Drug DISCO: How commercial incentives can improve cancer drug development

A look at the One Health initiative that is stepping beyond science to generate more treatments more quickly for canine and human cancer.

By Amanda Carrozza

Comparative oncology, which integrates the study of naturally occurring cancers seen in veterinary patients to optimize the development of new cancer drugs, has long been a component of One Health. Even if you believe you have a strong grasp on comparative oncology, or if you are not familiar with Chand Khanna, DVM, PhD, DACVIM, don’t stop reading. A new piece has been added to this life-saving puzzle.

Experts from around the world are working to develop commercial relationships between the human and animal health pharmaceutical and biotech sectors to speed development of cancer treatments with a novel approach to comparative oncology and One Health. Their proposal would create additional.

See page 30

Gene editing in animals: Miracle or madness?

A veterinarian who participated in the 2018-2019 AVMA Fellowship Program considers the implications of gene editing in both food animals and pets.

By Fred D. Lehman, DVM, MABM, DACT

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The proven way to treat canine diabetes once-a-day

The breakthrough you’ve been waiting for is here: now you can deliver glycemic control in most diabetic dogs WITH A SINGLE DAILY INJECTION.¹² To learn more, contact your Boehringer Ingelheim Sales Representative or Professional Services Veterinarian.

*PROZINC is approved for twice-daily use in cats.*

**IMPORTANT SAFETY INFORMATION:** PROZINC is for use in dogs and cats only. Keep out of the reach of children. Animals presenting with severe ketoacidosis, anorexia, lethargy, and/or vomiting should be stabilized with short-acting insulin and appropriate supportive therapy until their condition is stabilized. As with all insulin products, careful patient monitoring for hypoglycemia and hyperglycemia is essential to attain and maintain adequate glycemic control and to prevent associated complications. Overdose can result in profound hypoglycemia and death.

The most common adverse reactions were lethargy, anorexia, hypoglycemia, vomiting, seizures, shaking (dogs only), diarrhea, and ataxia. Many of the adverse reactions, such as lethargy, seizures, shaking (dogs only), and ataxia, are associated with hypoglycemia. Glucocorticoid and progestogen use should be avoided. The safety and effectiveness of PROZINC in puppies, kittens, or breeding, pregnant, and lactating animals has not been evaluated. PROZINC is contraindicated during episodes of hypoglycemia and in animals sensitive to protamine zinc recombinant human insulin or any other ingredients in PROZINC. For more information, please see full prescribing information.

References:

1 Data on file at Boehringer Ingelheim.
Compassion-First adds 43rd veterinary practice

Compassion-First Pet Hospitals welcomes a large New York practice, furthering its mission of creating long-term partnerships and elevating veterinary medicine.

By dvm360 Staff

Industry news  | NEWS

Earlier this month, Compassion-First Pet Hospitals announced the addition of AAHA-accredited Long Island Veterinary Specialists (LIVS) in Plainview, New York, to its chain of emergency and specialty hospitals. LIVS is known for advancing key research studies and for pioneering medical infrared imaging, retinal surgery, and nano hip replacement.

Founded in 1998, the 30,000-square-foot LIVS facility offers emergency and critical care, integrative medicine, internal medicine, interventional radiology, neurology/neurosurgery, oncology, ophthalmology, radioidone therapy, rehabilitation, pain management, and surgery, according to a Compassion-First press release. “The hospital is open 24 hours a day with a staff of 180 veterinary professionals.”

LIVS Chief of Staff Dominic J. Marino, DVM, DACVS, DACCT, CCRP, says the hospital is fortunate to have found a similar vision in Compassion-First, with quality of care being elevated consistently. With broadened access to a collaborative mix of experts, LIVS is excited to expand care on a local level.

“Compassion-First is a true partner who will help in growing our hospital by providing access to cutting-edge technologies, logistical support and management expertise,” Dr. Marino says.

The Compassion-First network includes 43 specialty and emergency care veterinary hospitals throughout the country. CEO John Payne says he views the collaborative group of hospitals as a family that is united by a common passion: to put pets and their owners at the center of their care as the hospitals maximize resources while working together.

Payne adds that each Compassion-First hospital brand maintains its own equity, uniqueness and integrity, and medical decisions—committing to a collective goal lead with compassion. “The incredible expertise of LIVS will help us further our vision to deliver the highest quality of veterinary medicine,” he says. dvm360
FDA approves generic carprofen chewable for dogs

The new drug provides proven safe, effective and relieving pain management associated with osteoarthritis.

By dvm360 Staff

Package Insert for Dogs

ProZinc® (prolamate zinc recombinant human insulin)

44 Edition Caution: Federal: law restricts this drug to use by or on the order of a licensed veterinarian. Description: ProZinc® is a sterile aqueous zinc protamine recombinant human insulin. Each ml of solution contains:

recombinant human insulin 40 International Units (IU) protamine zinc 0.446 mg zinc oxide 0.008 mg phosphate buffer 0.3 mg disodium phosphate, heparate hydrochloric acid 1.63 mg zinc histidine 3.0 mg maltose 1.4 mg Glucocorticoid and progestogen use should be avoided. Glucocorticoids, progestogens, and certain endocrinopathies can have an antagonistic effect on glycemic control until their condition is stabilized. As with all insulin products, careful patient monitoring for hypoglycemia should be stabilized with short-acting insulin and appropriate supportive therapy until their condition is stabilized. In severe cases of hypoglycemia, insulin metabolism, insulin-induced hyperglycemia (Somogyi Effect), and local or systemic reactions. Evaluation of ProZinc Therapy in the injection, including visualization, was observed in 4 dogs. Clinical Pharmacology: Twice daily dosing should be considered if the duration of insulin action is insufficient for once daily dosing. Approximately 24% less than 24% less than 7 units using blood glucose curves to avoid the increased risk of hypoglycemia. If twice daily dosing is required, ProZinc should be given once daily instead of twice daily because ProZinc may have prolonged duration of action in some dogs (see Clinical Pharmacology). The veterinarian should closely monitor the duration of action of the insulin and glucose concentrations were measured over twenty-four hours. In case of contact, immediately flush eyes with running water for at least 15 minutes. Accidental Swelling, bumps at the injection site, and redness. All injection site reactions resolved without cessation of therapy. Severity and frequency of adverse reactions are shown in Table 1. Headache 12 (4.3%)

T

he FDA recently announced the approval of India-based Cronus Pharma Specialties’ Carprofen Chewable Tablets for dogs (a generic version of Rimadyl—Zoetis PetCare). This nonsteroidal anti-inflammatory drug relieves pain and inflammation associated with osteoarthritis and helps control postoperative pain associated with soft tissue and orthopedic surgeries, according to the Freedom of Information Summary Original Abbreviated New Animal Drug Application. These tablets can be administered once daily (2 mg/lb of body weight) or twice daily (1 mg/lb). To control postoperative pain, the FDA recommends administering this drug approximately 2 hours before a procedure. Carprofen Chewable Tablets are scored (except for the unscored 37.5-mg strength), and contain 25, 37.5, 50, 75, or 100 mg of carprofen per tablet. Each tablet size is packaged in bottles containing 60 or 180 tablets. Carprofen Chewable Tablets should not be used in dogs exhibiting previous hypersensitivity to carprofen and is not intended for use in food-producing animals or in humans. Adverse reactions to carprofen may include decreased appetite, vomiting, diarrhea, dark or tarry stools, increased water consumption, increased urination, pale gums due to anemia, yellowing of gums, skin or white of the eye due to jaundice, lethargy, incoordination, seizure, or behavioral changes. In rare cases, serious adverse reactions can result in death. For more information about this new drug, visit animaldrugsatfda.fda.gov/adafta/app/search/public/document/download/fda9085.dcm
Gene editing in animals: Miracle or madness?

A veterinarian who participated in the 2018-2019 AVMA Fellowship Program considers the implications of gene editing in both food animals and pets.

By Fred D. Lehman, DVM, MABM, DACT

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Pandemic productivity: Have you acquired any new skills?

This summer has been one the likes of which we have not seen in our lifetime. For me, it’s been a summer of reflection and building friendships that have deeper meaning and purpose. Many of you have reached out to me about your new passions—starting your own online business, creating a bee farm, becoming a certified SCUBA diver, reconnecting with your classmates from vet school and, of course, creating summer staycations with your families and fur babies.

One new passion that I had no idea I would love so much is podcasting. I hadn’t listened to podcasts much until last year. My overall reaction was “wow.” Not only was I able to obtain some great knowledge, but I could do it while multitasking (a skill veterinary professionals tend to be born with). I was able to check the self-care box, exercising both my mind and body at the same time. I became hooked.

Cut to dvm360’s The Vet Blast Podcast, which we started last month. Being on the other side of the microphone is extremely fun and incredibly rewarding. Here are the key takeaways I have learned from hosting a podcast. Maybe they can be lessons for all of us.

Our profession has so many opportunities

Hearing about the journeys of other veterinary professionals—some of whom have been practicing for decades and are just as obsessed with veterinary medicine as they were when they first started practicing—has been incredibly inspirational to me. I’ve also chatted with veterinarians who have felt lost within our profession, reached out and connected with colleagues, and felt rejuvenated by changing their career path. Their stories of perseverance and fortitude are truly remarkable and make me proud to be part of this incredible profession. It’s been said in the multimedia world that real people and real stories make the best content, and I can certainly attest to that.

Embrace failure

Right from my very first episode, I experienced more technical problems than I would have thought possible. It took me weeks to understand the technical aspects of podcasting. (I spent a solid week just working on my intro music.) There still are some glitches, but I’m not perfect and nor should the podcast be. Authenticity is genuine, perhaps now more than ever. My guests have valued our time, conversations, and laughs. And just like doing a spa for the first time, it will get better with experience and practice.

Listen actively

Mom always said we have two ears and one mouth for a reason. In interviewing, client discussions, and everyday conversations, it’s easy to get caught up in thinking of the next question you’re going to ask without truly listening to the answer being given. Too often we don’t listen and instead simply spit out our own talking points as soon as we have an opening. That isn’t listening. Active listening means listening with all senses, and if we’re not listening actively the person we are talking with may conclude that what they are saying is uninteresting or unimportant. If I’m not engaged with pet parents in the exam room, the likelihood is high that compliance will be low. Interest and engagement are best conveyed via both verbal and nonverbal body language, including maintaining eye contact, nodding and smiling, and interjecting “yes” or simply “mm hmm” to encourage them to continue. By providing this “feedback” on the podcast, guests usually feel more at ease and thus communicate more easily, openly, and honestly.

Challenge yourself

If you are looking to challenge yourself during this pandemic, I strongly suggest moving outside your comfort zone. Lean on friends and family to explore opportunities you may not have deemed feasible. I absolutely love chatting with my guests. Knowledge is shared, friendships are built, and memories are made—it’s a win–win. To The Vet Blast Podcast celebrates you, and I encourage you to listen. Visit dvm360.com/podcasts for the latest episodes. If you are interested in being a guest on the podcast, please reach out to me at achristman@mjhlifesciences.com. I would love to have you on.

In the meantime, enjoy the rest of your summer. Stay safe and take some time to do something new!

—Adam Christman, DVM, MBA
Chief Veterinary Officer

The importance of proactive pet care

Last month, BluePearl Specialty and Emergency Pet Hospital reported an alarming 70% uptick in parvovirus cases among its more than 90 practices around the country. Although it is unclear at this time exactly why cases are spiking, several possible reasons point to unanticipated effects from COVID-19. Among the proffered causes: pets being adopted out from shelters without having completed their core vaccination series, pets spending more time outside with their owners, and routine vaccines being delayed due to stay-at-home orders or financial hardship among owners (page 25).

At press time, more than 164,000 American deaths have been attributed to COVID-19, and that number does not account for deaths indirectly caused by the disease, such as through economic hardship, emotional distress, and delayed medical care.

Months of staying at home meant fewer people visited their doctor for routine screenings and mild symptoms. The same has occurred with our pets, with confusion compounded by uncertainty about what are considered “essential” pet services. Vaccines didn’t seem as urgent when visiting the veterinarian may have meant exposure to a potentially deadly contagious virus. Yet it is becoming clear that skipping routine medical care may ultimately be harmful to both people and pets. While ensuring that clients keep up with their pet’s vaccinations may not seem a high priority right now in your practice or for your clients, core vaccines are as essential as ever to keeping pets safe and healthy, particularly for patients that frequent dog parks or are otherwise at risk for infectious disease. So, encourage your clients to provide proactive pet care, as veterinary practices by and large have done an outstanding job of instituting protocols to ensure the safety of clients, patients, and staff.

—Mike Hennessy Sr.
Chairman and Founder,
MJH Life SciencesTM
During these hectic times, it’s more important than ever to protect pets from parasites. Prevent fleas and ticks without the hassle of a monthly treatment.

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

The most commonly reported adverse reactions include vomiting, decreased appetite, diarrhea, lethargy, polydipsia, and flatulence. BRAVECTO Chews for Dogs have not been shown to be effective for 12-weeks’ duration in puppies less than 6 months of age. BRAVECTO Chews are not effective against lone star ticks beyond 8 weeks of dosing. Fluralaner is a member of the isoxazoline class. This class has been associated with neurologic adverse reactions including tremors, ataxia, and seizures. Seizures have been reported in dogs receiving isoxazoline class drugs, even in dogs without a history of seizures. Use with caution in dogs with a history of seizures or neurologic disorders. VIEW PRESCRIBING INFORMATION

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Flavored chews for dogs.

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

Description:
Each chew is formulated to provide a minimum dose of 11.4 mg/lb (0.25 mg/kg) body weight.
The chemical name of fluralaner is (±)-4-[5-(3,5-dichlorophenyl)-5-(trifluoromethyl)-4,5-dihydroisoxazol-3-yl]-2-methyl-N-(2-oxo-2,2,2-trifluoroethyamino) ethylbenzamide.

Indications:
BRAVECTO treats and controls the following tick infestations (Ixodes species) and the treatment and control of tick infestations (Ixodes scapularis (black-legged tick), Dermacentor variabilis (American dog tick), and Rhipicephalus sanguineus (brown dog tick)) for 12 weeks in dogs and puppies 6 months of age and older, and weighing 4.4 pounds or greater.
BRAVECTO is also indicated for the treatment and control of Amblyomma americanum (lone star tick) infestations for 8 weeks in dogs and puppies 6 months of age and older, and weighing 4.4 pounds or greater.

Dosage and Administration:
BRAVECTO may be administered orally as a single dose every 12 weeks according to the Dosage Schedule below to provide a minimum dose of 11.4 mg/lb (0.25 mg/kg) body weight.
BRAVECTO may be administered every 4 weeks in case of potential exposure to Amblyomma americanum ticks (see Effectiveness).
BRAVECTO should be administered with food.

Dosage Schedule

<table>
<thead>
<tr>
<th>Body Weight (lbs)</th>
<th>Fluralaner Content (mg)</th>
<th>Chews Administered</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.4 – 9.9</td>
<td>112.5</td>
<td>One</td>
</tr>
<tr>
<td>&gt;9.9 – 22.0</td>
<td>250</td>
<td>One</td>
</tr>
<tr>
<td>&gt;22.0 – 64.0</td>
<td>500</td>
<td>One</td>
</tr>
<tr>
<td>&gt;64.0 – 88.0</td>
<td>1000</td>
<td>One</td>
</tr>
<tr>
<td>&gt;88.0 – 123.0*</td>
<td>1400</td>
<td>One</td>
</tr>
</tbody>
</table>

* Dogs over 123.0 lb should be administered the appropriate combination of chews.

