT HARLING, DVM

Harling is an internist, managing partner, and head of the specialty services at Philadelphia Animal Specialty and Emergency (PASE).

NOTEWORTHY NEW RESEARCH BUCKING TRENDS IN TRADITIONAL TREATMENT

Because acute diarrhea is one of the most common concerns for small animal veterinary patients at general, emergency, and specialty hospitals, appropriate diagnostic workup and treatment is key. However, this is often trumped by the client's desire for limited expenditure and a quick fix, and demand for immediate treatment often supersedes acceptance on the part of clients that most cases of uncomplicated acute diarrhea resolve spontaneously.[1] Despite a paucity of evidence supporting use in clinically stable, healthy patients with non-septic acute diarrhea and few studies suggesting potential benefit within this patient subset, a recent study nevertheless identified systemic antimicrobials as the most prescribed pharmaceutical agent.[2-9]

In addition to the mounting evidence that antibiotics provide no significant benefit in terms of shortening duration of clinical signs or hospitalization, we know that their use can lead to adverse gastrointestinal signs and put patients at risk for long-term antimicrobial resistance, further potentiating longstanding ill effects on the intestinal gut microbiota.[8-14] These effects can be wide-ranging, as the gut microbiome not only affects the host metabolism but also interacts with the immune system, protects against potential pathogens, and directly or indirectly affects many physiologic functions.[12,15-18] For these reasons, it is prudent to avoid indiscriminate antibiotic use. Following recent trends in human literature, a paradigm shift in the management of acute uncomplicated diarrhea in dogs may involve interventions to support a healthy intestinal microbiome, including symptomatic management of diarrhea, therapeutic dietary modification, and the use of prebiotics, probiotics, symbiotic therapy (prebiotics and probiotics), and antidiarrheal probiotic pastes (ADPPs) in lieu of strategies involving the administration of antibiotics.

HOW TO DECIDE IF/WHEN TO USE ANTIBIOTICS

In 2018, the Working Group of the Federation of International Societies of Pediatric Gastroenterology, Hepatology and Nutrition (FISPGHAN) published *Universal Recommendations for the Management of Acute Diarrhea in Non-Malnourished Children*, which advised against the routine use of antibiotics for the treatment of acute enteropathy.[19] Despite similarities in the presenting populations, standard approaches in human medicine are geared toward management and prevention of progressive symptoms (without pharmaceutical intervention), while no standardized protocols or official guidelines exist for the management of canine and feline acute diarrhea. This often leads to inconsistencies in treatment recommendations, which are left to the discretion of clinicians, given that the exact etiology of presenting signs is rarely identified and few cases have a disease-specific targeted therapy.

Unfortunately, underlying etiologies causing similar presentations may be complex and include acute intestinal inflammation (gastroenterocolitis), infectious agents (endoparasites, bacteria, fungi, viruses, protozoa), dietary indiscretion, secondary extraintestinal organ dysfunction or inflammation, metabolic disturbances, endocrine diseases, and even patient stress, among many possible causes.[20] As with all patients, obtaining a complete history and performing a thorough physical exam is crucial to ensuring appropriate management. In obtaining history, it is important to confirm that the duration of signs is indeed acute (less than one week long) rather than a flare-up of a more chronic process (of more than 2 weeks in duration), which may influence diagnostic and treatment recommendations. If not identified in a timely manner, life-threatening conditions can present or develop even with acute, sometimes seemingly mild, cases of acute diarrhea. Considering patient signalment, age, weight, current medications, preexisting comorbidities, and hemodynamic stability (hydration status, vital and perfusion parameters) and thoroughly understanding the potential for ongoing losses will significantly impact management.

Screening young, unvaccinated animals that are not receiving monthly heartworm and flea prevention for canine parvovirus and endoparasite infection may be straightforward; however, the decision to begin antibiotic therapy should be guided by targeted diagnostics confirming disease presence and an understanding of the anamnesis and anticipated progression. In confirmed cases of canine and feline parvovirus, antibiotics are unavoidable because of the immunological incompetence derived from viral bone marrow suppression with high risk of intestinal bacterial translocation. Appropriate fecal screening may obviate the prescription of antimicrobials in a stable, parvovirus-negative patient. Such antibiotic stewardship is not only important for improving patient outcomes but remains pivotal for reducing subsequent environmental contamination and potential exposure of the general population to multidrug-resistant, potentially zoonotic pathogens.

BUT OWNERS SAY THEY WANT METRONIDAZOLE/TYLOSIN; WHAT'S THE HARM?

Despite sparse historical evidence that metronidazole may reduce the time it takes for acute diarrhea to resolve in dogs, even the authors of these studies note that most cases of canine

diarrhea resolve in a few days "regardless of treatment." Caution should be raised when owners say, "it worked before, just give me another week," especially if "only one dose" was needed to resolve the signs, as this temporal association could be simply coincidental. In the veterinary field, historical belief in beneficial outcomes may have been grounded in a perception that metronidazole possesses colonic anti-inflammatory properties (due to studies in human patients with Crohn disease) or that clinical signs associated with acute diarrhea or hematochezia increase the likelihood that an infectious process is involved and/or that the intestinal mucosal integrity is lost (increasing the risk of bacteremia).[21] In attempting to rationalize use, an owner's misguided assumption may be that an antibiotic would selectively target enteropathogenic bacteria responsible for causing acute clinical signs, leading to more rapid resolution of clinical signs. Although distressing to owners and clinicians alike, despite the presence of hematochezia, the consensus recommendations are against antibiotic use as no evidence corroborates benefit in cases of acute hemorrhagic diarrhea syndrome (AHDS) without signs of bacterial translocation with subsequent sepsis.[12] On the contrary, it has been demonstrated that administration of antibiotics in dogs presenting with AHDS did not significantly improve severity of clinical signs, fecal consistency, and duration of hospitalization when compared to placebo.[9] In truth, multiple canine and feline studies have demonstrated broad spectrum antibiotics markedly derange the fecal metabolome and reduce its diversity, with modifications persisting up to 4 years reported in human medicine.[11,22-26]

Although it was previously common for antibiotics such as metronidazole and tylosin to be included in an outpatient or inpatient treatment plan, increasing evidence-based research has identified significant short-term and long-term consequences of indiscriminate antibiotic use in both human and small animal patients.[8] This is highlighted by emerging evidence identifying the impact of a short course or even a single-dose of an antibiotic on the entire gut microbiome, which is made up of bacteria, archaea, viruses, and eukaryotic organisms.[12,14,17,24] Adverse clinical effects are believed to be due to the negative effects of antibiotics on these organisms, leading to alterations of the metabolome and opportunistic colonization by pathogenic bacteria.