Treatment with BRAVECTO may begin at any time of the year and can continue year round without interruption.

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

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

Keep BRAVECTO in a secure location out of reach of dogs, cats, and other animals to prevent accidental ingestion or overdose.

Precautions:
Fluralaner is a member of the isoxazoline class. This class has been associated with neurologic adverse reactions including tremors, ataxia, and seizures. Seizures have been reported in dogs receiving isoxazoline class drugs, even in dogs without a history of seizures. Use with caution in dogs with a history of seizures or neurologic disorders.

BRAVECTO has not been shown to be effective for 12-weeks duration in puppies less than 6 months of age. BRAVECTO is not effective against Amblyomma americanum ticks beyond 8 weeks after dosing (see Effectiveness).

Adverse Reactions:
In a well-controlled U.S. field study, which included 294 dogs (224 dogs were administered BRAVECTO every 12 weeks and 70 dogs were administered an oral active control every 4 weeks and were provided with a tick collar), there were no serious, adverse reactions. All potential adverse reactions were recorded in dogs treated with BRAVECTO over a 122-day period and in dogs treated with the active control over an 84-day period. The most frequently reported adverse reactions in dogs in the BRAVECTO and active control groups were vomiting.

Percentage of Dogs with Adverse Reactions in the Field Study

<table>
<thead>
<tr>
<th>Adverse Reaction (AR)</th>
<th>BRAVECTO Group: Percentage of Dogs with the AR During the 182-Day Study (n=224 dogs)</th>
<th>Active Control Group: Percentage of Dogs with the AR During the 84-Day Study (n=70 dogs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vomiting</td>
<td>7.1</td>
<td>14.3</td>
</tr>
<tr>
<td>Decreased Appetite</td>
<td>6.7</td>
<td>0.0</td>
</tr>
<tr>
<td>Diarrhea</td>
<td>4.9</td>
<td>2.9</td>
</tr>
<tr>
<td>Lethargy</td>
<td>5.4</td>
<td>7.1</td>
</tr>
<tr>
<td>Polydipsia</td>
<td>1.8</td>
<td>4.3</td>
</tr>
<tr>
<td>Flatulence</td>
<td>1.3</td>
<td>0.0</td>
</tr>
</tbody>
</table>

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

Post-Approval Experience (2019):
The following adverse events are based on post-approval adverse drug experience reporting. Not all adverse events are reported to FDA/VOM. It is not always possible to reliably estimate the adverse event frequency or establish a causal relationship to product exposure using these data.

The following adverse events reported for dogs are listed in decreasing order of reporting frequency for fluralaner:
Vomiting, lethargy, diarrhea (with and without blood), anorexia, pruritis, polydipsia, seizures, allergic reactions (including hives, swelling, erythema), dermatitis (including crusts, pusules, rash), tremors, and ataxia.

Contact Information:
For a copy of the Safety Data Sheet (SDS) or to report suspected adverse drug events, contact Merck Animal Health at 1-800-224-5318. Additional information can be found at www.bra vecto.com.

Clinical Pharmacology:
Fluralaner Concentrations are achieved between 2 hours and 3 days following oral administration, and the elimination half-life ranges between 9.3 to 16.2 days. Quantifiable drug concentrations can be measured (lower than necessary for effectiveness) through 112 days. Due to reduced drug bioavailability in the fasted state, fluralaner should be administered with food.

Mode of Action:
Fluralaner is a flavinoidic urea and belongs to the class of isoxazoline-substituted benzamidesthetic derivatives. Fluralaner is an inhibitor of the arthropod nervous system. The mode of action of fluralaner is the antagonism of the ligand-gated chloride channels (gamma-aminobutyric acid (GABA)-receptor and glutamate-receptor).

Effectiveness:
BRAVECTO began to kill fleas within two hours after administration in a well-controlled laboratory study. In a European laboratory study, BRAVECTO killed fleas and Ixodes ricinus ticks and reduced the numbers of live Ixodes and Ixodes ricinus ticks on dogs by >98% within 12 hours for 8 weeks. In a well-controlled laboratory study, BRAVECTO demonstrated 100% effectiveness against adult fleas 48 hours post-infection for 12 weeks. In well-controlled laboratory studies, BRAVECTO demonstrated ≥59% effectiveness against Dermacentor variabilis, Ixodes scapularis, and Rhipicephalus sanguineus ticks 48-hours post-infection for 12 weeks. BRAVECTO demonstrated ≥70% effectiveness against Amblyomma americanum 72 hours post-infection for 8 weeks, but failed to demonstrate ≥90% effectiveness beyond 8 weeks.

In a well-controlled U.S. field study, a single dose of BRAVECTO reduced fleas by ≥99.7% for 12 weeks. Dogs with signs of flea allergy dermatitis showed improved in erythema, alopecia, puppules, scales, and crustation as a direct result of eliminating flea infestations.

Pediatric:
In a well-controlled U.S. field study, which included 559 dogs; administered to 224 dogs, 80.7% of dogs voluntarily consumed BRAVECTO within 5 minutes, an additional 12.5% voluntarily consumed BRAVECTO within 5 minutes when offered with food, and 6.9% refused the dose or required forced administration.

Animal Safety:
Marginal of Safety Study: In a margin of safety study, BRAVECTO was administered orally to 8- to 9-week-old puppies at 1, 3, and 5X the maximum labeled dose of 56 mg/kg, at three, 8-week intervals. The dogs in the control group (0X) were untreated.

There were no clinically-relevant, treatment-related effects on physical examinations, body weights, food consumption, clinical pathology (hematology, clinical chemistry, coagulation tests, and urinalysis), gross pathology, histopathology, or organ weights. Diarrhea, mucoid, and bloody feces were the most common observations in this study, occurring at a similar incidence in the treated and control groups. Five of the twelve treated dogs that experienced one or more of these signs did so within 6 hours of the first dosing. One dog in the 3X treatment group was observed to be dull, inappetant, with evidence of bloody diarrhea, vomiting, and weight loss beginning five days after the first treatment. One dog in the 1X treatment group vomited food 4 hours following the first treatment.

Reproductive/Spay Study: BRAVECTO was administered orally to intact, reproducitively-sound male and female Beagles at a dose of up to 168 mg/kg (equivalent to 3X the maximum label dose) on three to four occasions at 8- week intervals. The dogs in the control group (0X) were untreated.

There were no clinically-relevant, treatment-related effects on the body weights, food consumption, reproductive performance, semen analysis, litter data, gross necropsy (adult dog), or histopathology findings (adult dogs and puppies). One adult 3X treated dog suffered a seizure during the course of the study (46 days after the third treatment). Abnormal salivation was observed on 17 occasions; in six treated dogs (11 occasions) after dosing and four control dogs (6 occasions).

The following abnormalities were noted in 7 pups from 2 of the 10 dams in only the treated group during gross necropsy examination: limb deformity (4 pups), enlarged heart (2 pups), enlarged spleen (3 pups), and crypt palpate (2 pups). During veterinary examination at Week 7, two pups from the control group had inguinal testicles, and two and four pups from the treated group had inguinal and cryptorchid testicles, respectively. No undescended testicles were observed at the time of necropsy (days 50 to 76).

In a well-controlled field study BRAVECTO was used concomitantly with other medications, such as vaccines, antibiotics, and steroids. No adverse reactions were observed from the concurrent use of BRAVECTO with other medications.

Storage Information:
Do not store above 86°F (30°C).

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

Approved by FDA under NADA # 141-426
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Rev. 04/19
HSVMA Leadership Council stands against feline declawing

The AVMA’s recent statement discouraging feline onychectomy as an elective procedure aligns with the popular stance throughout the global veterinary profession, but will it prompt more states to ban the procedure?

By Holly Cheever, DVM, Anne Fawcett, BA(Hons), BSc(Vet)(Hons), BVSc (Hons), MVS GradCertEdStud, MANZCVS (Animal Welfare), DECAWBM (AWSEL), and Nicholas H. Dodman, BVMS, DACVB, DACVAA

The Humane Society Veterinary Medical Association is pleased that the American Veterinary Medical Association (AVMA) has amended its position statement to reflect disapproval of feline declawing (onychectomy). According to the current statement, AVMA “discourages the declawing of cats as an elective procedure and supports nonsurgical alternatives,” stressing that “onychectomy is a surgical amputation and, if performed, multimodal perioperative pain management must be utilized.”

The AVMA is moving closer to the position of our many international colleagues who have expressed strong disapproval of declawing cats by making the procedure illegal in their countries.

Declawing frowned upon worldwide

In the United Kingdom, declawing was banned in 2006; anyone convicted of declawing a cat could face up to a year in prison and/or a fine of £20,000 (just over $26,000). Across continental Europe, the procedure is forbidden by the European Convention for the Protection of Pet Animals. It is also illegal or discouraged in many other countries, including Australia, New Zealand, Brazil, and Israel.

According to the Australian Veterinary Association’s policy on surgical alteration of companion animals’ natural functions for human convenience, declawing of cats is not supported or recommended because it is a type of surgery that does not benefit animals. This is consistent with policies of other Antipodean animal welfare organizations, including the Royal Society for the Prevention of Cruelty to Animals Australia.

We no longer need to feel conflicted or embarrassed by rejecting a practice that a majority of our international veterinary peers already eschew on the grounds that it causes dysfunction, deformity, and long-term pain, and is simply inhumane.

Refuting the arguments in favor of onychectomy

Proponents of declawing invariably justify the procedure on utilitarian grounds, claiming that it would yield the greatest outcome for the largest number of stakeholders, but this position is difficult to defend. For example, the longstanding AVMA debate on declawing cats was fueled by supporters who believe that a nondeclawed cat is more likely to be abandoned to a shelter by an owner with no tolerance for scratching/marking behaviors. Thus, cats would be “better off” declawed and remaining in their homes. But the American Association of Feline Practitioners (AAFP) and Canadian Veterinary Medical Association refute this contention, citing a lack of evidence that declawing protects cats from relinquishment, abandonment, or euthanasia.

Examination of publicly available intake and adoption records from five California cities between 2005 and 2014—before and after declaw bans were instituted—shows no correlation between a ban on declawing and increased surrender to shelters. In fact, fewer cats were surrendered after the procedure was banned (Figure 1). Additionally, data from the California cities show that fully clawed cats are no harder to place in new homes than declawed cats.

Cats do not benefit from onychectomy. Given that there are noninvasive alternatives, such as redirection of scratching behavior, environmental enrichment, and nail trimming or capping, it is difficult to support declawing on ethical or animal welfare grounds. Indeed, veterinarians who declaw cats may experience moral stress because they may feel they are acting against their values. This stress may contribute to psychological morbidity and even mortality among veterinarians. Veterinarians can
Why we need more veterinary colleges at HBCUs

By Jonathan Duonas

The first Black man to earn a Doctorate in Veterinary Medicine degree did so 123 years ago, in 1897. Seventy-one years ago, in 1949, the first Black woman followed in his footsteps. It has been 75 years since the establishment of Tuskegee University College of Veterinary Medicine (TUCVM), but African Americans today make up only 2.1% of the veterinarian workforce. It’s time for us to address this lack of diversity among American colleges of veterinary medicine.

Despite TUCVM producing roughly 70% of all African-American veterinarians, Black Americans continue to be underrepresented in the profession. In the past 10 years, five new colleges of veterinary medicine were established across America, and lack of representation makes it nearly impossible for Black Americans to pursue a number of careers, including veterinary medicine.

To truly do away with the injustices against African Americans in this country means to provide HBCUs with appropriate funding. Moreover, to increase the number of Black Americans who pursue a Doctorate in Veterinary Medicine degree, there must be more colleges of veterinary medicine at HBCUs. One is not enough!

It is well past time for another veterinary school at one of our nation’s HBCUs. Take your pick: Delaware State University, Florida A&M University, Lincoln University of Missouri, North Carolina A&T State University, South Carolina State University, Tennessee State University, University of Arkansas Pine Bluff, University of Maryland Eastern Shore, Virginia State University, West Virginia State University, University of the District of Columbia, and many others.

Black lives matter, Black representation matters, and Black veterinarians matter! We are greater than 2.1%.

REFERENCES
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ZOETIS PETCARE
Merck completes acquisition of Sentinel parasiticides

By dvm360 Staff

Merck Animal Health has completed its acquisition of US rights to Sentinel Flavor Tabs (milbemycin oxime/lufenuron) and Sentinel Spectrum Chews (milbemycin oxime/lufenuron/praziquantel)—products that target common intestinal parasites—according to a company press release. The announcement comes less than 2 months after Merck Animal Health and Virbac agreed on a price tag of about $400 million.

With this acquisition, Merck now offers a comprehensive range of products that address the seven most common parasites that affect dogs: ticks, fleas, roundworms, hookworms, whipworms, tapeworms, and heartworms.

“Our veterinary medicines, including parasiticides, and vaccines continue to transform the animal health industry and further solidify our position in the US Companion Animal category,” said Merck Animal Health President Rick DeLuca, in the release.

First diagnostic test for canine IBD now available

By dvm360 Staff

Antech Diagnostics (part of Mars Veterinary Health) has announced the availability of its Canine CE-IBD assay, the first blood test for canine inflammatory bowel disease (IBD) (also known as chronic enteropathy, or CE). Identifying IBD in dogs is traditionally invasive, time-consuming, and costly, but this new blood test allows for a rapid result of “consistent with CE/IBD” or “not consistent with CE/IBD,” according to a company release. It works by incorporating data from three biomarkers—for gliadin sensitivity (similar to gluten sensitivity), bacterial proliferation (Escherichia coli), and intestinal inflammation—to determine possible causes of a dog’s gastrointestinal (GI) signs.

The use of biomarkers, according to a recently published supporting study, helps veterinarians determine whether IBD is present, reinforce the need for additional diagnostics, develop more individualized treatment plans, and possibly monitor therapeutic response.

“The opportunity to rule in or rule out IBD early, identify possible causes and use evidence-based medicine to help pet owners understand care recommendations—all quickly and cost-effectively—allow us to treat a dog who is suffering faster,” says Jennifer Ogeer, BSc, DVM, MSc, MBA, MA, vice president of Medical Affairs & Commercial Marketing at Antech, in the release. “We can inspire confidence in a worried pet owner and gain ongoing commitment to our care recommendations, ultimately supporting a dog’s rapid return to health.”

The Canine CE-IBD assay can be used when a dog has been experiencing GI signs for a minimum of 3 to 7 days, although results are more accurate when signs persist for at least 3 weeks. The test is currently available to US veterinarians, with availability in Canada following the end of COVID-19–related travel restrictions.

REFERENCE

Osteoarthritis (OA) is underdiagnosed in dogs, particularly in smaller and younger dogs as well as those in the early stages, when clinical signs might not be evident to owners. Although veterinarians in general do a good job of identifying OA in the later stages of the disease, OA assessments aren’t always a normal part of annual evaluations—young dogs with OA may remain undiagnosed until more prominent signs appear. But we know that we can change the course of these dogs’ lives by identifying OA early, rather than waiting until OA progresses to the later stages, when there is less we can do. If we can diagnose and begin management of that disease process at a younger age, we can have a much more successful outcome for all parties involved: the pet, the pet owner, and the veterinarian.

One way to get the canine OA dialogue started earlier is by introducing the Canine OsteoArthritis Staging Tool (COAST) in practice. The COAST tool may be a good start toward changing the paradigm of OA and helping dog owners and veterinarians appreciate the need to not only identify OA in younger dogs but also intervene early.
A variety of management options exist, including weight management, nutrition, physical therapy/rehabilitation, drug therapy, and nonpharmaceutical strategies. The addition of Adequan® Canine (polysulfated glycosaminoglycan) as a US Food and Drug Administration (FDA)-approved product is ideal in cases of early-stage OA in dogs. Backed by a strong scientific foundation, Adequan Canine can proactively treat OA, when diagnosed, to slow cartilage loss in a dog’s synovial joints. The specific mechanism of action of Adequan in canine joints is not known.