A robust, diverse microbiome can act as in a pro- and anti-inflammatory capacity, maintaining a delicate balance and preventing excessive inflammation while promptly responding to control opportunistic pathogenic bacterial overgrowth or infections. Many diseases, systemic or localized, impact or are impacted by the gut microbiome, and are associated with dysbiosis (alterations in the composition of the gut microbiota that result in functional changes in the microbial transcriptome, proteome, or metabolome).[27] In a study evaluating the long-term effects of tylosin in healthy dogs, those exposed to the antibiotic exhibited decreased bacterial diversity and fecal dysbiosis, with measurement of dysbiosis index not uniformly resolving post-discontinuation of treatment.[28] In a prospective evaluation of dogs treated with metronidazole for 7-14 days, a minimum 4-week effect of metronidazole on fecal microbiome and metabolome was identified.[24] In fact, despite reducing populations of the potentially pathogenic order Clostridiales (*C. perfringens* and *C. difficile*), reductions in *Clostridium* cluster XIVa, IV, and XVIII, which are important producers of short-chain fatty acids, may reduce innate anti-inflammatory effects through the induction of regulatory T cells in the intestinal cells. Importantly, although previous studies have suggested an association between increased levels of *Clostridium* in the feces of dogs suffering from acute and chronic diarrhea, this does not indicate causation and should not be used to contend that antibiotics be administered.[29]

IF I CAN'T PRESCRIBE AN ANTIBIOTIC, WHAT CAN I USE?

The growing concerns regarding frequent antibiotic use in human and veterinary medicine highlight the trend toward seeking out alternative and/or synergistic strategies to manage acute diarrhea. However, client satisfaction is largely based on their confidence treatment plans will expedite patient recovery; few if any clients will be satisfied without clear expectations or an understanding of the treatment plan. Symptomatic therapies, including motility inhibitors to reduce cramping and urgency, may provide relief to distressed patients and owners seeking rapid resolution of signs, but they can also affect the gut microbiome (albeit less profoundly than antibiotics) and have limited prospective studies clearly identifying indication for use.

With amassing evidence cementing diet as the foundation of health in both human and veterinary patients, it is logical that dietary modification remain the basis of management of acute diarrhea. Given the strong interplay between nutritional intake and microbiota diversity, health, and function, highly digestible (ie, protein digestibility ≥ 87% and fat and carbohydrate digestibility ≥ 90%), low-residue food with moderate levels of fat (< 14% dry matter basis) has been the cornerstone of prescription diets. The addition of small amounts (< 5% DM basis) of soluble fiber (psyllium husks, apple pectin, soy fiber) or mixed solubility fiber (pea fiber, beet pulp) may normalize intestinal motility, improve water balance, and support a more healthy microbiota, whereas fiber higher quantities (7-15% DM basis) can normalize intestinal transit time, add ingestible bulk and retain excess water, buffer enterotoxins, and provide intraluminal stimuli to reestablish the coordinated actions of enzyme delivery, digestion, and absorption.[20]

Probiotics are supplements or foods that contain viable microorganisms with a proven benefit to the host, whereas prebiotics are supplements or foods (often dietary fibers or carbohydrates) that selectively stimulate the growth and/or activity of indigenous microorganisms. The use of probiotics is based on their ability to help reestablish microbial–host balance in the digestive system after disruption of normal function by stress, infection, or medical therapy. In a randomized double-blind clinical trial, dogs presenting with acute diarrhea achieved acceptable fecal consistency after 3.5 ± 2.2 days when receiving probiotic, 4.6 ± 2.4 days with oral metronidazole, and 4.8 ± 2.9 days with placebo (no statistically significant differences).[8] Even without colonizing the intestine, bacteria administered with probiotics can modify intestinal microbiota composition and metabolism, conveying beneficial effects via counteraction of dysbiosis. In a study performed in dogs with acute uncomplicated idiopathic diarrhea, probiotic administration (*Bifidobacterium animalis* strain AHC7) allowed for a shorter resolution time and a lower proportion of patients receiving metronidazole when compared with the control group (placebo).[30] Similarly, probiotic interventions containing ≥ 1 strain of *Enterococcus faecium* (strains SF68 and 4b1707), *Bacillus coagulans*, *Lactobacillus acidophilus*, and *Bifidobacterium animalis* have been shown to decrease the incidence of diarrhea in healthy dogs.[31] Lastly, in patients previously treated with antibiotics, recent studies have identified a more rapid recovery of the fecal microbiome and overall metabolome composition in those that received synbiotics as compared to placebo.[11,32]

In addition to the modulation of the microbiota, it is helpful to use substances that facilitate reparative processes and have anti-inflammatory effects, as acute diarrhea can damage and inflame the intestinal barrier. Antidiarrheal probiotic pastes offer an advantage over other treatments commonly used for managing acute diarrhea, such as antimicrobials and dietary modification, for whose efficacy there is no evidence. ADPPs can act through such mechanisms as inhibition of pathogen growth and modulation of gastrointestinal immune function, gastrointestinal microbiome, and gastrointestinal motility, and may facilitate the binding of water and toxins.[31]

Kaolin/pectin formulations (such as Pro-Pectalin) have gained popularity for symptomatic therapy of diarrhea. Kaolin, an aluminum silicate, and pectin, a carbohydrate extracted from the rind of citrus fruits, act synergistically as a demulcent and an adsorbent in the treatment of diarrhea by binding bacterial toxins (endotoxins and enterotoxins) within the GI tract. In placebo-controlled clinical trials, treatment with ADPP was associated with significantly shorter duration of diarrhea (ADPP: median, 32 hours; 95% confidence interval [CI], 2-118; n = 51; placebo: median, 47 hours; 95% CI, 4-167; n = 58; $P = .008$) and a more rapid rate of resolution of diarrhea (1.60 times faster), and it required fewer additional medical interventions for non-improvement or worsening clinical signs (3.5% and 14.8% of dogs, respectively).[31] The results suggest that these options had a favorable clinical outcome compared to antibiotics and are a valid antibiotic-sparing approach to the management of acute diarrhea. ◎