Veterinarians in general practice tend to not be proactive in identifying OA, particularly in younger and smaller dogs. Many veterinarians often wait for owners to mention red flags or for clinical signs to become severe before making an OA diagnosis and initiating treatment. Although both pet owners and veterinarians still think of OA as an old dog disease, we need to move away from that misconception and start having the OA conversation sooner with pet owners of young dogs, especially the dog breeds with a higher potential to experience OA.

Recognizing OA in the early stages is a significant challenge in the primary care setting, mainly because veterinarians don’t make OA assessments a part of annual evaluations due to a lack of time and resources. The diagnosis of canine OA currently depends largely on the dog owner noticing—and bringing to the veterinarian’s attention—a general “slowdown” or a reduced ability to perform certain physical activities that affect the interaction between the dog and owner. This recognition by owners usually doesn’t happen until changes are profoundly obvious, typically when the dog is older and in the later stages of disease.

Adequan® Canine brand of polysulfated glycosaminoglycan (PSGAG).

INDICATION 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 on the last page or at adequancanine.com.
OA CAN START VERY YOUNG; IT IS A LONG-LASTING DISEASE, ESSENTIALLY FOR A LIFETIME.

In people, OA is an age-related disease: The older you get, the more likely you are to have OA. Quite possibly by association, the historic approach to OA in the veterinary industry has been to only begin management if a patient is symptomatic, at which point the disease is often quite advanced and the dog is older. OA can start very young; it is a long-lasting disease, essentially for a lifetime. Unlike the disease in humans, OA in dogs is driven primarily by developmental disease, which means that pathophysiology is beginning as puppies are developing. So in many respects, OA is not just an old dog disease. This is why it is incumbent to diagnose early, and perhaps even more important to start the conversation with pet owners before making a diagnosis is even in consideration.

SMALLER DOGS ARE MORE UNDERDIAGNOSED

“Osteoarthritis is still severely underdiagnosed at its early stages. It’s particularly underdiagnosed in smaller dogs because we still have different expectations about under diagnosing in smaller dogs than in bigger dogs. We still have a long way to go in diagnosing osteoarthritis.”

– Dr. Denis Marcellin-Little

Both owners and veterinarians may have different standards for what we expect from small dogs. We may exercise differently with them, or maybe they don’t exercise as much outside the house, so owners are less likely to notice changes in mobility and fitness. In addition, the way veterinarians think about pain in small dogs might differ from how they regard pain in big dogs. Veterinarians need to become much more proactive and more sensitive to the pain perceived by dogs, both large and small, who have OA. We need to detect it earlier and manage it more comprehensively.

THERE IS A MISCONCEPTION THAT OA IS A DISEASE OF OLDER DOGS

“When we miss identifying or diagnosing young dogs with osteoarthritis, we’ve really missed a number of years in this dog’s life where we could have been intervening.”

– Dr. Kristin Kirkby Shaw

Most people—both veterinarians and pet owners—have a perception of canine OA as being an old dog disease. Identifying OA in a young dog tends to make veterinarians uncomfortable. After all, who wants to tell the excited, proud owner of a new puppy that the dog is at risk of developing OA or is already showing early signs of disease? It can be challenging to have these conversations because most pet owners think of osteoarthritis or arthritis as a scary word.

THE IMPORTANCE OF THE OA CONVERSATION WITH PET OWNERS AND HOW TO FRAME IT

“We need to have these conversations earlier in the life of these higher-risk breeds. Pet owners need to know what potentially can occur down the road. We have to let these pet owners know that it’s okay if their young dog is diagnosed with osteoarthritis. In fact, it’s much better for all parties involved that we find it sooner rather than later.”

– Dr. Whit Cothern
However, having the OA conversation with clients early on is essential in helping early detection and allowing for early intervention. By beginning this dialogue with dog owners and letting them know it is better to identify the disease early, we can help them overcome their fear and start treatment. We as veterinarians must remember we are advocates for these dogs.

**OA IS NOT READILY DIAGNOSED IN EARLY-STAGE OA DOGS**

A big gap in veterinary medicine is the ability to diagnose developmental orthopedic disease in young dogs. Historically, veterinarians have treated OA patients when they are older and have clinical signs. We need to overcome barriers to early diagnosis so we can implement treatment early in the disease course and potentially alter the progression of OA. To do this, the industry needs more training, evidence-based tools, and guidance to give owners answers and to help identify and start treating dogs with OA earlier, when we can make more of an impact in their lives.

**BARRIERS TO EARLY DIAGNOSIS**

“Our understanding [of OA] and how we encounter it in [dogs] has remained somewhat stagnant up until very recently, but it’s accelerating. It has become very clear that we collectively as veterinarians need to radically accept that there needs to be a different way of thinking about osteoarthritis, rethinking how we recognize it, assess it, and manage it.”

– Dr. Mark Epstein

There are a few concerns regarding barriers to early diagnosis of OA. Each of these issues will need to be addressed to begin diagnosing early-stage OA in dogs.

1. **IMPROVE CLINICAL SKILLS**
   In some cases, clinicians have not been trained or are not comfortable with the clinical skills and tests needed to make an early OA diagnosis. If the opportunity to diagnose the developmental orthopedic diseases in young dogs is missed, it could eventually lead to OA or the progression of OA later in life.

2. **NEED FOR MORE EVIDENCE-BASED TOOLS**
   Veterinarians lack evidence-based tools to identify canine patients with early-stage OA. There are no successful biomarkers for the physiology or pain of OA. Clinical metrology instruments (CMIs), such as the Canine Orthopedic Index (COI) and the Canine Brief Pain Index (CBPI), are used for symptomatic patients but do not help with the problem of early OA identification. In addition, there is a large, unmet need for a staging system for OA, similar to the one created by the International Renal Interest Society (IRIS) for chronic kidney disease, that provides evidence-based treatment recommendations.

3. **MAINTAIN PRACTICE REVENUE**
   It is important for veterinarians to get in the habit of making the OA exam part of the annual pet visit. If there is a presumptive diagnosis of OA, there can be some reluctance to refer to a specialist early in the dog’s life, based on a perception of the potential loss of revenue.
Even if the visit can be monetized through dispensing of medication, the lack of independent advice regarding OA diagnosis, combined with the time constraints of a wellness exam in general practice, results in a prioritization of discussion about conditions with evidence-based solutions which can be monetized (e.g., dental care).

4. OVERCOME PSYCHOLOGICAL BARRIERS
There are also psychological barriers to having the OA conversation in primary care—for both the veterinarian and owner. Beyond the time constraints of a wellness exam, veterinarians don’t want to deliver the “bad news” of an OA diagnosis for a young dog, and owners don’t want to have a conversation about their bouncy 7-month-old Golden Retriever potentially having OA, especially if they’ve just paid a breeder a lot of money.

OA in dogs frequently develops secondary to an underlying joint disorder, such as a fracture of the joint, cranial cruciate ligament disease, or developmental orthopedic disease, which develops in young dogs. We can predict the dogs that are going to develop OA by identifying dogs with risk factors for OA, but we need evidence-based tools to do so.

Initially, the pain of OA is mild or intermittent, and dogs can function. Veterinarians tend to ignore these short-term or mild problems, waiting for clinical signs to become more severe, and owners may not notice them. We really start paying attention when the changes are more pronounced or the secondary changes from OA cause loss of the ability to go on a walk, get into a car, or climb a set of stairs. We make our task of managing OA much more difficult by waiting for the signs to be more profound.

"Osteoarthritis is actually a very predictable disease, and this is because in dogs, it’s almost always secondary to an underlying disorder of the joint. If we can identify [conditions that show up in young dogs] early, we can predict the dogs that are going to go on to develop osteoarthritis."
– Dr. Kristin Kirkby Shaw

"With the young dog, part of the reluctance is we haven’t had a great toolbox of simple or easy answers to give them. When we diagnose in a young dog, you tell the people who have the puppy that now they’re going to go see a surgeon when they just bought the expensive Golden Retriever, and they start to get a little shell-shocked."
– Dr. Anne Dagner

Veterinarians can have an impact on the disease in its early stages, including in growing dogs. If we start treating very late in the disease, then we’re really just trying to play catch-up. We need to change the way we identify OA patients, identifying them as early as possible so we can start therapy to help extend the longevity of those joints and improve the dog’s comfort and overall quality of life. We can change the whole course of a dog’s life by identifying OA early.

“One of the huge benefits about being able to identify something like osteoarthritis early is we really improve our chances of maintaining quality of life, maintaining joint function, maintaining the dog’s ability to do the things that they love to do for as long as possible. And that really is something that we should all strive to do.”
– Dr. Bryan Torres

We need to change the way we identify OA patients, identifying them as early as possible so we can start therapy to help extend the longevity of those joints and improve the dog’s comfort and overall quality of life.
The Canine OsteoArthritis Staging Tool (COAST) offers a way to begin to bridge that gap in diagnosing and evaluating young dogs with OA. It can be used to screen pets, as well as open up a conversation with owners about both symptomatic and asymptomatic pets.

FOLLOW-UP VISITS ARE MORE LIKELY WHEN SUPPORTED BY NUMERIC DATA

“I think what we’re talking about here is a checklist. For me, that’s the first thing: Get a screening checklist, a catch-all to open up a conversation.”
– Dr. Duncan Lascelles

The Canine OsteoArthritis Staging Tool allows the primary care clinician to recognize these very early OA dogs in particular and advance the discussion about management prospects much earlier in the disease course than previously imagined. COAST is used by both dog owners and veterinarians to grade the impact of OA on the dog:

- The owner completes a CMI (questionnaire) as well as his or her perception of the dog’s degree of discomfort.
- The veterinarian evaluates the dog’s mobility and posture and then assesses the dog’s joints.

Veterinarians face challenges in getting dog owners to return for a more thorough OA exam and return visits. Owners are more likely to follow up when numeric data are available that indicate a potential problem (such as the IDEXX symmetric dimethylarginine [SDMA] test for renal disease). A tool providing numeric data can be tracked over time and can help veterinarians develop a partnership with owners and encourage early identification of OA.

Research Society International [OARSI] initiative in human medicine). We need tools to fill our veterinary OA toolbox and to provide owners with answers, both before and after diagnosis of early-stage canine OA.
Using a tool like COAST helps develop a partnership with owners that encourages early identification of preclinical dogs with OA risk factors as well as owner education and engagement. The COAST tool is unique in that it can and should be used as a baseline for all dogs prior to any indications of OA. By promoting a team approach that incorporates the veterinarian, nurses/technicians, and reception staff, the COAST tool can provide more opportunities to increase owner understanding of OA and the treatment plan, as well as maximize efficiency of information gathering and alleviate time constraints for the veterinarian. Go to www.adequancanine.com/resource-library to download or print a COAST form and pet owner questionnaire.

Detecting and treating OA early may be simpler, cheaper, and smarter than waiting for a dog to become severely affected by the disease. Similarly, determining a dog’s baseline can help clinicians address flare-ups. Fortunately, once we have identified dogs with early-stage OA, we can employ a variety of OA management options to help change the outcome and have a lasting impact on these patients.

By identifying dogs in the early stages of OA and then being more proactive with weight management, nutrition, disease-modifying osteoarthritis drugs (DMOADs), and rehabilitation discussions earlier in the disease course, veterinarians can help delay the onset of clinical signs of OA, slow the progression of the disease, and extend the nonpainful years for these dogs, ultimately perhaps even postponing euthanasia.

With early intervention, the following is helpful to pet owners:

- Being able to delay the need for prescribing pain medications
- Education about signs of OA pain and progression to look for
- A follow-up visit with some form of evaluation
Focusing on early intervention allows veterinarians to create an environment in which dog owners are aware of the risk factors and goals of OA management. This includes setting dogs up for maintenance of a lean body mass, keeping them active through daily exercise, and defining what will help keep these dogs comfortable, such as lifestyle and activity changes. Veterinarians can also use this opportunity to discuss with owners when dogs start to have changes away from their baseline and how to get flare-ups under control using multimodal management to address pain and discomfort.

“I think there’s a misconception among dog owners and veterinarians that dogs with osteoarthritis shouldn’t be active. And really it’s quite the opposite. We need to keep those joints moving, whether it’s through manual therapy with a physical therapist or a rehab vet or it’s just having the dog do a series of exercises at home.”

– Dr. Kristin Kirkby Shaw

Veterinarians have a number of options, including weight management, nutrition, and physical therapy/rehabilitation, that can be implemented earlier in the course of OA, when they’ll be much more effective. Protecting strength, joints, joint motion, and fitness in a dog is better than trying to recover all of those elements after they’re lost.

In a young dog that’s been diagnosed with developmental orthopedic disease or OA, veterinarians need to provide the right exercise recommendations to the owner, whether it’s taking the dog to a rehabilitation facility or just giving the client basic exercises for the dog to do at home, as well as reinforcing the foundation of taking the dog for a walk every day.

If the general practitioner suspects early OA but is uncomfortable making a diagnosis, partnering with a rehabilitation specialist is a positive option. Rehabilitation specialists can spend the time needed to thoroughly evaluate the patient and have a comprehensive discussion with the owner. A specialist can further educate the owner about the disease state and OA progression, the importance of early intervention, and the benefits of various OA management options. Along with prescribing a drug or treatment, they can take time to explain the reasons behind the recommendations and provide owners with detailed guidance on activity modification and at-home, low-impact exercises to help the dog stay active or regain function.

Adequan® Canine (polysulfated glycosaminoglycan) is approved by the FDA to slow cartilage loss in a dog’s synovial joints. Backed by scientific evidence, Adequan Canine proactively treats the disease, unlike other products, which are used retroactively. The specific mechanism of action of Adequan in canine joints is not known. Adequan Canine can help keep clients coming back to the practice and can be ideal for use in dogs with early-stage OA.

Adequan® Canine (polysulfated glycosaminoglycan) is a brand of polysulfated glycosaminoglycan (PSGAG).

**INDICATION** 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 on the last page or at adequancanine.com.
ADEQUAN® CANINE (polysulfated glycosaminoglycan) HAS A STRONG SCIENTIFIC FOUNDATION

“Adequan Canine is the only [product] that has been proven to positively impact the course of joint disease over time.”
– Dr. Denis Marcellin-Little

The original histologic studies done on Adequan Canine demonstrated physiologic changes in the cartilage, providing a strong scientific foundation for the use of this product. Evidence from the early studies indicates dogs receiving Adequan Canine during early joint degeneration do much better than dogs not receiving it. Many products that veterinarians use in managing OA don’t have that level of evidence backing their use for protecting cartilage in dogs, which ultimately can have a functional impact on these dogs and how mobile they are at home.

THE USE OF AN FDA-APPROVED PRODUCT SUCH AS ADEQUAN CANINE OVER A NUTRACEUTICAL IS PREFERRED

“Adequan Canine is FDA approved. It’s not treated like a traditional oral nutraceutical that potentially doesn’t have some oversight body.”
– Dr. Bryan Torres

Adequan Canine is the only FDA-approved disease-modifying osteoarthritis drug (DMOAD) that inhibits cartilage loss in a dog’s synovial joints. It empowers veterinarians to proactively treat the disease, not just the signs of canine OA. Experts agree among COAST stage 2 and 3 patients, they would support the recommendation of Adequan Canine over a nutraceutical. In addition, the fact that Adequan Canine is FDA approved and has an efficacy study backing its use makes it a preferable direction.

ADEQUAN CANINE KEEPS BUSINESS WITHIN THE PRACTICE

“It’s not only that it’s an injectable that the client is coming in for us to administer, but it’s also a product that allows you to reestablish yourself as the expert, as the trusted resource for the pet owner. Adequan Canine provides you the opportunity to have these discussions about osteoarthritis.”
– Dr. Whit Cothern

Adequan Canine gives veterinarians a unique opportunity to better control the management of OA progression with the dog owner. Because veterinarians administer this injectable in-clinic, it helps prevent owners from using potentially unreliable products.

Adequan Canine is the only FDA-approved disease-modifying osteoarthritis drug (DMOAD) that inhibits cartilage loss in a dog’s synovial joints.

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General practitioners can again be the trusted valuable resource to pet owners, where they want to come to you to discuss OA and disease progression in their pet.

**ADEQUAN® CANINE (polysulfated glycosaminoglycan) IS SUITABLE FOR DOGS IN WHICH JOINT DISEASE IS DIAGNOSED EARLY**

“In my practice, I talk about Adequan Canine with almost every patient because I feel like it’s such an important component of a comprehensive osteoarthritis plan. There’s really nothing else out there quite like it. So, I’m going to talk about weight management, I’m going to talk about activity recommendations, and then I’m almost always going to talk about Adequan Canine, especially in young dogs that may not be severely symptomatic. We have the opportunity to give what I describe to owners as an “insurance policy” for their dog’s cartilage, and by starting it early on, we’re going to potentially change the course of the OA disease.”

– Dr. Kristin Kirkby Shaw

As veterinarians are starting to move into the process of slowing down and minimizing progression of arthritic changes in these early-stage patients, that’s a very good avenue of timing for when Adequan Canine should be introduced, as opposed to waiting until the patient comes back with severe radiographic signs, severe periarticular fibrosis, and a loss of range of motion.

**WHY USE ADEQUAN CANINE?**

“Adequan Canine is remarkable because of its ability to protect the cartilage of dogs that are developing osteoarthritis. It’s able to protect cartilage from degeneration, and we don’t have that type of information about other things that we use in managing osteoarthritis in dogs.”

– Dr. Denis Marcellin-Little

The main goals when using Adequan Canine are to slow the progression of OA and reduce joint inflammation. In some cases, owners may not yet appreciate their dog’s discomfort in everyday movements, or their dog may only have mild changes in activity. By starting Adequan Canine early after an OA diagnosis, veterinarians may be able to delay or deter the use of traditional pain medications.

**INDICATION**

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The active ingredient in Adequan® Canine is polysulfated glycosaminoglycan (PSGAG). PSGAG is polysulfated glycosaminoglycan isolated by extracting glycosaminoglycans (GAGs) from bovine tracheal cartilage. GAGs are polysaccharides composed of repeating disaccharide units. The GAG present in PSGAG is principally chondroitin sulphate containing 3 to 4 sulfate esters per disaccharide unit. The molecular weight for PSGAG used in the manufacture of Adequan® is 3,000 to 15,000 daltons. Each mL of Adequan® Canine contains 100 mg of PSGAG, 0.9% v/v benzyl alcohol as a preservative, and water for injection q.s. to 1 mL. Sodium hydroxide and/or hydrochloric acid have been added when necessary to adjust pH. The solution is clear, colorless to slightly yellow.

Pharmacology: The specific mechanism of action of Adequan® in canine joints is not known. PSGAG is characterized as a “disaccharides modifying osteoarthritis drug”. Experiments conducted in vitro have shown PSGAG to inhibit certain catabolic enzymes which have increased activity in inflamed joints, and to enhance the activity of some anabolic enzymes. For example, PSGAG has been shown to significantly inhibit serine proteinases. Serine proteinases have been demonstrated to play a role in the Interleukin-1 mediated degradation of cartilage proteoglycans and collagen. PSGAG is reported to be an inhibitor of Prostaglandin E2 (PGE2) synthesis. PSGAG has been shown to increase the loss of proteoglycan from cartilage. PSGAG has been reported to inhibit some catabolic enzymes such as elastase, stromelysin, metalloproteinases, cathepsin B1, and hyaluronidases, which degrade collagen, proteoglycans, and hyaluronic acid in degenerative joint disease. Anabolic effects studied include ability to stimulate the synthesis of protein, collagen, proteoglycans, and hyaluronic acid in various cells and tissues in vitro. Cultured human and rabbit chondrocytes have shown increased synthesis of proteoglycan and hyaluronic acid in the presence of PSGAG. PSGAGs have shown a specific potentiating effect on hyaluronic acid synthesis by synovial membrane cells in vitro. Absorption, distribution, metabolism, and excretion of PSGAG following intramuscular injection have been studied in several species, including rats, rabbits, humans, horses and dogs.

Studies in rabbits showed maximum blood concentrations of PSGAG following IM injection were reached between 20 to 40 minutes following injection, and that the drug was distributed to all tissues studied, including articular cartilage, synovial fluid, adrenals, thyroid, peritoneal fluid, lungs, eyes, spinal cord, kidneys, brain, liver, spleen, bone marrow, skin, and heart. Following intramuscular injection of PSGAG in humans, the drug was found to be bound to serum proteins. PSGAG binds to both albumin and chi- and beta-globulins and the extent of the binding is suggested to be 30 to 40%. Therefore, the drug may be present in both bound and free form in the bloodstream. Because of its relatively low molecular weight, the synovial membrane is not a significant barrier to the transfer of PSGAG from the bloodstream to the synovial fluid. This systemic distribution from the synovial fluid to the cartilage takes place by diffusion. In the articular cartilage the drug is deposited into the cartilage matrix. Serum and synovial fluid distribution curves of PSGAG have been studied in dogs and appear similar to those found in humans and rabbits. In rabbits, metabolism of PSGAG is reported to take place in the liver, spleen, and bone marrow. Metabolism may also occur in the kidneys. PSGAG administered intramuscularly and not protein bound or bound to other tissues is excreted primarily via the kidneys, with a small proportion excreted in the feces.

Toxicity: In a subacute toxicity study, 32 adult beagle dogs (4 males and 4 females per treatment group) received either 0.9% saline solution or PSGAG at a dose of 5 mg, 15 mg, or 50 mg per kg of body weight (approximately 2.3, 6.8, or 22.7 mg/lb), via intramuscular injection twice weekly for 13 weeks. PSGAG dose levels were not equivalent to 10% (3X), 30% (10X) the recommended dosage of 2 mg/kg, and more than 3 times the recommended 4-week duration of treatment. Necropsies were performed 24 hours after the final treatment. During week 12, one dog in the 50 mg/kg dosage group developed a large hematoma at the injection site which necessitated euthanasia. No other mortalities occurred during the treatment period. Statistically significant changes in the 50 mg/kg group included increased body weight, increased body length, increased body weight gain, increased food consumption, increased body fat, increased body water, and increased liver weights. Increased cholesterol and kidney weights were noted in the liver and kidney. No macroscopic lesions were noted in the kidneys. Microscopic lesions included increased fat accumulation, increased cholestasis, and increased liver cell mitoses. No significant changes in any of the other organ systems were noted. Changes in body weight and food consumption were noted in dogs treated with PSGAG at doses of 10% and 30% of the recommended dosage, but not at the highest dose level.

In a 1-year carcinogenicity study, 150 male and female Sprague-Dawley rats were used and divided into 5 groups. One group received 5 mg/kg of PSGAG twice weekly for up to 52 weeks; the three other groups received 15 mg/kg, 30 mg/kg, and 50 mg/kg, respectively, and the 5th group received 0.9% saline solution. At the end of the treatment period, all animals were autopsied. Significant changes were observed in the kidneys, testes, spleen, trachea, and lungs. Kidney changes included a decrease in glomerular filtration rate and an increase in glomerular basement membrane thickness. Testicular changes included an increase in seminiferous tubule diameter. The spleen changes included an increase in number of red blood cell macrophages and an increase in the number of lymphocytes. No significant histopathological changes were observed in the tissues and organs. There were no significant changes in the other clinical parameters including body weight, food consumption, clinical chemistry, hematological, and urinalysis parameters. 

Adverse Reactions: The following adverse events are based on voluntary, post-approval reporting. Not all adverse reactions are reported to FDA/CVM. It is not always possible to reliably estimate the adverse event frequency or establish a causal relationship to product exposure using these data. The signs reported are listed in decreasing order of reporting frequency.

Storage: Adequan® Canine Solution 100 mg/mL in a 5 mL preserved multiple dose vial. Multiple dose vial for intramuscular use in dogs.

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

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

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When cats get hangry...

A new study finds an explanation for why it’s so difficult for owners of obese cats to restrict their pet’s diet.

By Michael Nappier, DVM, DABVP

Up to 60% of cats in the United States are obese. One of the most common methods used to treat obesity is calorie restriction. Because many owners find calorie restricting their cat to be difficult, however, compliance with this recommendation often suffers. Despite calorie restriction being arguably critical to the successful treatment of feline obesity, little is known about how this dietary change affects cats’ feeding patterns and intake of food.

What they did
To find out, researchers assigned 80 domestic shorthair cats to one of two groups (n = 40 each) that were balanced for sex, age, weight, and body condition score. Several cats ultimately were excluded from the trial due to failure to adjust to their social group, leaving 38 cats in the test group (weight 4.2 ± 0.9 kg) and 31 cats in the control group (weight 4.4 ± 0.8 kg).

All cats were fed an identical commercially available diet on an identical schedule from an electronic feeding device. They were given canned food in the morning and dry food in the afternoon/overnight, with very occasional treats. The test group was mildly calorie restricted (6%) by cutting off access to additional food when their allotted calorie intake was reached. All cats were monitored for 9 months, after which the calorie restriction was ended.

What they found
Fed ad libitum, cats consumed about 30% of their calories in the morning serving of wet food and 70% of their calories in dry food over the remainder of the day. The cats in the restricted group quickly changed to rapidly consuming 70% of their calories in the first meal, leaving only 30% of their calories for the rest of the day. This resulted in significantly decreased food access in the evening and overnight. Because of this, the research team limited the maximum amount of calories consumed in the morning meal to 50%. The control group saw no change.

When the calorie restriction ended, the restricted group quickly reverted back to its original 30/70 calorie consumption ratio. The researchers also noted an increase in fights during the pre-meal time period in the calorie-restricted group.

What to take home
Restricting cats’ calories changes their feeding behavior significantly. They tend to eat larger meals faster, consuming their allotted calories more quickly. This is compared with the normal feline behavior of multiple small meals throughout the day. The authors also showed that calorie-restricted cats tend to get “hangry.” In the home environment, the authors suggest, these changes would likely result in begging behavior that could in turn make owner compliance with calorie restriction less likely. The authors also suggest that strategies such as puzzle feeders or dividing the cats’ food into multiple smaller meals could be a strategy to combat these changes.

Dr. Nappier is assistant professor of community practice in the Department of Small Animal Clinical Sciences at the Virginia-Maryland College of Veterinary Medicine in Blacksburg, Virginia.

REFERENCE

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dvm360 introduces new editorial advisory board

By dvm360 Staff

vm360 is proud to introduce our new editorial advisory board, a 19-member group of veterinary leaders who will assist in identifying key industry trends, suggest editorial and business opportunities, and serve as brand ambassadors. Our chief veterinary officer is thrilled about the brain power the board will bring to our family of publications, including dvm360, Vetted, and Firstline, as well as current and future multimedia endeavors.

“We are honored to have an advisory board full of talent, innovation and passion for veterinary medicine. I look forward to seeing the many ways in which relevant, important and necessary content becomes displayed to the world,” says Dr. Adam Christman, DVM, MBA.

Following are our new board members, including their areas of specialty and a few fun facts about them.

LIZ BALES, VMD
Dr. Bales is a 2000 graduate of the University of Pennsylvania School of Veterinary Medicine. Her special interest is the unique behavioral and wellness needs of cats. She is a writer, speaker, and featured expert in all things cat around the globe.

Dr. Bales is allergic to cats!

CHRISTOPHER J. ALLEN, DVM, JD
Dr. Allen is president of Associates in Veterinary Law, PC, which practices exclusively in the areas of veterinary law, partnership and management structure and disputes, probate involving veterinary practices, contracts, and practice mergers and acquisitions. After admission to the bar in New York’s First Judicial Department (Manhattan) in 1982 and veterinary school graduation in 1988, Dr. Allen purchased a multi-doctor private veterinary hospital in New York. In 1994, he opened his law practice. He writes the monthly dvm360 column “Letter of the Law.”

An American muscle car enthusiast, Dr. Allen owns a 1970 Plymouth Superbird, which he drove on the Atlanta Motor Speedway and Talladega.

JAN BELLOWS, DVM, DAVDC, DABVP
Dr. Bellows, a long-time contributor to dvm360, is the current president of the Foundation for Veterinary Dentistry. He practices veterinary dentistry at All Pets Dental in Weston, Florida.

Dr. Bellows is an avid runner. To date, he has completed 83 full marathons.

MARTY BECKER, DVM
A passionate advocate for the human-animal bond, Dr. Becker is the founder of Fear Free, which works to prevent and alleviate fear, anxiety, and stress in pets. This includes veterinary and other pet professionals, pet parents (FearFreeHappyHomes.com), as well as animal shelter and rescue group staff and volunteers (FearFreeShelters.com). Dr. Becker was integral in introducing Happy Paws magazine, which helps owners provide their pets with the physical and emotional care they need to live happier, healthier, and fuller lives. Dr. Becker practices at North Idaho Animal Hospital.

Dr. Becker did, in fact, raise Idaho potatoes. He has also played a Stradivarius and been inside the torch of the Statue of Liberty.
ASHLEY BOURgeois, Dvm, dacvd
Dr. Bourgeois practices at Animal Dermatology Clinic in Portland, Oregon. She is an owner/shareholder and on the board of directors for the practice group, which has locations in California, Kentucky, Indiana, Georgia, Australia, and New Zealand. Dr. Bourgeois is passionate about educating veterinarians about dermatology and work-life balance through her podcast, speaking engagements, and social media presence (TheDermVet). She is a mom of two young kids.

Within a single week, Dr. Bourgeois went skydiving in New Zealand, and scuba diving and bungee jumping in Australia.

WALTER BROWN, BS, RVtg
Social media influencer, digital cinematographer, and comedian Walter “Skinni Go Live” Brown combines his background in veterinary medicine with comedy to bring education and relief to veterinary professionals and pet owners (facebook.com/lilskinni). He started his social media comedy career in 2018 as the voice for the National Pan-Hellenic Council organizations and the University of Georgia’s Bulldawg Nation and now “VetMed Funnies.” Outside comedy, Brown enjoys learning and training in the field of emergency and critical care.

Brown is a tarantula enthusiast.

ELIZABETH “BETSY” CHARLES, DVM, MA
Dr. Charles combines a variety of professional experiences with her love of veterinary medicine to help others be the best they can be. After graduating from Washington State University College of Veterinary Medicine in 2003 and completing an internship with an equine referral hospital, she joined a performance horse practice as an associate veterinarian. After 3 years, she was promoted to director of the practice’s imaging center. She is also an adjunct professor at Washington State University. She loves to teach, read, ride her horse Lenny, and spend time with her way too energetic red heeler, Sadie.

Dr. Charles has not seen a single episode of “Friends” or “Seinfeld.”