References available online at dvm360.com

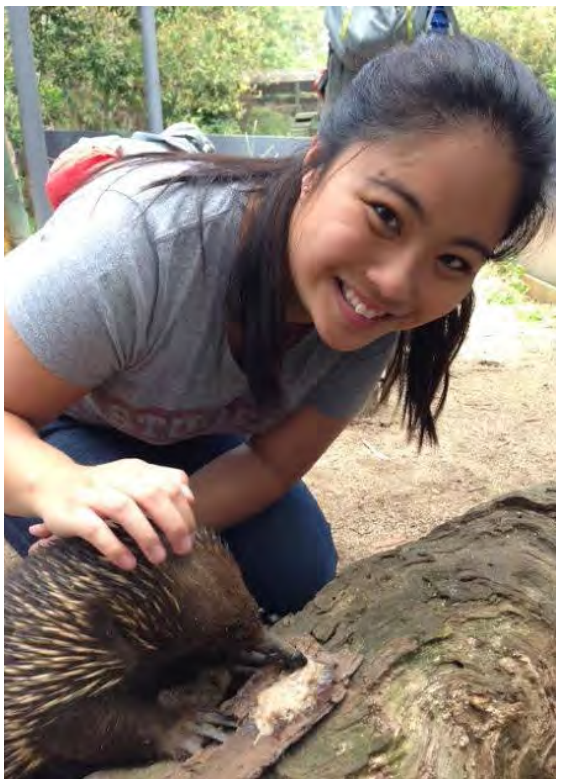
Phil Tucak BSc, BVMS

AI-driven app offers pet advice, and livestock disease outbreaks in Indonesia prompt alert

Editor's note: This column provides a unique perspective on care for exotics and global veterinary issues.

When the COVID-19 pandemic first hit Australia in early 2020 and her veterinary practice adapted by rostering its staff into separate teams for week-on/week-off work schedules, veterinarian Nicole Su, BSc, BVMS MANZCVS (unusual pets), had spare time on her hands and got involved in the development of Upilio, an innovative app for pet owners.

"I've been in exotics-only clinical veterinary practice since graduation in 2014, and when my vet practice moved to a team-based system with week-on/week-off scheduling at the start of the pandemic, I found myself in the unprecedented situation of not having enough to do on my week off," Su said. "Then I heard via a friend about the work that computer programmer Nick Ihab was doing developing an AI [artificial intelligence]–driven pet advice app."



"I felt that the idea of automating a little pet personal assistant in your pocket could be beneficial for both pet owners and their vets, augmenting the vet-patient-client relationship."

The premise for Upilio came about when Nick Ihab, BSc, made the impulse decision to get 2 baby guinea pigs—only realizing afterward that he didn't know how to care for them.

After reaching out on some online communities, Ihab realized that this was a common issue and that although the answers to many of his questions should come from a veterinarian, they didn't need to come from a vet only during a consultation—and they could potentially be stored in a database that people could access at any time.

"For example, many questions were around what fruit and vegetables guinea pigs could safely eat, and there's lots of contradictory advice online due to the ability of any random person to present their opinion as fact on the internet," Su said. "When I joined Upilio, the app was a very basic database and profile maker, but we are planning on a comprehensive solution for diet and husbandry that encompasses the majority of pet species once we get funding."

"One major portion of the app will be a pet-food finder that takes into account allergens, special needs like skin health, age, breed, and size. [There will] also be alerts built into the system for queries that need a consultation, encouraging owners to follow up with their primary care veterinarian."

Su and Ihab also plan to incorporate alerts into the app that would notify pet owners when they need to book an appointment for their pet by tracking parameters like weight fluctuations and food intake, as well as remind pet owners about their pet's vaccinations and revisit appointments. Upilio is looking for further seed funding to aid development of the app and will debut a web version of its dog-food finder later in 2022.

Su said the past 2 years have been a rewarding experience because her veterinary expertise complements Ihab's tech know-how.

"The combination of our backgrounds in vet and programming really makes it unique, and essentially what Nick is doing with the pet-food finder program is trying to replicate my own mental algorithm for recommending commercial diets when I am presented with a particular patient," Su explained. "A large portion of our working time together consists of [me] explaining what I do in a veterinary sense in different situations and us coming up with a way to present this information in a way that helps owners understand—and is also tailored to the specific needs of their pet."

"We're hoping to apply this concept to several challenges that pet owners face, but always in a way that reminds them that their primary care veterinarian still needs to be their pet's main advocate and that encourages pet owners to seek pet care advice from vets instead of influencers, breeders, or pet store employees."

AUSTRALIA ON HIGH ALERT DURING LUMPY SKIN DISEASE, FOOT-AND-MOUTH DISEASE OUTBREAKS IN INDONESIA

Recent outbreaks of the livestock diseases foot-and-mouth disease[1] and lumpy skin disease[2] in Indonesia have prompted Chief Veterinary Officer of Australia Mark Schipp to remind livestock producers and veterinarians in Australia to be vigilant against the diseases, which are currently not present in Australia.

Foot-and-mouth disease is a contagious viral disease that affects cattle, sheep, goats, and pigs, and prior to the current outbreak, Indonesia had been free of the disease since 1986. Lumpy skin disease is a viral disease of cattle and water buffalo that was previously limited to Africa; however, since 2019, the disease has spread through China and Southeast Asia. If either disease arrived in Australia, there would be devastating consequences for the livestock industries and animal trade.

The Australian Veterinary Association has also warned that Australia's shortage of veterinarians in rural and regional areas could put the nation's biosecurity at risk, with insufficient veterinary capacity to respond to any potential disease outbreaks.[3]

The Australian Government Department of Agriculture, Water, and the Environment has been disseminating regular information updates on foot-and-mouth disease and lumpy skin disease to veterinarians and livestock industry groups.

For references, visit dvm360.com.

Help firm stool fast with *Pro-Pectalin*™

Pro-Pectalin™

More than just a probiotic | A multimodal approach to intestinal health support

- Intended to help reduce loose stools in dogs and cats.
  Helps with occasional loose stools, related to:

Stress	Feeding of table scraps
Garbage gut	Antibiotic administration
Changes in diet	

- Highly palatable, effective and fast-acting.
- May be used individually along with a bland diet or used as part of a broader protocol.

1.800.267.5707
vetoquinolusa.com

vetoquinol
ACHIEVE MORE TOGETHER

CE GUIDELINE

CE CATEGORY: Medical
CE METHOD OF DELIVERY:
Journal with online test available anytime

CE HOURS: 1.0 HOUR
This program is pending RACE-approval for 1.0 CE credit hour in jurisdictions that recognize RACE-approval. The RACE-approval will be updated online once approved. RACE (Registry of Approved Continuing Education) is a program of the American Association of Veterinary State Boards (AAVSB), established as a resource for review of continuing education Providers and their programs. More information can be found at www.aavsb.org/ce-services.

CE CERTIFICATE REQUIREMENTS
Participants must receive a 70% grade or higher on the exam to receive CE credit hours. After successfully completing the test, you can immediately access your results. When you receive a grade of 70% or higher, your CE certificate will be available as a PDF for download. Should you need to retake the test for any reason, you may do so immediately.