STEPHEN CITAl, RVt, SRA, RLAT, VCC, CVPP, VTS-LAM
Cital is a multi-credentialed veterinary technician whose focus has been on anesthesia and pain management in all species. More recently he has become well known for his contributions to the research and education on cannabinoids in veterinary medicine. A frequent writer and lecturer, Cital is also known for his push for technician advancement and diversity within the veterinary industry. You can find him on Instagram (@animalguy).

Cital is an avid plant collector and self-proclaimed chef of Latin dishes.

BO BROCK, DVM
Dr. Brock owns a thriving, multi-species veterinary clinic in Lamesa, Texas (population 9207 and sometimes referred to as “the middle of nowhere”). He graduated from Texas A&M University College of Veterinary Medicine & Biomedical Sciences and was voted equine practitioner of the year for the state of Texas in 2007. In addition to practicing veterinary medicine, Dr. Brock is an active public speaker, an author, and an adjunct professor at Texas Tech University.

Dr. Brock writes the hilarious “Stampede” column in dvm360, where he recounts his adventures in practicing veterinary medicine in small-town America.
STEVE DALE, CABC
Dale hosts two nationally syndicated radio shows, speaks at conferences around the world, and is a special contributor at Chicago's WGN Radio. He formerly hosted Animal Planet Radio, wrote a syndicated column for the Chicago Tribune, and was a contributing editor for USA Weekend and columnist at Cat Fancy magazine. He serves on the boards of directors of the Human Animal Bond Association and Winn Feline Foundation, and is an advocate and speaker of Fear Free and Cat Friendly Practices. His blog is stevedale.tv.

BASH HALOW, LVT, CVPM
Halow is a veterinary business advisor and a veteran practice manager. Through Halow Consulting, he has helped dozens of veterinary hospitals build stronger teams and grow their businesses responsibly and ethically. He is a frequent contributor to many veterinary publications and a speaker at national and international conferences. He founded the New Jersey Veterinary Hospital Management Association and the Big Apple Veterinary Management Association in New York City. He lives in New York City and Northeastern Pennsylvania.

DAVID DYCUS, DVM, MS, CCRP, DACVS-SA
Dr. Dyarus is medical director, chief of orthopedic surgery, and co-founder/co-director of Nexus Veterinary Specialists and the Veterinary Sports Medicine & Rehabilitation Institute in Baltimore, Maryland. He lectures nationally and internationally, has published numerous research articles, authored or co-authored several book chapters, and is co-editor of the textbook Complications in Canine Cranial Cruciate Ligament Surgery. Along with being a scientific reviewer for multiple journals, he serves on the editorial review board and is the associate editor (orthopedics) for Veterinary Surgery.

LIZ HUGHSTON, MED, RVT, CVT, LVT, VTS (SAIM) (ECC)
Hughston is a relief technician, trainer, and consultant in the San Francisco Bay Area for both general and emergency/specialty practices. She worked on the committee that developed the California RVT Association’s mentor program and is the former co-chair of the AVECCCT Mentor Committee. She currently chairs the AIMVTC Credentialing Committee and is president of the National Veterinary Professionals Union. She is co-editor of an upcoming textbook on veterinary cannabis use and works with clients as a certified veterinary cannabis counselor.

SHAWN MESSONNIER, DVM
Dr. Messonnier is the proud author of several award-winning books: The Natural Health Bible for Dogs & Cats, The Natural Vet’s Guide to Preventing and Treating Cancer in Dogs, and Breast Choices for the Best Chances: Your Breasts, Your Life, and How YOU Can Win The Battle! He is a 1987 graduate of Texas A&M University College of Veterinary Medicine & Biomedical Sciences and owns Paws & Claws Holistic Animal Hospital in Plano, Texas. His special interest include functional medicine, Chinese/Western herbology, homeopathy, homotoxicology, nutritional therapies, and acupuncture.

CHRIS PACHEL, DVM, DACVB, CABC
Dr. Pachel has operated both house-call and office-based behavior practices and currently owns and is lead clinician at the Animal Behavior Clinic in Portland, Oregon. He lectures regularly throughout the United States and internationally, teaches at multiple US veterinary schools, and has authored several articles and book chapters on topics such as intercat aggression and pet selection for animal-assisted therapy. He is a sought-after expert witness in legal cases involving animal behavior and is vice president of veterinary behavior on the executive leadership team for Instinct Dog Behavior and Training.

Fun Fact
Dale is in the Dog ‘Writers’ Hall of Fame.

Fun Fact
Dr. Dyarus is deathly afraid of cockroaches.

Fun Fact
Halow is a closeted chicken hoarder. He can’t pass a tractor supply without going in to see if they have baby chickens for sale. He usually leaves with “only eight” because he tells himself that as long as he keeps it under 10 his habit is under control.

Fun Fact
Hughston attended rodeo camp in Northern California every summer for more than 10 years.

Fun Fact
Dr. Pachel a classically trained musician, although he’s been out of practice for some time!
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KATHRYN PRIMM, DVM, CVPM
Dr. Primm speaks with students, other veterinarians, and pet owners about effective communication, marketing, and the roller-coaster that is private practice. She hosts two popular podcasts on Pet Life Radio, is resident veterinarian for iheartdogs.com and iheartcats.com, and is author of Tennessee Tails: Pets and Their People. The world’s first Fear Free—certified professional, Dr. Primm sits on the Fear Free Advisory Panel. She is owner, founder, manager, and chief veterinarian at Applebrook Animal Hospital in Ooltewah, Tennessee.

Among Dr. Primm’s favorite things to do at work is sing song lyrics but change the words to fit the situation. “For example, if we are feeling a dog all over for ticks,” she says, “I might sing, ‘It’s the final patdown....”

EMILY SEIDL, DVM
Emily Seidl earned her DVM from the Atlantic Veterinary College in Prince Edward Island, Canada. She spent her formative years working for animal shelters in Lancaster, Pennsylvania, and training capuchin monkeys at Franklin & Marshall College. Today, she is the shelter veterinarian at the Animal Welfare Association in Voorhees, New Jersey.

Six years ago, Dr. Seidl agreed to be an emergency foster for a 3-week-old kitten that had been found in a field missing three legs, an ear tip, and its tail. Today, Suki is living her best life with Dr. Seidl in New Jersey.

MARC A. ROSENBERG, VMD
Dr. Rosenberg is medical director at Voorhees Veterinary Center in Voorhees, New Jersey. For the past 12 years he has served on the New Jersey State Board of Veterinary Medical Examiners. In 1982, he hosted America’s first nationally televised pet information show, “People, Pets, & Dr. Marc,” on PBS. He is the author of the monthly dvm360 column “The Dilemma.”

Dr. Rosenberg won a silver medal in the Senior Olympics (over age 70) basketball competition.

Emily Seidl earned her DVM from the Atlantic Veterinary College in Prince Edward Island, Canada. She spent her formative years working for animal shelters in Lancaster, Pennsylvania, and training capuchin monkeys at Franklin & Marshall College. Today, she is the shelter veterinarian at the Animal Welfare Association in Voorhees, New Jersey.

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DNA debunks age-old ratio for dog years to human years

By tracking age-related progressions in gene methylation patterns of dogs and comparing them with those previously observed in people, researchers have constructed a new “epigenetic clock” for translating dog years to human years.

By Joan Capuzzi, VMD

All mammals pace their way through similar milestones, from embryogenesis to birth; then infancy, youth, and adolescence; and, finally, maturity, senescence, and death.1 But every species ages at its own clip. Some compress their lives into a couple years, while others, like certain whales, take an entire century to cycle through the life stages.

Because ripening times vary widely among animals, correlating the age of one species with that of another is like comparing apples and oranges. This reality contradicts the age-old credo that we can calculate the human equivalent of a dog’s age simply by multiplying by 7.

Defining dog years
Researchers at the University of California San Diego School of Medicine recently created a formula that offers a more accurate comparison of age in humans and dogs. It is based on fluctuations in the way dogs and humans attach methyl groups to the nucleotide bases in their genomes as they advance through the years.

The methylation pattern—or “methylome”—of the cytosine–guanine dinucleotides (CpGs) is an epigenetic mark that modifies gene transcription and thereby regulates the speed at which an organism ages and reaches specific physiologic milestones.2

Not only do people and dogs age at mismatched rates, but the two species differ in their racing times between each mile marker. The comparison between them is not linear as the 1:7 years rule of thumb suggests. The data from this study, recently published in Cell Systems, illustrates this perfectly. While a 9-year-old dog, for instance, has the approximate genetic wear-and-tear of a 65-year-old human, a canine yearling doesn’t equal a 7-year-old child but rather a 30-year-old Ready to start a family.

Seeking vintage genes
Investigators came up with these correlations by collecting blood from 104 Labrador retrievers at different life stages, ranging from 5 weeks to 16 years. The subjects were mostly recruited at canine-centric events, such as dog shows.

Using DNA extracted from whole blood samples, a technique called syntenic bisulfite sequencing was applied to characterize CpG methylation in regions of the canine genome that mirror those of humans. About 232,000 CpG sites have been found to be conserved between humans and dogs. Of these, 54,469 CpGs were well profiled in both species. Regions included exons, transcription start sites, and CpG islands or “islands.”

The researchers looked at whether the conserved methylation alterations in dogs and humans followed a constant rate of change, and whether this tempo correlated with the lifespan of each species, as is the conventional wisdom.3,4 For this, they lined up the age of each dog with the average age of its human methylene “twin.” The canine methyloemes were also compared with those previously measured in mice.5

To resolve whether conserved changes involved particular genetic regions, they coned down their study of CpG methylation sites to 7942 genes for which orthologs were present in all three species. From this, they spotted 394 genes for which methylation values showed conserved age-dependent behavior across species.

These genes occurred within five clusters, primarily developmental in function and concentrated near transcription start sites. Four of these clusters—associated with synapse assembly, neuroepithelial cell differentiation, and anatomic patterning—displayed methylation that amplified with age. The fifth cluster involved leukocyte differentiation and nucleic acid metabolism and demonstrated decreasing methylation with age.

Genetic clocks teaming dogs and people
Until now, epigenetic clocks have been used to study methylene data within a species rather than across species. But a review of established methylation values in different species reveals closer epigenetic correlations when using conserved developmental genes (less than 400 in the current study) than when casting a wider genetic net.

Analysis of the data shows that the rate of methylene remodeling is determined not only by the lifespan of a species—the shorter-lived the species, the more rapid the remodeling—but also by the timing of key physiologic events.

Tracking changes in how methyl groups attach to DNA strands reveals a conserved, though nonlinear, age-related progression between dogs and people. The study also shows that dogs age more quickly than humans at an early age, then trickle along following sexual maturity.

The highest methylene similarities—and greatest epigenetics-physicsology agreement—were observed when pairing young dogs with young humans and senior dogs with aged humans: It’s easier to define a dog in human years at either of these two poles. However, these same genetic comparisons during the intervening adolescent and mature stages are murkier.

One limitation of the study is that it used DNA from whole blood, for which age-dependent drops in leukocyte population occur in both dogs and people. These shifts could influence the findings. Second, the study focused exclusively on Labrador retrievers. Expanding the scope to include other breeds (canine subspecies) could modify the results.

Characterizing epigenetic changes across both breeds and species may help solve more global riddles, such as whether the timing of epigenetic changes early in life influences the overall lifespan of a species, or of a specific individual within a species.

By highlighting conserved patterns of epigenetic changes across species and throughout life, this research suggests that aging is more a continuation of development rather than a distinct process. By matching—or, rather, mismatching—those patterns among dogs and people, we now know that the common question, “How old is my dog in people years?” is not as straightforward as once thought.

REFERENCES

Dr. Capuzzi is a small animal veterinarian and journalist based in the Philadelphia area.
University & association news | NEWS

UC Davis names executive director of One Health Institute

Dr. Michael Ziccardi will lead the organization for 5 years.

By dvm360 Staff

Earlier this month, Michael Ziccardi, DVM, MPVM, PhD, became the new executive director of the One Health Institute at the University of California, Davis School of Veterinary Medicine. He will serve in the position for a 5-year term.

Dr. Ziccardi is a wildlife veterinarian as well as an epidemiology professor and scientist at UC Davis. He also travels around the world teaching about wildlife health and conservation.

Formed in 2009 to advance the health of animals, people, and the environment, the One Health Institute has been on the forefront of the global response to COVID-19, providing legislative guidance in the United States, and laboratory support and workforce training in other regions of the world.

“This new leadership opportunity is truly an honor,” Dr. Ziccardi says in a press release announcing his appointment. “In the midst of the COVID-19 pandemic, society has experienced first-hand the key importance of pursuing large-scale issues with a One Health focus, as well as the amazing expertise and cutting-edge science that One Health Institute staff and faculty continue to bring to the problem.”

Dr. Ziccardi received his DVM degree in 1993, his master’s in preventive veterinary medicine in 1994, and his PhD in epidemiology in 2001, all at UC Davis. He currently serves as the co-director of the Karen C. Drayer Wildlife Center—the One Health Institute’s flagship—and helps direct the Oiled Wildlife Care Network. He is a veteran of more than 50 oil spills worldwide, including establishing and leading the Marine Mammal and Sea Turtle Unit during the Deepwater Horizon spill in 2010. He has received the Pacific State/ British Columbia Oil Spill Task Force Legacy Award twice and the UC Davis Cal Aggie Alumni Foundation Outstanding Alumnus Award in 2016.

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Kentucky, Florida accept PAVE certification for veterinary licensure

By dvm360 Staff

Last month, Florida and Kentucky became the 44th and 45th of 62 US jurisdictions to accept certification from the Program for the Assessment of Veterinary Education Equivalence (PAVE) as part of the licensure process for international veterinary graduates.

PAVE evaluates the education equivalence of graduates of international, non-accredited veterinary programs on behalf of participating American Association of Veterinary State Boards (AAVSB) member boards. An international veterinary graduate who has attained PAVE certification has proven their English proficiency, passed the program’s Qualifying Science Examination (QSE), and completed an evaluated clinical experience at an institution accredited by the AVMA’s Council on Education. Candidates must also pass the North American Veterinary Licensing Examination (NAVLE) and fulfill any other requirements set forth by the jurisdiction in which the individual wishes to practice.

“The AAVSB is always laser focused on member boards having the right information at the right time to be able to make a licensure decision. This is especially pertinent today as our membership grapples with how to streamline the veterinary licensure process during the COVID-19 pandemic,” says AAVSB Executive Director James T. Penrod, CAE, FASLA, in a press release.

In addition to North America, PAVE certification is part of the veterinary licensure process in Australia and New Zealand.
Could storage mites in pet food lead to false-positive food allergy diagnoses?

Researchers recently reviewed the published literature about growth of storage mites on commercial dry pet foods.

by dvm360 staff

Canine atopic dermatitis is an inflammatory skin condition associated with the production of immunoglobulin E (IgE) specific for a substance that is either ingested or inhaled. Typical signs include pruritus, erythema, lichenification, seborrhea, and lesions from chronic inflammation, licking, chewing, and scratching. House dust mites (HDM) of the *Dermatophagoides* genus are the most common allergens recognized by the circulating IgE of atopic dogs. In laboratory experiments, dogs that are sensitized to HDM experience atopic flares when exposed to various species of storage mites. Because storage mites commonly grow on cereals used in commercial pet foods, researchers conducted a literature review to determine whether allergen cross-reactivity could lead to a false-positive diagnosis of food allergy. The results were published in *BMC Veterinary Research*.1

The investigators searched two databases for detailed studies using a series of key words. Of 87 identified articles, 10 were selected that were common to both database searches. Five articles reported results from laboratory studies, and five reported on field studies.