CE SURVEY
Your educational experience is important to us. Please consider providing your feedback by taking our survey both *before* and *after* reading the article. (Refer to the Instructions section.) We will use this information to determine if educational objectives have been achieved. Please note, this survey is optional and will not be considered nor graded as part of earning a CE certificate. There are no right or wrong answers.

INSTRUCTIONS
(to be completed in this order)

1. Pre-CE Survey: Take the online survey online prior to reading the article.
2. Article: Begin the course by reading the article within the *dvm360®* magazine in its entirety.
3. Exam: Take the exam online after reading the article. (Refer to the test question at the end of the article.)
4. Post-CE Survey: Take the online survey after completing the CE exam.

ONLINE ACCESS: CREATE A DVM360 FLEX™ ACCOUNT AT CE.DVM360.COM/REGISTER
Have an account? ce.dvm360.com
Access activity: dvm360. com/journal/CE/June2022
Transcript: ce.dvm360.com/learn/transcript
Track CE via AAVSB's RACETrack: www.aavsb.org/veterinary-continuing-education-tracking/
Questions: ceinfo@dvm360.com
Privacy Policy: dvm360.com/privacy
Terms and Conditions: dvm360.com/terms

This cool LYME REFRESHER *is not* a drink recipe!

Lyme disease currently is the most common vector-borne disease in the United States, accounting for more than 90% of all confirmed cases of such medical conditions in humans.[1] Spread by the blacklegged tick (*Ixodes scapularis* or *Ixodes pacificus*) and caused by the bacterium *Borrelia burgdorferi*, Lyme disease was first identified in Lyme, Connecticut, amid a cluster of odd cases of arthritis. Today, health officials estimate that at least 30,000 human cases of Lyme disease are diagnosed each year in the United States.[1] While the diagnosis and treatment of a bacterial infection may seem straightforward, Lyme disease is anything but.[2] In fact, significant controversy surrounding chronic Lyme disease cases persists, leading to the apt moniker "the Lyme wars."[3] Controversy notwithstanding, the fact that clinical Lyme disease results from exposure to *B burgdorferi* via a bite from an infected tick is not in question.

Since December 1975, when 51 residents (39 children and 12 adults) of 12,000 individuals living in and around Lyme, Connecticut, were diagnosed with juvenile arthritis or arthritis of unknown cause, Lyme disease has been a prominent issue in the lives of New Englanders. It took 7 long years to define the etiology of the medical condition later named Lyme disease. In 1982, infection with the spirochete *B burgdorferi* was causally related to the "bull's-eye rash" often described by early patients.[4] The stark bull's-eye rash, or erythema migrans, only was found in 25% of this initial cluster of cases; however, in 2021, the Centers for Disease Control and Prevention (CDC) reported that 70% to 80% of infected individuals experienced the characteristic rash.[5] Approximately 20 other species of *Borrelia* have since been identified; *Borrelia burgdorferi* and *Borrelia mayonii* are the predominant species found in North America, whereas *Borrelia garinii*, *Borrelia afzelii*, *Borrelia burgdorferi*, and *B spielmanii* are species commonly detected in Europe.[6]

ETIOLOGY

In the United States, ticks in the *Ixodes* genus are the vectors for Lyme disease. Specifically, *I scapularis* is found in New England and the upper Midwest, and *I pacificus* is found on the Pacific Coast. The life cycle of these species of *Ixodes* has 3 stages (ie, larvae, nymph, and adult) that last 2 to 3 years, and each stage involves a new host for feeding. The 3 hosts can be birds, mammals, amphibians, or reptiles. To find a host, ticks may "quest" by climbing to the top of a blade of grass, stretching out their first pair of legs like outstretched arms, and clinging to the grass with their back legs as they wait for an unsuspecting host to brush past them. When they come into contact with a host, the tick will latch on for the ride.

Ticks rise from the brush rather than fall from the trees. Once on the host, some ticks quickly begin to feed within a few minutes, while others spend up to 2 hours roaming around the host looking for a preferred location.[7] To feed, the tick will grasp onto and cut into the skin. Then, the magic potion of tick saliva goes to work. Tick saliva has incredible properties and acts as a type of cement that helps to keep the tick attached as it feeds. The tick saliva also has anesthetic properties to prevent the host from becoming agitated initially by the tick bite.[7] After the tick has fed to the point of engorgement, which typically takes several days, it will fall off the host and continue maturation to the next life stage. It then will seek out another host and feed again, repeating this scenario until it reaches adulthood.

A tick of the *Ixodes* species may become infected from any of the blood it has feasted upon during the life cycle. As soon as the tick is infected, it harbors the infection through the remaining stages of the life cycle.[8] This "transstadial transmission" often begins when the 6-legged larvae feeds upon the first host. However, female ticks cannot pass infection with *B burgdorferi* to offspring, as transovarial transmission does not occur.[9] After feeding on their third and final host, ticks seek to mate. Males typically die after mating, whereas females drop off the final host, lay thousands of eggs, and then die.[8] In recent surveys, 35% to 50% of nymphs and adult ticks were infected with *B burgdorferi*.[10,11]

The enzootic life cycle of *B burgdorferi* appears to be well integrated with that of the *Ixodes* species. Tick larvae often feed on small mammals (eg, mice) that serve as reservoirs for *B burgdorferi*, but the larvae may also feed on squirrels, birds, and lizards. Nymphs feed on similar hosts and often infect their second host with the bacteria, thereby perpetuating the microbe's life cycle for the next generation of ticks. Adult ticks typically feed on large animals (eg, deer) and mate on the host after feeding.[12] Although deer seem important for the life cycle by serving as a third host and providing an opportunity for ticks to mate, the deer are incompetent hosts for *B burgdorferi*.[13]

The life cycle of the *Ixodes* species is truly complex and integrated, since tick populations (and, therefore, *B burgdorferi*) are quite sensitive to ecosystem dynamics. For example, white-footed mice, eastern chipmunks, short-tailed shrews, and masked shrews are amplification hosts that increase the population density of infected nymphs.[14] Therefore, when populations of these small mammals increase, the population and density of infected ticks increases. However, if the population of other small mammals (eg, opossums, squirrels) that are not as well suited for infection with *B burgdorferi* increases, then the number and density of nymphs infected with *Ixodes* species decreases or becomes diluted.[14] Once again, this demonstrates how ecosystem dynamics and animal and human health all are interdependent.

THE OUTER SURFACE PROTEIN -A, -B, -C'S (WITH AN -E...AND AN -F?)

An incredibly challenging aspect of *B burgdorferi*'s biology is its ability to change its outer surface protein (Osp). Indeed, the sneaky little bacteria evaded effective vaccination for years by wearing a different mask at each stage>>

popout, schankz/ Adobe stock

Written by

Jenifer Chatfield, DVM, DACZM, DACVPM

Chatfield is a double-boarded veterinary specialist with a passion for sharing her love of the animal world with others through edu-tainment on multiple platforms. Her YouTube show, "*Is this a thing: Veterinary translations for pet owners!*" is a great resource for informed pet owners and her podcast and YouTube show, "*Chats with the Chatfields*" provides side-splitting perspectives through unfiltered and authentic conversations with interesting people from the world of animals. As a national thought leader, she routinely speaks at the nation's largest veterinary conferences on diversity, zoo medicine, infectious diseases, disaster response, and public health. She serves as an associate editor for the *Journal of Zoo and Wildlife Medicine* and has been integral in shaping the peer-reviewed literature for more than 15 years. Her peer-reviewed publications cover a range of topics including pharmacokinetics, wild animal behavior, infectious disease, and assisted reproduction in endangered species. Chatfield is a diplomate of both the American College of Zoological Medicine and the American College of Veterinary Preventive Medicine. Learn more at https://drjenthevet.com/.

Lyme disease currently is the most common vector-borne disease in the United States, accounting for more than 90% of all confirmed cases of such medical conditions in humans.[1]

of its life cycle, so the Osp expressed in vitro was totally different from that expressed in vivo. In a more technical sense, *B burgdorferi* upregulates and downregulates the expression of different Osps during the 3 stages of the life cycle, and each is believed to fill different roles.

As the tick feeds on an infected reservoir and ingests bacteria during the blood meal, OspA expression is upregulated. OspA not only binds the bacteria to the midgut of the tick, but it also protects it from the tick's gut environment and immune system.[15] OspB is believed to serve only a minor role in this infection. OspC, however, is necessary for subsequent mammalian infection when the tick feeds again and when mammals first are infected; it recently was shown to block dermal macrophages from phagocytosing the spirochete.[15] *B burgdorferi* also embraces an old-school method for avoiding the host's immune system by simply outrunning white blood cells, since the bacteria are much faster than the typical mammalian white blood cell. When fancy cloaking devices fail, run!

Further complicating the sequence of infection events is the newly characterized variable major proteinlike sequence, expressed (VlsE) lipoprotein, which performs similarly to OspC in mammalian hosts.[16] However, the actions of these 2 factors are not interchangeable. OspC is necessary during early *B burgdorferi* infection; VlsE, on the other hand, appears to be involved in persistent infection, as routine variations may provide for immune system evasion.[16] How fast can VlsE mutate (or effectively produce a genetic variation on the expressed Osp)? Use of next-generation sequencing and other space-age molecular tools has determined that a new variation is produced at least every 8 hours at the onset of infection.[6] Now, that's a productive workday! A key confounding characteristic of VlsE and OspC is the need for in vivo settings for expression. These immune-evasion weapons are not active (or even detectable) in laboratory culture that requires the time-consuming and expensive mouse infection model.[6]

A final member of the Osp family is currently labeled OspF, which is believed to be a utility player for the bacteria that potentially contributes to immune evasion efforts but that also plays other specific roles at different stages of infection.[17] OspF is expressed most often in late infection, with antibodies being produced 6 to 9 weeks post infection.[18]

But after the bacteria successfully enter the canine host, what clinical signs are expected? Which are most common? What about cats?

LYME DISEASE IN DOGS AND CATS—CLINICAL SIGNS

Cats can become infected with *B burgdorferi*, as evidenced by antibody production, but this infection is not associated with any clinical disease. Further, most seropositive dogs are asymptomatic; some estimates show that only 5% to 10% of infected dogs show any clinical signs.[19] Two types of clinical presentations (polyarthritis, renal manifestations) have been characterized in dogs, with Lyme-associated nephritis being the condition most rarely reported.[20] The most common clinical presentation in humans includes a rash, but dogs do not typically manifest erythema migrans in the area of the tick bite.[21]

The most common clinical signs of *B burgdorferi* infection in dogs include fever; polyarthritis producing an intermittent, shifting lameness; lymphadenopathy; lethargy; and anorexia. Less than 1% to 2% of seropositive dogs develop Lyme nephritis, although Labrador and golden retrievers may be predisposed to developing the condition. Nearly one-third of nephritis cases have been associated with prior or concurrent lameness along with clinical signs of renal compromise.[20] The nephritis resulting from *B burgdorferi* infection is a protein-losing nephropathy, and no predictive tests currently are available to determine which seropositive dogs are at highest risk for having advancing disease.[20]

When should diagnostics be employed, and in what clinical context? Or is clinical context even important in the diagnostic interpretation of Lyme disease testing? If a dog has a history of travel to a Lyme-endemic area, potentially has been exposed to a tick, and has clinical signs consistent with potential infection with *B burgdorferi*, then further diagnostics should be considered. But what diagnostics are appropriate? What if the dog has been previously vaccinated? How might that disrupt testing confidence?

LYME DISEASE IN DOGS AND CATS—DIAGNOSTICS

Several diagnostics are available for suspected cases of canine Lyme disease; however, the results of none are truly definitive in the absence of clinical context. Diagnostic interpretation is critical, as most available diagnostic platforms rely on indirect detection of *B burgdorferi* indicated by antibody presence. Among vaccine-preventable diseases such as Lyme, differentiation between vaccine-induced and natural disease–induced antibodies may be difficult, but it is critical to the practitioner. Additionally, since *B burgdorferi* is a master at immune system evasion, antibody production may be delayed or largely absent despite legitimate infection. The point-of-care enzyme-linked immunosorbent assay often performed in general practice detects antibodies to a specific invariable VlsE region named C6. Antibodies to C6 are generated only as a response to natural disease to *B burgdorferi*, because VlsE is not expressed in culture, and culture is used to produce vaccines.[22] Additionally, although OspC antibodies are detectable in dogs that are exposed to the *B burgdorferi* but not infected, VlsE is not expressed by bacteria until they have been in the mammalian host for 1 to 3 weeks.[23] Therefore, a positive result when testing for antibodies to C6 indicates infection rather than exposure or vaccination.

Early detection of infection can be done before the expression of the C6 peptide by testing for different Osps simultaneously using a multiplex assay. Because *B burgdorferi* is a dynamic bacterium and such dynamics are driven by the environment, the multiplex assay detects antibodies to OspA, OspC, and OspF. Since each antigen is produced in a different phase of the bacterial life cycle (ie, tick midgut, early mammalian infection, and chronic mammalian infection, respectively), assessing the presence of all 3 may be prudent when the timeline of exposure or infection is largely unknown. Additionally, because the multiplex assay detects antibodies to OspA and OspC, infection may be detected earlier than with evaluation only for antibodies to C6.[18]

Practitioners would do well to remember from elementary immunology that physiological systems do not always read the memo and behave in predictable ways. Indirect diagnostic pathways can produce false-negative results in the face of fulminant infection, depending on overall health status. If clinical context indicates likely infection with *B burgdorferi* despite negative or equivocal antibody test results, a clinician's skill in the "art of medicine" should drive a patient's treatment.