**Laboratory studies**

The survival and multiplication of *Dermatophagoides* HDM was first reported on dry dog food in 1972.2 Nearly 40 years later, *Tyrophagus putrescentiae* storage mites were shown to survive and grow on three commercial dry dog foods.2 *Tyrophagus* mites grew on all three dog foods, with the highest numbers of mites found whenever molds had been allowed to grow on the kibble.

In 2015, samples of dog foods stored in nine different sealed plastic bags and in a lidded cup were evaluated to see whether *T. putrescentiae* could infest and proliferate them.3 After 3 months, *Tyrophagus* storage mites were discovered in 55% of the bags. Mites had not made holes in the packaging itself but had entered the bags via faulty seals. Lidded cups were not contaminated. The same year, investigators evaluated whether *T. putrescentiae* storage mites preferred to grow on protein-, fat- or carbohydrate-rich diets and found they grew best on the dog foods richer in proteins and fat.5

Finally, in 2016, several experiments were conducted to evaluate the growth of *T. putrescentiae* in different conditions.6 In the first experiment, mites were found to grow better on green and brown rather than white and red colored kibbles. (Whether the different-colored kibbles had different nutrients was not explained.) The second study found higher mite growth when kibbles were crushed rather than intact, and when the initial mite population density was highest. The third showed that four different strains of *Tyrophagus* mites grew better on crushed dog food than a commercial mite diet. The final experiment confirmed that a high initial mite inoculum leads to a higher final mite count.

**Field studies**

In the first field study, 30 purchased and 50 pet owner–obtained commercial dry dog food samples tested with an enzyme-linked immunosorbent assay for HDM were all negative.7 In another study, 23 bags of...
commercial dry dog foods were tested for mite contamination by microscopy. Even though the bags were opened and closed twice daily over a 6-week period during this study, storage mites were not discovered. The influence of different storage conditions on the contamination of dry dog foods with storage mites was first reported in 2008. Dry dog food bags were kept for 6 weeks in either laboratory storage with low average temperature and humidity or a ventilated garage with high temperature and humidity. More mites were detected in the bags stored in high temperature and humidity conditions.

In 2011, identical bags of a single commercial dry dog food were stored in 10 different household. Each bag was divided equally between the original sack with its reusable seal, a paper bag whose top was rolled for closure, and a plastic box with a sealed lid. These containers were stored next to each other, and the food was sampled every month for storage mite detection. At the end of the study period, mite numbers were significantly higher in the food samples stored in paper bags (60% of bags had evidence of mites) compared with baseline.

In the last field study, dog owners in eastern Australia provided 20 samples of commercial dry dog foods stored in open bags or storage boxes in home environments. The food samples were examined for the presence of storage mites, and a small portion was kept for 2 additional months before their incubation under higher humidity and temperature conditions. Finally, nine new bags of commercial dog foods were purchased and tested as above. Mites were undetectable in any specimens after any of the incubation times. Similarly, storage mites were not observed when opening newly purchased bags or after storing the foods for 6 weeks at room temperature. In contrast, when incubating samples of these foods at high temperature (26°C [78.8°F]) and humidity levels (80%), storage mites were present as early as 3 weeks after beginning the experiment and in 78% of foods after 6 weeks of incubation.

Conclusions and take-home
Several clear conclusions can be drawn from this literature review. The research shows that storage mites, especially for the most commonly found and studied species *T. putrescentiae*, can grow in commercial dog kibbles, particularly protein- and fat-rich foods. They proliferate best when the initial contaminating mite density is high, when kibbles are crushed, or when mold overgrowth has occurred due to suboptimal storage. Typically, storage mite contamination is low to undetectable in newly purchased commercial dog food. If bags are stored indoors in temperate conditions, little to no overgrowth occurs. In contrast, when bags are stored in situations with high temperature and humidity, mites can enter through faulty seals and proliferate in the packages.

The allergenic cross-reactivity between the *Tyrophagus* storage mites and the *Dermatophagoides* HDM is known to be very high. *Tyrophagus* mites have been shown to trigger flares of allergy in laboratory beagles experimentally sensitized with the *Dermatophagoides* HDM. Although this cross-reactivity has only been demonstrated in a laboratory setting, atopic dogs with high-levels of *Dermatophagoides farinae* HDM–specific IgE are likely to have signs flaring after eating a food contaminated with storage mites. Thus, when performing food trials for the diagnosis of food allergies in dogs and (probably in cats), it makes sense to minimize factors that encourage storage mite proliferation. Using food from newly purchased, sealed bags that have been stored indoors in temperate conditions appears to decrease the risk of mite contamination. A diet trial with home cooked ingredients unlikely to have mite contamination is another option.

**REFERENCES**

**For prescribing NexGard® (afloxanoler) over 220 million times.**

The only flea & tick control product indicated for the prevention of *Borrelia burgdorferi* infections as a result of killing black-legged ticks

Gentle protection in a bite-sized monthly dose

Proven safety for puppies as young as 8 weeks, weighing 4 pounds or more

The savoury beef-flavored chew that makes compliance a treat

**We thank you**

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5. Hennervald K, Beck W, Müller R. Evaluation of storage mites in commercial dry dog food and in the environment as well as their importance in veterinary medicine [in German]. Tierarztl Prax. 2007;35:325-332. doi: 10.10255/0025-1622/44

**IMPORANT 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.

1. Data on file at Boehringer Ingelheim. NexGard® (afloxanoler) Chewables is a registered trademark of the Boehringer Ingelheim Group. ©2020 Boehringer Ingelheim Animal Health USA Inc., Duluth, GA. All rights reserved. US-PET-0253-2020-C
In the US field study, one dog with a history of seizures experienced a seizure on the same day after receiving the first dose and on the same day after receiving the second dose of NexGard.

This dog experienced a third seizure one week after receiving the third dose. The dog remained enrolled and completed the study. Another dog with a history of seizures had a seizure 19 days after the third dose of NexGard. The dog remained enrolled and completed the study. A third dog with a history of seizures received NexGard and experienced no seizures throughout the study.

The following adverse events are based on post-marketing adverse drug experience reporting. Not all adverse events are reported to FDA. CMRP is not always possible to reliably estimate the adverse event frequency or establish a causal relationship to product exposure using these data.

The following adverse events are reported for dogs are listed in decreasing order of reporting frequency for NexGard:

Vomiting, pruritus, lethargy, diarrhea (with and without blood), anorexia, seizure, hyperactivity/restlessness, paining, erythema, ataxia, dermatitis (including rash, papules), allergic reactions (including hives, rash, and urticaria), anaphylactic reactions (including shock).

**Contact Information:**
For a copy of the Safety Data Sheet (SDS) or to report suspected adverse events, contact Boehringer Ingelheim Animal Health USA Inc. at 1-866-387-4251 or www.negewhetherdog.com for additional information about adverse drug experience reporting for animal drugs. contact FDA at 1-888-FDA-VETS or www.fda.gov/reportanimalae.

**Mode of Action:**
Afoxolaner is a member of the isoxazoline class, shown to bind at a binding site to inhibit insect and acarine ligand-gated chloride channels, in particular those gated by the neurotransmitter gamma-aminobutyric acid (GABA). The resulting block of pre- and postsynaptic chloride ion transport of chloride ions across cell membrane. Prolonged agonist-induced hyperpolarization results in uncontrolled activity of the central nervous system and death of insects and acarines. The selective toxicity of afoxolaner between insects and acarines may be inferred by the differential sensitivity of the insects and acarines. GABA receptors versus mammalian GABA receptors.

**Effectiveness:**
In a well-controlled laboratory study, NexGard began to kill fleas hours after initial administration and demonstrated >98% effectiveness at eight hours. In a separate well-controlled laboratory study, NexGard demonstrated >90% effectiveness against adult fleas 24 hours post-infestation for 35 days, and was >90% effective at 12 hours post-infestation through Day 27, and on Day 35. On Day 28, NexGard was 81% effective 12 hours post-infestation. Dogs in both the treated and control groups that were infested with fleas on Day 1 generated flea eggs at 12- and 24-hours post-treatment (0.11 eggs and 1.7 eggs in the NexGard treated dogs, and 4.6 eggs and 7.1 eggs in the control dogs, at 12- and 24-hours, respectively). At subsequent evaluations post-infestation, fleas from dogs in the treated group were essentially free of egg production until Day 14 (0.11 eggs and white flea eggs from dogs in the control group continued to produce eggs (0.14 eggs).

In a 50-day US field study conducted in households with existing flea infestations of varying severity, the effectiveness of NexGard against N. glutinosa on the Day 30, 60 and 90 visits compared with baseline was 98.0%, 99.7%, and 99.9%, respectively. Collectively, the data from the three studies (two laboratory and one field) demonstrate that NexGard kills fleas before they can lay eggs, thus preventing subsequent infestations after the start of treatment of existing flea infestations.

In well-controlled laboratory studies, NexGard demonstrated >97% effectiveness against Dermacentor variabilis, >99% effectiveness against Ixodes scapularis, and >95% effectiveness against Rhipicephalus sanguineus. 48 hours post-infestation for 30 days. At 72 hours post-infestation, NexGard demonstrated >97% effectiveness against Amblyomina americanum for 30 days. In two separate, well-controlled laboratory studies, NexGard was effective at preventing Borrelia burgdorferi infestations after dogs were infested with infected scalopine vectors 28 days post-treatment.

**Animal Safety:**
A safety field study was conducted in households with existing flea infestations of varying severity. The effectiveness of NexGard against Ixodes scapularis on Days 30, 60, and 90 compared with baseline was 98.0%, 99.7%, and 99.9%, respectively. Collectively, the data from the three studies (two laboratory and one field) demonstrate that NexGard kills fleas before they can lay eggs, thus preventing subsequent flea infestations after the start of treatment of existing flea infestations.

In well-controlled laboratory studies, NexGard demonstrated >97% effectiveness against Dermacentor variabilis, >99% effectiveness against Ixodes scapularis, and >95% effectiveness against Rhipicephalus sanguineus. 48 hours post-infestation for 30 days. At 72 hours post-infestation, NexGard demonstrated >97% effectiveness against Amblyomina americanum for 30 days. In two separate, well-controlled laboratory studies, NexGard was effective at preventing Borrelia burgdorferi infestations after dogs were infested with infected scalopine vectors 28 days post-treatment.

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

**How Supplied:**
NexGard is available in four sizes of beef-flavored soft chewables: 11.3, 28.3, 88, and 170 mg strengths. Each chewable size is available in color-coded packages of 1, 3 or 6 beef-flavored chewables.

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**NEWS | Infectious disease**

**Spice in parvovirus cases may be related to COVID-19**

BluePearl is investigating the reasons behind a 70% increase in parvovirus cases seen in its hospitals in recent months.

By dvd360staff

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**Infectious disease**

**Spice in parvovirus cases may be related to COVID-19**

BluePearl is investigating the reasons behind a 70% increase in parvovirus cases seen in its hospitals in recent months. The hospital compared data collected from earlier this year with data from the same time period over the past five years (2015 to 2019). Parvovirus, a highly contagious disease that attacks the canine gastrointestinal-tract, is spread through dog-to-dog contact as well as contact with contaminated stool, environments, or people. The disease typically affects puppies and partially vaccinated/unvaccinated dogs. Left untreated, it can be fatal with 48 to 72 hours, but survival among treated dogs reaches about 90%. It is unclear exactly why cases are spiking, but there are multiple possibilities related to COVID-19.

With high demand for pet fostering and adoption during lockdowns, some shelters may have released pets that had not yet completed their vaccination series. Likewise, stay-at-home orders resulted in more people taking their pets outside, potentially increasing exposure risk. Finally, routine vaccination schedules may have been disrupted or delayed due to restrictions on "non-essential" services or financial difficulties among owners due to unemployment.

"We are in the very early stages of analyzing this data; looking for possible causes of the increase and determining what the implications are for this and other preventable companion animal diseases," says James Bar, DVM, DACVECC, BluePearl’s chief medical officer, in a press release. "Parvo outbreaks pose a serious threat to our canine friends, but skipping routine vaccinations could also put human health at risk through the possibility of rabies exposure."

Dogs can begin showing signs of parvovirus within 3 to 10 days after exposure, but they are conta-
Gene editing in animals: Miracle or madness?

A veterinarian who participated in the 2018-2019 AVMA Fellowship Program considers the implications of gene editing in both food animals and pets.

By Fred D. Lehman, DVM, MABM, DACT

Observing the novelty and intrigue of an operating government from the front row seat of a congressional office was a highlight of my veterinary career. The AVMA Congressional Fellowship provided that opportunity and much more. As one might anticipate, certain issues occasionally warrant our profession’s attention and potential action but, for many reasons, are glossed over because other pressing concerns take priority. Such is the case for genetic modification in animals.

Where we stand today

Advances in genetic modification have surged at warp speed in recent years. While geneticists have been mapping human and animal genomes and linking specific alleles and their loci to their function, new tools have been developed to restructure the genetic architecture with amazing efficiency. As with many emerging issues, our legal and regulatory agencies find themselves in a situation in which they must respond without the luxury of time to understand all the scientific implications.

Gene editing in animals has the potential to add new dimensions to our ability to relieve animal suffering while also creating an opportunity for unbridled changes to the physiology, anatomy, and functionality of animals in our care. Perhaps veterinary engagement will provide advocacy and transparency for species that can’t speak for themselves.

The contemporary topic of genetic modification has not yet been lauded as the scientific phenomenon that it is because, like an iceberg, many issues beyond the science are not readily visible and have yet to surface. Scientists and entrepreneurs began disclosing details of recent breakthroughs with implications that boggle the mind.

With a high degree of certainty, these technological conquests will provide incredible new options for the treatment of inherited disease, prevention of infection, and improvement in the efficiency of meat and milk production. These scientific advancements have outpaced clear guidance from federal regulators and the counsel of bioethicists.

CRISPR: simpler and less expensive

The innovation responsible for the quantum leap is known as clustered regularly interspaced short palindromic repeats (CRISPRs) and CRISPR-associated (Cas9) system.1-5 CRISPR allows precise modification of the genetic architecture capable of knocking out a gene(s) or inserting small genetic segments.

Terms such as genetic engineering, genetic modification, and genetically modified organisms (GMOs) are somewhat familiar to many, as they are widely used in describing techniques associated with enhancing productivity and disease resistance of plants for crop production. To the nonexpert, a simple description of genetic engineering or modification conveys a rather complex process of splicing genetic segments from one species into another to achieve the desired trait. In contrast, the simpler CRISPR technology is less expensive and enables modification(s) to a targeted single gene or group of genes.6

Opportunity knocks

Application of the technology has significant upside potential. Gene-edited pigs resistant to infection from porcine reproductive and respiratory syndrome virus are at the forefront of candidates to enter the market.7 Not far behind is genetic dehorning in cattle.8 Holstein cattle are universally horned, and the common practice is to dehorn calves via cauterie. Dehorning has raised animal welfare concerns because it is typically implemented without anesthesia. However, by transferring a gene from a polled breed with the use of transcription activator-like effector nucleases (TALENs) and CRISPR-stimulated homology-directed repair (HDR) technology, the welfare issues could be resolved.9

An example of an innovative dimension is the creation of surrogate sires, whereby the male germinal tissue is destroyed chemically and new germinal tissue from another (potentially genetically edited) sire or germ-line is subsequently introduced into the testicular stroma.10 The resulting mature male would theoretically be capable of natural mating. The potential implications here include breeding endogenous parent stock adapted to the native environment while yielding progeny with enhanced capacity for meat or milk production, thereby introducing the desired traits (eg, polled cattle or even disease resistance).

Current regulatory environment

Regulation of animal genetic modifications in the United States has been determined by the Food and Drug Administration (FDA) to fall under that agency’s authority via the federal Food, Drug, and Cosmetic Act (FD&C Act); food animals have received the mainstay of their oversight.11 The altered animal’s genome is to be the targeted regulatory domain and the process will follow the design afforded to new animal drug applications (NADAs).

But transference of this nomenclature has sparked some confusion. Use of the term “animal drug” to also apply to the altered genome creates a framework for regulatory oversight. For example, “a new animal drug is deemed unsafe” under section 512(a)(1) unless the FDA has approved a new animal drug application (NADA) for its intended use.12

The FDA will likely retain the option to grant exceptions to all or portions of the traditional NADA through enforcement discretion, which could be loosely interpreted to mean that marketing could proceed following a satisfactory risk assessment and establishment of reasonable assurance of...
a safe food product. If at any time the FDA's assessment of the safety changes, the enforcement discretion can be withdrawn and marketing must cease.

The first FDA review of a genetically modified species intended for human consumption was a transgenic Atlantic salmon developed by AquaBounty Technologies of Maynard, Massachusetts. The review process appears to have been quite rigorous.

**Congress has conveyed its caution regarding the editing of human embryos by withholding federal funding for research.**

The alteration results in increased production of endogenous growth hormone, allowing the fish to reach market size and be harvested in a much shorter period of time (perhaps 18 months vs. 36 months in wild varieties). The fish are all female and, even though they are raised in aquatic farms, escape or inadvertent introduction would likely not impact native species through cross-breeding.

The review process has consumed a decade and a significant financial investment. Because the modification involved transfer of genes from one species to another, the intensive regulatory view could be deemed as warranted and certainly sets a precedent for future reviews. Minor modifications made via CRISPR logically may warrant lower hurdles. In either case, postapproval monitoring and reporting requirements can be anticipated.

Further clarification of the FDA's intent to regulate gene editing via CRISPR techniques is provided in a 2018 draft guidance for industry titled “Regulation of Intentionally Altered Genomic DNA in Animals.” An excerpt from this draft indicates that offspring from cross-breeding will also prompt regulatory oversight and reads as follows:12 "

Each new animal drug approval covers all animals containing the same genomic alteration(s) (the regulated article or new animal drug) derived from the same alteration event(s). Animals containing the genomic alteration as a result of breeding between an intentionally altered animal and its nonintentionally altered counterpart animal are covered by the new animal drug approval."

This poses questions as to how the agency will regulate subsequent generations. It also will require new models for commercial entrepreneurs regarding collection of royalties or other trading revenue streams. The FDA has also suggested that non–food animals would be subject to far less regulatory oversight under enforcement discretion.

**The industry and regulatory intersect**

Scientists and industry groups have been seeking an abbreviated regulatory path for animal modifications that would be less expensive, perhaps seeking precedent from GMO crop regulations. Although the framework for regulating food was established through the FD&C Act, the FDA has regarded most genetically modified crops used for food as substantially equivalent to non–genetically modified plants and subsequently designated them as generally recognized as safe (GRAS).14

Meanwhile, under the Plant Protection Act, the US Department of Agriculture Animal and Plant Health Inspection Service has regulatory oversight of plant products from biotechnology with focus on risk from pests and diseases.15 Animal geneticists and their commercial partners contend that the trait(s) derived from CRISPRI gene modifications are minor and could have occurred naturally or in a controlled breeding environment, thus warranting a hands-off approach.16 As mentioned, the FDA has signaled that some oversight will be provided, with enforcement discretion based on the results of a risk assessment that includes human food safety, animal safety, and environmental safety. Thus, genetically modified meat could enter the food chain without supplemental identification or labeling.

In contrast to the FDA plan, Brazil, Argentina, and potentially other countries have identified a gated regulatory process. If the food animal had only minor genetic edits (vs. significant genetic modification), it will be classified as non-GMO and allowed to be marketed without further review. The meat can enter the food chain without restriction. Scientists and entrepreneurial organizations point out that if off-shore regulations are less stringent, the technology will relocate to countries with more lenient regulatory climates. Currently, imports of meat products from countries that have approved gene-edited animals will not be required to be identified or labeled accordingly. And, because the meat product(s) is indistinguishable from that of non–gene-edited animals, enforcement of potential label requirements would be virtually impossible.

**Humans versus animals**

Human gene editing has garnered attention from both Congress and regulators. Concern for manifestation of unintended consequences has slowed adoption of heritable gene editing in humans.17,18 It appears to be of less concern in animals.

In contrast, ex vivo gene therapy in humans has been met with enthusiasm, as it provides nonheritable solutions. Ex vivo gene therapy involves modification of cells that are recovered from the patient, subsequently edited, and returned to the same patient or used as an allograft whereby the altered genes moderate or eliminate the disease condition. Examples include cures for sickle cell anemia and significant promise for certain types of cancer.19 Congress has conveyed its caution regarding the editing of human embryos by withholding federal funding for research. The concern centers on lack of complete confidence that a gene's secondary or indirect influence (off target) will not impact other body functions or systems. Potential chimeras or embryos containing both edited and nonedited cells are also an enigma and further compromise confidence in the exactness of an anticipated outcome. Because changes made to an embryo's genome will be passed to future generations, trepidation centers on the realization that genome editing has the potential to reduce diversity. And, while editing genes may mitigate a genetically mediated condition or even cancer, the patient may be more prone to unforeseen complications, such as premature aging.

Calls for stringent ethical and social review of potential applications include assessment of the impact on social justice, geopolitics, and potential social discrimination and division targeted at the individual or perhaps the nonedited population.20 Despite the concern, however, a path to designer babies may not be too distant in the future.21 During a recent review of the genetic sequence of the newly created hornless cattle, it was revealed that inadvertent insertion of DNA from the bacterial plasmid had occurred in one animal.22,23 Although it is impossible to anticipate any manifestations of the presence of the foreign DNA, the review
Communicating to the public

Messaging from the scientific community has justified genetic editing as a response to the need to feed a growing population as efficiently as possible. In reality, most communications have focused on academic achievements. Fact-focused statements and scientific logic may not be adequate to drive a favorable reception for nonscientific audiences.

If issues such as animal welfare and a less-than-natural food source are not considered before developing commercial messaging, consumer acceptance may be negatively impacted. Justification for gene editing and animals has and will continue to involve narratives for increasing efficiency in the food supply, but disclosures for regulatory oversight of gene editing in non–food animals is vague or nonexistent. Will there be regulatory considerations for the well-being of non–food animals?

Likewise, there appears to be no governmental agency or central body presently tasked to categorize and coordinate key physiologic information that may impact diagnostic approaches and nutrition plans. Because identification of animals that might have been modified to enhance athletic capabilities will not be feasible (or perhaps not within the realm of possibilities), will veterinarians be engaged to consult on an animal’s eligibility to compete? Will the FDA expand its future oversight?

As a congressional fellow, I advocated for a congressional hearing to identify key issues and explore options for oversight of genetic editing in non–food animals; hopefully this will find support in the near future as awareness and concern grow. Veterinary practitioner awareness is critical to prepare for engagement, but perhaps more important is the profession, and specifically the AVMA, to commission a genetic-editing panel that provides guidance for ethical considerations, anticipates the physiologic impact, and serves as a sounding board for regulatory agencies.

Finally, as I reflect on the issues that whizzed by my eyes as an AVMA Fellow, I am aware that my personal concern centers on the perception that this ship seems rudderless. Without effecting collaborative action among scientists, commercial stakeholders, bioethicists, and veterinarians, the long-term impact of an amazing new tool on our domestic breeds will remain undetermined.

Dr. Lehman, an alumnus of Oklahoma State University, was a 2018-2019 AVMA Congressional Fellow. He built his AVMA career in academia and industry.

REFERENCES


One Health

> Continued from cover

opportunities for canine clinical trials that ultimately will advance both human and veterinary oncology.

“We hope our recommendations will reposition comparative oncology canine trials as integral and parallel to human development and that this move will create opportunities for stepwise iteration and the improvements in the human cancer drug development path that are increasingly necessary,” Dr. Khanna says.

How drug DISCO came about

Just before the World Small Animal Veterinary Association (WSAVA) 2019 World Congress in Toronto, the association’s One Health Committee held a workshop—led by Dr. Khanna, now at Ethos Veterinary Health and Ethos Discovery, along with William Eward, DVM, MD, orthopedic surgical oncologist at Duke University, and Joelle Fenger, DVM, PhD, DACVIM, assistant professor of oncology and hematology at The Ohio State University College of Veterinary Medicine—aimed at developing a new strategy for enhancing cancer drug development using a One Health approach.

That workshop led to the publication of a report in Annals of Medical and Clinical Oncology earlier this year outlining how new commercial perspectives from closer relationships between the human and animal biotech and pharmaceutical sectors will deliver a “win–win” for both people and dogs in the quest for successful cancer drug development.1 As a means to bring the sectors together, the authors proposed the cancer Development Incentive Strategy using Comparative Oncology (DISCO).

“The field of comparative oncology as part of cancer drug development stands out as a successful example of the One Health approach to medicine, and this new manuscript presents a nuanced and novel strategy to deliver this translational opportunity,” says Michael Lappin, DVM, PhD, DACVIM, chair of WSAVA’s One Health Committee.

The drug DISCO initiative was conceptualized to increase adoption through new commercial incentives that would bring human and animal pharmaceutical companies closer.

dvm360 recently spoke with Dr. Khanna, a driving force behind the initiative, to learn how drug DISCO will enhance drug development and how veterinarians can play a role in advancing this subset of the field.

For the past 20 years, Dr. Khanna’s career has been split between practicing as a veterinary oncologist and working as a scientist on drug development in humans through a research program at the National Cancer Institute (NCI). “Because children and dogs get very similar cancers, there was an obvious connection with my work as a researcher and my work as a veterinarian,” he says. “That resulted in me founding the Comparative Oncology Program within the NCI, which is part of the National Institutes of Health.”

The Comparative Oncology Program brought much greater visibility to the field. This clarity highlighted the fact that many of the questions related to a drug’s development simply could not be answered through traditional preclinical models that involved testing on rodents or in human clinical trials. “So, it is not surprising that the drugs with many unanswered questions did not succeed as human drugs,” Dr. Khanna says.

By including his canine patients with cancer in clinical trials, Dr. Khanna has been able to bridge the gap and provide unprecedented insight into human cancer drug development. The data generated from his work are then used in developing human cancer drugs. As a result, life-saving animal health cancer drugs are created as well. “There are no examples of drugs that are approved for the treatment of cancer in dogs that arose without the intent to develop a human drug,” he explains. “The origin of every drug that has been approved for use in canine cancers came in some way from the development of a human drug.”

Even with increased synchronicity in human and animal oncology research, Dr. Khanna and his colleagues identified a high failure rate associated with cancer drug development for humans and the potential positive impact comparative oncology could have. The drug DISCO initiative was conceptualized to increase adoption through new commercial incentives that would bring human and animal pharmaceutical companies closer. Developing commercial relationships between sectors also facilitates a model for self-funded research.

How drug DISCO works

“The elevator pitch is that we need more chances at bat,” Dr. Khanna explains. “We need more clinical trials that include dogs and then have those same drugs evaluated in humans. This will create a line that can be drawn between the dog response and the human response.”

If all goes according to plan, a human drug company would...
license its cancer treatment to an animal health drug company. This would provide the human company—which retains the right to develop the drug in humans—with the opportunity to generate revenue by completing research that will help dogs diagnosed with a variety of cancers. The animal health company benefits by receiving access to a successful drug without having to do the upfront research itself.

“It is not as though drug DISCO is a new idea,” Dr. Khanna says. “Right now, these things happen when someone just happens to know people from the animal health company and the human health company and can broker that relationship. We are trying to make this happen more consistently without existing relationships.”

Dr. Khanna hopes that within 5 years these closer collaborations will become more commonplace. One of the biggest hurdles to achieving the streamlined process, however, is that certain aspects of the processes for approving veterinary and human health drugs are unnecessarily siloed. “If we can better align some of these processes, more parts of the approval process for a human drug can be used to simplify a veterinary approval and create efficiency and value for all parties, since part of the approval process will already be done and they won’t have to repeat it all while creating the veterinary counterpart,” he says. There are some parts of the approval process that will need new studies, of course, but the goal is to eliminate redundancy where it is reasonable.

Dr. Khanna says that many requirements of the FDA approval process should be repeated for each species. However, some aspects are unnecessarily repetitive, mainly in the manufacturing approval. He offers a hypothetical example involving the coating of a pill: “If one portion of the approval was to make sure that the coating doesn’t break down when the pill is dropped on the ground, there is no reason to have to prove that for both the human and animal drug because it’s the same ground that the pill hits and everything about the pill is the same,” he says. “However, the coating of some pills is broken down differently in an animal than in a human, and that topic would need further veterinary-specific studies and approvals.”

Drug DISCO involves adding commercial incentives, and including the private sector in the equation provides additional opportunities for dogs to be included in treatment trials. “For me, drug DISCO is an opportunity for additional studies and to do so with commercial benefits for both parties,” he said.

**Doing your part**

Dr. Khanna hopes that through mutually beneficial research, there will be rapid growth in the number of successful treatments available to treat veterinary patients with cancer. Many advancements in comparative oncology take place in the laboratory, but all veterinarians can play a pivotal role in improving the field by taking advantage of clinical trials (see How clinical trials help your patients). “If we had every primary care veterinarian in the world realize that there are clinical trials that provide their clients with access to the latest and greatest therapy and encourage them to pursue clinical trials, we would deliver curative outcomes for patients more quickly,” he says.

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**How clinical trials help your patients**

Clinical research trials, or studies, are aimed at advancing or improving treatment options in all areas of medicine. Veterinary oncology studies may involve existing or new treatments, including chemotherapy, radiation therapy, surgery, and immunotherapy, among others. Many of these trials also provide insight into how the treatments being studied in dogs may be translated to help people with cancer.

Clinical trials are conducted largely at colleges of veterinary medicine and at some private specialty referral hospitals. For some trials, the patient must be brought to the trial location (or sometimes multiple locations), but others involve testing or procedures that can be completed at the primary veterinarian’s office.

It’s important to keep in mind that the safety and/or efficacy of the regimen being studied may have been proven already in laboratory animals, or in healthy dogs or cats, which may make your clients more inclined to participate.

The Flint Animal Cancer Center at Colorado State University in Fort Collins provides a great explanation about the benefits of clinical trials, how trials are conducted, what’s involved for clients, enrollment procedures, and more. The AVMA offers a searchable database of veterinary clinical trials in all areas (ebusiness.avma.org/aahsd/study_search.aspx), and the Veterinary Cancer Society provides a comprehensive list of ongoing cancer trials in the United States (vetcancersociety.org/pet-owners/clinical-trials). Here is a small sampling of veterinary cancer trials currently in progress:

**Spleen cancer**

- **Study purpose:** Compare overall survival among dogs with splenic hemangiosarcoma treated with splenectomy, a nonspecific immunotherapeutic, and concurrent doxorubicin versus standard of care (splenectomy and doxorubicin alone)

**Location:** Iowa State University College of Veterinary Medicine

**For more information:** vetmed.iastate.edu/vmc-clinical-trials/ randomized-open-label-study-evaluating-use-immunocidin non-specific-immunotherapy-concurrent

**Lymphoma**

- **Study purpose:** Determine whether CHOP or LOPP chemotherapy is more effective in treating canine T-cell lymphoma

**Location:** University of Pennsylvania School of Veterinary Medicine

**For more information:** vet.upenn.edu/research/ clinical-trials-vicc-all-clinical-trials/canine-trial comparison-of-the-efficacy-impact-on-suppressor-cells-of-chop-vs-lopp-chemotherapy in-canine-t-cell-lymphoma

**Bladder cancer**

- **Study purpose:** Evaluate the safety and effectiveness of a novel therapy in dogs with transitional cell carcinoma of the bladder

**Location:** Animal Clinical Investigation, LLC (multi-state study)

**For more information:** animalcli.com/category/ pain-management-bladder-cancer/

**Liver cancer**

- **Study purpose:** Examine the use of transarterial embolization in dogs with naturally occurring liver cancer

**Location:** University of California, Davis

**For more information:** studypages.com/s/using-a-new-technique-to-shrink-liver-tumors-in-dogs-539845/?ref=gallery

**Any cancer**

- **Study purpose:** To develop a noninvasive test for early detection of cancer.