LYME DISEASE IN DOGS AND CATS—TREATMENT

The causative agent of Lyme disease is a bacterium, so antibiotics are the treatment of choice. However, since the majority of infected dogs (and all cats) are asymptomatic, should antibiotic treatment be given? Therein lies the rub! In the age of antimicrobial resistance, should asymptomatic dogs be treated?

If the *B burgdorferi*—infected dogs served as a reservoir for perpetuating the pathogen, thereby presenting a public health threat, the answer would be that asymptomatic dogs should receive antibiotic therapy. Fortunately, however, dogs are believed to be a dead-end host, meaning that ticks feeding on infected dogs do not become infected with *B burgdorferi*. Controversy regarding the treatment of asymptomatic dogs notwithstanding, the remaining symptomatic population of beloved canines surely needs relief, especially if the animals suffer from Lyme-induced glomerulopathy. Effective treatment consists of appropriate antibiotic administration (doxycycline or amoxicillin for 31 days or 2 injections of cefovecin given 2 weeks apart)[24] and other supportive care as necessary based on clinical signs. Lameness, arthritis, and renal damage may persist beyond resolution of the infection due to tissue damage from the immune response to the infection. Immune-complex deposition may complicate subsequent organ function and may be the culprit responsible for so-called chronic Lyme syndromes. Response to treatment can be monitored by checking for a decrease in antibodies to C6 using a quantitative test.[25]

PREVENTION

The risk profile for infection with *B burgdorferi* is fairly straightforward. If a dog is going to have a reasonable likelihood of exposure to infected vectors (eg, ticks infected with *B burgdorferi*), then the dog is at increased risk for infection. Geographically, more than 95% of human cases of Lyme disease occur in just 14 states: Connecticut, Delaware, Maine, Maryland, Massachusetts, Minnesota, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, Vermont, Virginia, and Wisconsin.[26] As the geographic range for human infection continues to expand, it is important to note the seroprevalence of dogs in different regions of the United States. According to the Companion Animal Parasite Council (CAPC), "in endemic areas, regional seroprevalence in dogs ranges from 1.4% in the West to as high as 13.3% in the Northeast. However, in nonendemic areas such as the southern United States, infection is rarely documented in pets without a travel history to an endemic area."[27] The peak time of year for onset of illness in these cases was July, making late spring and early summer the most common times of year for transmission; this also tracks with the tick's life cycle.[26] Travel to these historically endemic regions of the United States during the spring and summer months surely increases the risk of transmission of Lyme disease to a pet. If a dog has a suitable risk profile based on known lifestyle characteristics or if a client simply elects vaccination, a vaccine that targets OspA and OspC is likely to be most effective.[28] Both OspA and OspC are expressed at the initiation of infection and are largely conserved no matter what immune-evading variations come into play later.

The most successful prevention against any vector-borne disease is, of course, to avoid exposure to the vector. However, that can be tricky for pets. Thus, prevention of Lyme disease in pets is a multifactorial effort. Effective tick prevention is the cornerstone of prophylaxis, and vaccination in at-risk populations is the extending foundation. It is true that most tick preventives actually act after the tick bites the dog, but such a treatment may be effective in preventing Lyme disease. Typically the tick must stay attached for more than 24 hours to successfully transmit *B burgdorferi* while it feeds, so preventives that kill the tick quickly are more likely to prevent Lyme disease.[29]

Some commonly available tick preventives include the isoxazolines (eg, fluralaner, lotilaner, afoxolaner, sarolaner); phenylpyrazoles (eg, fipronil); pyrethroids (eg, permethrin, deltamethrin, flumethrin, cyphenothrin); and the nonsystemic acaricide and insecticide amitraz.[30] Indeed, each family of compounds has its own safety and efficacy profile. As noted by Burgio et al, "the systemically distributed isoxazolines performed much better than cutaneous distributed imidacloprid + permethrin and are optimal treatment choices against attached ticks based on the combination of earlier onset of activity and speed of kill."[31] In a head-to-head study comparing imidacloprid plus permethrin, fluralaner, afoxolaner, and >>

CE EXAM

dvm360.com/journal/CE/June2022

1. Lyme disease is the most common vector-borne disease in the U.S.

a. True

b. False

2. Ixodid ticks are 2-host ticks, meaning they require only 2 different hosts to complete their life cycle.

a. True

b. False

3. What percentage of dogs infected with *B burgdorferi* exhibit clinical signs?

a. 10%

b. 90%

c. 100%

d. 50%

e. None of the above

4. Cats are immune to infection with the *B burgdorferi* bacteria.

a. True

b. False

5. The nephritis resulting from *B burgdorferi* infection is a protein-losing nephropathy and no predictive tests are currently available to determine which seropositive dogs are at highest risk for advancing disease.

a. True

b. False

INSTRUCTIONS:
Begin the course test online after reading this article at **dvm360.com/journal/CE/Feb2022**

sarolaner, imidacloprid plus permethrin had the fastest onset of activity (2 hours), but failed to reach over 90% efficacy by 48 hours. Of the remaining acaricides evaluated, fluralaner had the fastest onset of activity (4 hours), speed of kill (8 hours) and achieved 100% efficacy by 12 hours against adult *Rhipicephalus sanguineus*.[31]

Naturally, decisions regarding prevention of any ectoparasite should be made by a clinician and should consider an animal's overall health status, likely client compliance, and family environment rather than a single factor. However, when duration of vector attachment is important in potential infection, as it is in the case of *B burgdorferi*, such clinical recommendations become clearer.

CURRENT PICTURE

While the awareness of Lyme disease as a public health threat continues to rise, the overall seroprevalence among dogs in the United States remains low at 1.4% in the West to as high as 13.3% in the Northeast. However, CAPC currently recommends, "screening dogs for exposure to *B burgdorferi* due to rapid geographic expansion of endemic areas."[27] Unfortunately, Lyme disease is not the only disease spread by the *Ixodes* species, and no pathogen exists in a vacuum. Vaccination for Lyme disease should be considered if a dog is traveling to or lives in an endemic area.

Ever since its initial appearance in 1975, *B burgdorferi* has puzzled scientists and public health experts alike. Not only is *B burgdorferi* the most complex bacterium genetically, but the sneaky spirochete also has an incredible ability to evade a host's immune system. Cleverly expressing different Osps depending upon environmental factors (eg, culture medium, tick gut, mammalian host, point variations of genetic code [during prolonged infections]), *B burgdorferi* is truly impressive from a microbiology standpoint. With diagnostics focused largely on indirect methods of pathogen detection, reliable results can still seem murky. Treatment may seem straightforward with fairly mundane antibiotics, but the damage done by the immune system's own processes may persist for the life of the animal. Yet for every complex problem, there exists a simple solution. In baseball, if a batter is unable to hit the curveball, then he is wise to swing for contact before the pitch has an opportunity to move. In tick-borne disease, a clinician is wise to avoid the murky diagnostic arena and simply prevent long-term contact with the vector. The key to treating tick-borne disease is often better prevention, and infection with *B burgdorferi* is no exception. Therefore, recommend year-round effective tick prevention and vaccination as dictated by an individual risk-based assessment.

REFERENCES

1. Lyme disease. Centers for Disease Control and Prevention. Updated August 30, 2021. Accessed December 6, 2021. www.cdc.gov/lyme/index.html
2. Auwaerter PG, Bakken JS, Dattwyler RJ, et al. Antiscience and ethical concerns associated with advocacy of Lyme disease. *Lancet Infect Dis*. 2011;11(9):713-719. doi:10.1016/S1473-3099(11)70034-2
3. Campos, M. Lyme disease: resolving the "Lyme wars." Harvard Health Publishing. June 18, 2018. Accessed December 6, 2021. https://www.health.harvard.edu/blog/lyme-disease-resolving-the-lyme-wars-2018061814071
4. Burgdorfer W, Barbour AG, Hayes SF, Benach JL, Grunwaldt E, Davis JP. Lyme disease-a tick-borne spirochetosis? *Science*. 1982;216(4552):1317-1319. doi:10.1126/science.7043737
5. Lyme disease: signs and symptoms of untreated Lyme disease. Centers for Disease Control and Prevention. Updated January 15, 2021. Accessed December 6, 2021. www.cdc.gov/lyme/signs_symptoms/index.html
6. Chaconas G, Castellanos M, Verhey TB. Changing of the guard: how the Lyme disease spirochete subverts the host immune response. *J Biol Chem*. 2020;295(2):301-313. doi:10.1074/jbc.REV119.008583
7. Ticks: how ticks spread disease. Centers for Disease Control and Prevention. Updated September 21, 2020. Accessed December 6, 2021. www.cdc.gov/ticks/life_cycle_and_hosts.html
8. The tick lifecycle. Tick Research Lab of Pennsylvania blog. December 1, 2020. Accessed December 6, 2021. www.ticklab.org/blog/2020/12/01/the-tick-lifecycle/
9. Hutchinson ML, Strohecker MD, Simmons TW, Kyle AD, Helwig MW. Prevalence rates of Borrelia burgdorferi (Spirochaetales: Spirochaetaceae), Anaplasma phagocytophilum (Rickettsiales: Anaplasmataceae), and Babesia microti (Piroplasmida: Babesiidae) in host-seeking Ixodes scapularis (Acari: Ixodidae) from Pennsylvania. *J Med Entomol*. 2015;52(4):693-698. doi:10.1093/jme/tjv037
10. Lyme disease: overview life cycle. Companion Animal Parasite Council. Updated May 15, 2019. Accessed January 7, 2022. https://capcvet.org/guidelines/lyme-disease/
11. Prusinski MA, Kokas JE, Hukey KT, Kogut SJ, Lee J, Backenson PB. Prevalence of Borrelia burgdorferi (Spirochaetales: Spirochaetaceae), Anaplasma phagocytophilum (Rickettsiales: Anaplasmataceae), and Babesia microti (Piroplasmida: Babesiidae) in Ixodes scapularis (Acari: Ixodidae) collected from recreational lands in the Hudson Valley Region, New York State. *J Med Entomol*. 2014;51(1):226-236. doi:10.1603/me13101
12. Radolf JD, Caimano MJ, Stevenson B, Hu LT. Of ticks, mice and men: understanding the dual-host lifestyle of Lyme disease spirochaetes. *Nat Rev Microbiol*. 2012;10(2):87-99. doi:10.1038/nrmicro2714
13. Piesman J, Schwan TG. Ecology of Borreliae and their arthropod vectors. In: *Borrelia: Molecular Biology, Host Interaction and Pathogenesis*. Caister Academic; 2010:251-278.
14. Levi T, Keesing F, Holt RD, Barfield M, Ostfeld RS. Quantifying dilution and amplification in a community of hosts for tick-borne pathogens. *Ecol Appl*. 2016;26(2):484-498. doi:10.1890/15-0122
15. Tilly K, Bestor A, Rosa PA. 2016. Functional equivalence of OspA and OspB, but not OspC, in tick colonization by Borrelia burgdorferi. *Infect Immun*. 84(5):1565-1573. doi:10.1128/IAI.00063-16
16. Zhang JR, Hardham JM, Barbour AG, Norris SJ. Antigenic variation in Lyme disease borreliae by promiscuous recombination of VMP-like sequence cassettes. *Cell*. 1997;89(2):275-285. doi:10.1016/s0092-8674(00)80206-8. Published correction appears in *Cell*. 1999;96(3):447.
17. McDowell JV, Sung SY, Price G, Marconi RT. Demonstration of the genetic stability and temporal expression of select members of the lyme disease spirochete OspF protein family during infection in mice. *Infect Immun*. 2001;69(8):4831-4838. doi:10.1128/IAI.69.8.4831-4838.2001
18. Wagner B, Freer H, Rollins A, et al. 2012. Antibodies to *Borrelia burgdorferi* OspA, OspC, OspF and C6 antigens as markers for early and late infection in dogs. *Clin Vacc Immunol*. 2012;19(4):527-535. doi:10.1128/CVI.05653-11
19. Levy SA, Magnarelli LA. 1992. Relationship between development of antibodies to *Borrelia burgdorferi* in dogs and the subsequent development of limb/joint borreliosis. *J Am Vet Med Assoc*. 1992;200(3):344-347.
20. Littman MP. Lyme nephritis. *J Vet Emerg Crit Care (San Antonio)*. 2013;r;23(2):163-173. doi:10.1111/vec.12026
21. Vogt NA. Lyme borreliosis in animals (Lyme disease). Merck Veterinary Manual. Updated March 2021. Accessed December 6, 2021. https://www.merckvetmanual.com/generalized-conditions/lyme-borreliosis/lyme-borreliosis-in-animals
22. Liang FT, Jacobson RH, Straubinger RK, Grooters A, Philipp MT. Characterization of a *Borrelia burgdorferi* VlsE invariable region useful in canine Lyme disease serodiagnosis by enzyme-linked immunosorbent assay. *J Clin Microbiol*. 2000;38(11):4160-4166.
23. Crother TR, Champion CI, Whitelegge JP, et al. Temporal analysis of the antigenic composition of *Borrelia burgdorferi* during infection in rabbit skin. *Infect Immun*. 2004;72(9):5063-5072.
24. Wagner B, Johnson J, Garcia-Tapia D, et al. Comparison of effectiveness of cefovecin, doxycycline, and amoxicillin for the treatment of experimentally induced early Lyme borreliosis in dogs. *BMC Vet Res*. 2015;11:163. doi:10.1186/s12917-015-0475-9
25. Philipp MT, Bowers LC, Fawcett PT, et al. Antibody response to IR6, a conserved immunodominant region of the VlsE lipoprotein, wanes rapidly after antibiotic treatment of Borrelia burgdorferi infection in experimental animals and in humans. *J Infect Dis*. 2001;184(7):870-878. doi:10.1086/323392
26. Schwartz AM, Hinckley AF, Mead PS, Hook SA, Kugeler KJ. Surveillance for Lyme disease - United States, 2008-2015. *MMWR Surveill Summ*. 2017;66(22):1-12. doi:10.15585/mmwr.ss6622a1
27. Lyme disease: prevalence. Companion Animal Parasite Council. Updated May 15, 2019. Accessed January 7, 2022. https://capcvet.org/guidelines/lyme-disease//
28. LaFleur RL, Dant JC, Wasmoen TL, et al. Bacterin that induces anti-OspA and anti-OspC borreliacidal antibodies provides a high level of protection against canine Lyme disease. *Clin Vaccine Immunol*. 2009;16(2):253-259. doi:10.1128/CVI.00373-08
29. Lyme disease: transmission. Centers for Disease Control and Prevention. Updated January 15, 2021. Accessed January 7, 2022. www.cdc.gov/lyme/transmission/index.html
30. Quick product reference guide. Companion Animal Parasite Council. Accessed December 6, 2021. https://capcvet.org/parasite-product-applications/
31. Burgio F, Meyer L, Armstrong R. A comparative laboratory trial evaluating the immediate efficacy of fluralaner, afoxolaner, sarolaner and imidacloprid + permethrin against adult Rhipicephalus sanguineus (sensu lato) ticks attached to dogs. *Parasit Vectors*. 2016;9(1):626. doi:10.1186/s13071-016-1900-z
32. Vogt NA, Stevens CPG. Why the rationale for canine *Borrelia burgdorferi* vaccination Is unpersuasive. *Front Vet Sci*. 2021;8:719060. doi:10.3389/fvets.2021.719060

Only Nobivac® Lepto$_4$

PROTECTS AGAINST MORTALITY[1]

To learn more, contact your Merck Animal Health sales representative or your distributor representative.

Customer Service: 1-800-521-5767
(Monday–Friday, 9:00AM–6:00PM EST)

Technical Services: 1-800-224-5318
(Monday–Friday, 8:30AM–7:00PM EST)

Nobivac®
Protection unites us.

References: 1. LaFleur RL, Dant JC, Wasmoen TL. Prevention of disease and mortality in vaccinated dogs following experimental challenge with virulent leptospira. *J Vet Int Med.* 2011;25:747.

MERCK
Animal Health

Shawn Messonnier, DVM

Handout

Coenzyme Q10
use in pets

The doctor has prescribed coenzyme Q10 (CoQ10) for your pet. CoQ10 is a popular and safe supplement that has been used for many years in people and animals. There are a number of uses in pets for CoQ10, and it is important to administer the supplement as prescribed.

CoQ10 is an antioxidant synthesized in most tissues in the body and found in all cells, with its highest concentration in the heart, kidneys, liver, and pancreas. The supplement is also found in foods including organ meats, poultry, fish, meat, nuts, soybean oil, canola oil, fruits, vegetables, dairy products, and eggs.

CoQ10 is useful for treating pets with a variety of medical problems and those needing antioxidant support. Pets with dental disease, especially those with gingivitis, may benefit from CoQ10 because of its ability to reduce gum inflammation. Pets with cardiovascular disease also may benefit because the supplement improves heart function, as may pets with cancer because it improves immune function. In particular, pets receiving the chemotherapy drug doxorubicin may benefit from CoQ10 usage as it may mitigate the heart toxicity that can occur during treatment with the cancer drug. CoQ10 is not as commonly used in pets as in people, but pets taking statin drugs to lower blood cholesterol or lipid levels should receive the supplement to prevent the adverse effects commonly seen with statins. Finally, CoQ10 in dogs and cats can also be used to reduce high blood pressure; as regular supplementation in older pets due to declining CoQ10 in aging patients; and in pets with any type of immune dysfunction, diabetes mellitus, hyperthyroidism and hypothyroidism, myasthenia gravis, and degenerative myelopathy.

CoQ10 supplementation is considered very safe in dogs and cats; absorption may improve when it is given with food, especially a fatty meal. The supplement can be given along with various medications the doctor may have prescribed for your pet. As always, though, it is important to let your doctor know of any adverse effects or dosage changes once your pet begins supplementation with CoQ10.

Because there is a wide variety of quality among CoQ10 supplements, clients should use only the product that has been prescribed, for best results. The supplement market is largely unregulated (unless adverse events are reported to the Food and Drug Administration or Department of Agriculture) and anyone can develop and sell supplements without any consideration for the effectiveness, safety, or quality of ingredients. Purchasing and administering supplements from unknown or disreputable manufacturers can be costly and may expose your pet to supplements that are ineffective or even harmful, especially if contaminated with other ingredients. Although we don't expect adverse effects to occur, remember that any medication or supplement can cause adverse effects in an individual patient; however, these are much less likely to occur with supplements than with conventional medications.

cynoclub, alfaolga/ Adobe stock

vetscan RAPID Tests

Scan to learn more

Quick results at the point of care

VETSCAN® Rapid Tests provide reliable results in 10 minutes or less, with only 3 simple steps –no snapping required.

No refrigeration required for storage

Fast, accurate results in 8–10 minutes

12–24 month shelf life

RPD-00131

Discover innovative breakthroughs: like running ahead of schedule.

CREATING CLARITY

IDEXX Reference Laboratories goes above and beyond what you expect from a lab. Through an unmatched combination of tests, support, and technology, we help you reach answers faster and save time for what matters. And there's nothing more innovative than that.

› DISCOVER MORE WITH IDEXX REFERENCE LABORATORIES
IDEXX.COM/REFLAB

IDEXX