**Location:** University of Minnesota

**For more information:** vetmed.umn.edu/centers-programs/ clinical-investigation-center/current-clinical-trials dogs-cancer-study-201
How the Paycheck Protection Program is helping fund the veterinary profession

Data about PPP use among practices, advice for borrowers, and a look at what’s ahead.

By Matthew Salois, PhD, and Rosemary Radich, MA

COVID-19 has challenged businesses of all kinds across the country. Throughout the pandemic, veterinary practices have responded with innovative strategies to continue providing patient care, retain staff, maintain cash flow, and operate more efficiently—all while also donating personal protective equipment to our colleagues in human medicine and implementing strict guidelines to keep teams and clients safe.

Many veterinary business owners have made use of the federal government’s forgivable COVID-19 loan program, the Paycheck Protection Program (PPP). In fact, more than half of all veterinary practices in the United States have benefited from PPP, according to data from the US Small Business Administration (SBA), which oversees the loans. This funding has played a key role in supporting veterinary care and keeping practices open during the COVID-19 pandemic.

Veterinary use of PPP: What the data show

AVMA analysts examined the SBA data on allocation of PPP funds as of July 6, and cross-referenced it with AVMA data on veterinary practices. Among the key findings:

- At least 18,657 veterinary hospitals—about 56% of practices nationwide—have used PPP loans as part of their strategy to maintain cash flow and keep their doors open during the COVID-19 pandemic.
- PPP loans have helped keep more than 200,000 veterinary team members working and caring for patients.
- More than 80% of the loans taken by the veterinary profession were for less than $150,000.
- PPP funds have been distributed among veterinary practices in all 50 states, plus the District of Columbia, Guam, Puerto Rico, and the Virgin Islands.

States that got hit with COVID-19 later generally saw fewer practices taking out PPP loans, but these states may need more support in the future.
For veterinarians who have taken a PPP loan, AVMA’s advice is to consider waiting to apply for loan forgiveness until after Congress decides whether to make additional changes to the program and additional SBA guidance is available.

AVMA economists also looked at geographic differences in PPP loan use, and connected that with our own research into COVID-19-related business strategies for veterinary practices and data on the incidence of COVID-19 nationwide. Here’s what we saw:

• States with the highest rates of COVID-19 cases generally had higher rates of PPP loan borrowing.
• States that got hit with COVID-19 later generally had fewer practices taking out PPP loans—less than a 50% borrowing rate compared with 80% elsewhere. That means these states may need more support in the future.

What’s next for loan forgiveness
When PPP was first introduced, most applications came from businesses in states that were being hit hardest by COVID-19 at the time. As infection rates increase in other states—particularly in the West and South—additional practices may need access to the forgivable loan offerings created by PPP.

The AVMA will continue to advocate for funding as circumstances require, so that veterinary practices will have access to these critical funds. We also are advocating for favorable tax treatment of PPP loan proceeds, and for a streamlined forgiveness process for loans below $150,000, which would include the vast majority of veterinary PPP loans. This is forgiveness criteria are ongoing. Congress may issue extensions and/or retroactive changes to the program. With loan repayment deferred until after you apply for forgiveness and the SBA rules on your eligibility, AVMA advises waiting to see whether the program rules continue to change. We also encourage you to remain in contact with your practice’s advisors as you explore the best options to seek forgiveness.

Other relief loans available
PPP isn’t the only loan program available to veterinary practices impacted by COVID-19. The SBA’s Economic Injury Disaster Loan program provides small businesses with working capital to help overcome temporary revenue losses resulting from disasters. COVID-19 legislation expanded this program to provide for an advance of up to $10,000, distributed within 3 days, which can be used to cover payroll costs, rent, mortgage, and other obligations.

Need more information?
More information on both SBA loan programs can be found on AVMA’s COVID-19 resource center (avma.org/Coronavirus). AVMA regularly updates the page regarding the laws and regulations affecting veterinary small businesses, veterinarians, and veterinary students during the pandemic.

Dr. Salois is chief economist and director, and Rosemary Radich is the principal data scientist, of the AVMA Veterinary Economics Division.

AVMA EYE ON ECONOMICS | Matthew Salois, PhD

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**PPP 101: The basics**

PPP is a loan program for small businesses that was created to provide relief from the economic impacts of COVID-19. It offers forgivable loans to cover up to 24 weeks of qualified expenses, including payroll costs (up to $100,000 per employee), mortgage interest payments, rent, and utilities. To have loans forgiven, at least 60% of the money must be used for payroll costs. Borrowers can choose which non-payroll costs to submit for forgiveness.

The loans have a fixed interest rate of 1% for any amounts that aren’t forgiven. Payments on principal, interest, and fees are deferred until the SBA makes its forgiveness determination for each loan and notifies the lender. Interest will accrue during this time.

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**Need more information?**
More information on both SBA loan programs can be found on AVMA’s COVID-19 resource center (avma.org/Coronavirus). AVMA regularly updates the page regarding the laws and regulations affecting veterinary small businesses, veterinarians, and veterinary students during the pandemic.

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Matthew Salois, PhD

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For veterinarians who have taken a PPP loan, AVMA’s advice is to consider waiting to apply for loan forgiveness until after Congress decides whether to make additional changes to the program and additional SBA guidance is available.
**The curbside care controversy**

As pandemic restrictions ease, should veterinary practices get to choose whether they stop or continue curbside care?

Teton Animal Hospital is an established suburban veterinary clinic in the Northeast that has served its community for 25 years. When COVID-19 hit, the practice continued to provide patient care while observing the social distancing mandates issued by the governor and recommended by the state veterinary medical association. Curbside visits were cumbersome initially but soon proved to be very efficient. In addition, the use of FaceTime and other telecommunication apps was well accepted by staff and pet owners alike.

When COVID-19 case numbers started to drop in the state, the governor began allowing a phased reopening of various non-essential businesses. Several weeks later, when retail stores reopened with mask and social distancing requirements, the owners and staff at Teton Animal Hospital remained uncomfortable allowing pet owners into the facility. The clinic sent an email to clients and posted on the practice’s website and social media platforms that curbside pet care would continue for the near future to protect staff.

Continuing curbside care helped boost the morale of an already stressed staff. A staff member testing positive for COVID-19 would hurt the clinic’s ability to function, mandating the need to exclude contact with pet owners until a viable treatment or vaccine became available. These proactive steps, the owner reasoned, were the only way to ensure the viability and safety of the practice. Many pet owners understood the continued curbside policy, but many strongly disagreed.

**Dr. Rosenberg’s response**

Phased and staged openings of cities and towns are based on both scientific health care recommendations and, to some degree, political pressures. Veterinary facilities are particularly vulnerable. For many practices, if a single staff member contracts COVID-19 everything will grind to a halt. This is not the case in most business models. For many types of businesses quarantines are instituted for an affected employee and business continues remotely. Veterinary workplaces require staff to work shoulder to shoulder to provide proper pet care.

In view of the uniqueness of veterinary practice, I feel curbside care will be with us for some time, and that our patients and their owners will do just fine.
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Understanding the limits of your noncompete agreement

It’s no mystery that associate veterinarians trying to figure out if their noncompete is enforceable find themselves trying to solve, well, a mystery.

New legislation and court opinions throughout the country are turning what used to be a fairly clear prohibition on contractually specified competing practice into a confusing puzzle of definitions, case-by-case interpretations, and newly enacted statutes. In Massachusetts, for example, the enforceability of a noncompetition agreement may depend on whether it was entered into before or during the employment relationship. In Rhode Island, enforceability might hinge on whether the agreement is signed as part of a separation-from-employment deal. In Washington state, whether your noncompete will be upheld may depend on the salary you made when you signed the agreement or your pay rate when your employment terminated.

The increasing complexity around noncompetes creates just as big a challenge for practice owners (including corporations). On one hand, restrictions that are too broad could be struck down as not having a realistic relationship with the “good-will protection” actually needed by the clinic that drafted it. On the other hand, if a noncompete is created with an insufficient duration or distance (perhaps for the sake of ensuring enforceability), the document offers little protection to the drafter.

The new trend is an old idea

Throughout the many years when practitioners’ noncompete terms were relatively certain to be enforceable in most jurisdictions, many drafters ignored or glossed over a potential companion or alternate provision known as a “client nonsolicitation language.” Post-employment nonsolicitation clauses have existed for a long time. And in the new world of judicial and legislative distaste for noncompetes, these clauses may be moving to the forefront of veterinary employment law.

Simply put, a nonsolicitation agreement (NSA) expressly prohibits a former employee from reaching out to existing clients of their former employer for the purpose of encouraging them to leave that practice and come to the employee’s new hospital (or a practice the employee might start up or purchase after exiting employment).

NSAs seem ideal at first blush. So why have they not been more widely used in the recent past? And, for that matter, if they weren’t popular before, why are they becoming more widely used nowadays?

A solid, enforceable noncompete still trumps an NSA

In a situation where a veterinary practice enters into an associate noncompetition agreement that is fair, reasonable, and signed in a state that “doesn’t hate” noncompetes, the train to enforcement is quick and fairly free of obstacles:

• Obvious violation of the agreement may entitle the practice to an injunction or temporary restraining order. This stops the violator immediately, not a year or more later when the case might reach trial.
• Proof is easily ascertained. If the noncompete area is Manhattan, for example, and the associate goes to work near Times Square—boom, proof is complete.
• The idea of hiring an associate who is burdened by a noncompetition agreement scares potential employers whose offices are within the noncompete radius. They don’t want to find themselves with no veterinarian (if a temporary restraining order is issued) and in the crosshairs of the new potential hire’s former boss, who might initiate a long course of noncompete litigation.

But NSAs have one big plus

NSAs don’t carry the level of intimidation branded by noncompetes. An NSA basically says: “Associate, you can work where you like but under no circumstances may you call up our clients or send them letters, texts, or emails suggesting that they come see you at your new spot.” That sounds fairly reasonable and, in fact, legislators look much more favorably on NSAs than on noncompetition agreements.

For example, the Rhode Island Noncompetition Agreement Act, which became effective January 15, 2020, places numerous limitations on noncompetition covenants in that state. However, it specifically excludes NSAs from coverage by the statute.

So, why not go with an NSA every time?

There are three big drawbacks to enforcing an NSA:

• Proving solicitation of clients is not easy. Evidence that an NSA has been violated often requires testimony from a client who has been “solicited.” Clearly, no client who leaves the old practice and has their records transferred is going to be willing to testify voluntarily that any solicitation occurred. That leaves the clinic that is trying to prove an NSA violation to identify clients who were solicited but chose to stay put.
• The definition of “solicitation” is a moving target. Calling a former employer’s clients and recommending they change practices is clearly solicitation, but what if a client calls the departing clinician at home because he heard “through the grapevine” that she was moving to a new practice? Is it solicitation if the new clinic announces the arrival of the new doctor on its website? What if the veterinarian who is moving to a new practice states on her Facebook page that she is leaving her old job? If that is OK, can she also name her new clinic and say she is accepting new patients?
• A new employer can take steps to mitigate the impact of an NSA. Once the departing DVM begins working at a new hospital, what is there to prevent the new boss from aggressively marketing the services of their new hire? The new employer was never a party to the NSA signed by the new associate. Furthermore, nothing prevents an associate who has taken a new job under the cloud of an NSA from asking their new office to prepare a form to be signed by clients that they have come to that hospital to see that new veterinarian entirely of their own volition.

Nonsolicitation law is developing and changing rapidly

The legal status of both noncompete agreements and NSAs is in constant flux, owing to the strengthening of “right-to-work” advocacy. But just as powerful an influence is the rapidly emerging law of information technology. Competition and solicitation become very hard to define and control through legislation when social media and teledmedicine challenge the imagination of even the most skilled drafting attorneys and judges.

The best advice for both private practices and corporate hospital chains looking to protect their client base and goodwill is this: Do not let your employment contractual language get stale; review it regularly and make an effort to see how your existing employment documents comport with developing and morphing law. dvm360
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A veterinary dermatologist provides pointers for discerning dietary sensitivities in your patients.

By Natalie Stilwell, DVM, MS, PhD

Understanding the key differences between food allergies and other dietary conditions can help veterinarians diagnose and manage allergy cases, Dr. Dell explains. He also makes sense of many “truths and lies” surrounding home-cooked diets.

**Food allergy or something else?**

Just like any other allergy, food allergy is immunologically mediated and requires sensitization after repeated exposure to a particular antigen, Dr. Dell says. By contrast, food intolerance is a physiologic reaction lacking any immunologic component; therefore, intolerance can occur from a single exposure to a food. Sometimes dermatologists use the term “cutaneous adverse food reaction,” which is an all-encompassing term for all other food-related reactions.

Although nearly any dietary component can cause a cutaneous adverse food reaction, true food allergies typically occur to proteins ranging from 10 to 70 kDa in size. Beef, poultry, and dairy are three of the most common food allergens in dogs and cats. Closely related allergens, such as duck and chicken, or venison and beef, can cross-react because they share similar molecular structures.

Unlike environmental allergies, food allergies cause nonseasonal signs. Recent studies estimate that 25% of nonseasonal pruritus cases result from food allergies. Remember that clinical signs often affect the “ears and rears” and may include recurrent otitis externa as well as perianal licking and scooting. Affected dogs may also paw at the muzzle and have pruritus of the distal limbs, whereas cats may develop facial pruritus, miliary dermatitis, and eosinophilic granuloma complex.

One-quarter of pets with food allergy also display gastrointestinal signs, including diarrhea, flatulence, and vomiting. As a general rule, Dr. Dell says, food allergy is most common when animals develop signs either very early in life (less than 18 months of age) or later in life (older than 9 years). This can be confusing because some atopic (environmental allergy) patients develop mild signs mid-life (age 2 to 5 years) but don’t present to their veterinarian for severe signs until aged 8 or 9. Collecting a thorough history is very important. At this time, food allergy has no known genetic component.

**Enduring the elimination diet**

Dr. Dell admits that diagnosing food allergy can be difficult, particularly when clients “feed eight different types of treats, alternate foods or buy whatever is at the pet store.” Even a diet history with limited ingredients can become challenging because cooking and preparation methods can significantly alter an ingredient’s antigenic properties. Diagnosis is further complicated by the lack of straightforward tests. He describes serum allergy tests as generally “inaccurate and unrepeatable.” At-home hair and saliva tests remain trendy and tempting for many people; however, these are simply “not based on scientific principles,” according to Dr. Dell, and cannot detect allergens accurately. Most at-home tests measure immunoglobulin A, an expected component of saliva even in nonallergic pets.

Dietary elimination and rechallenge remains the most reliable method of diagnosis. Dr. Dell recommends an 8-week elimination period to allow for complete resolution of residual inflammation and to better assess trends in the pet’s condition. Some clients choose not to pursue a rechallenge, he says, which is acceptable “if the client is happy and the dog looks and feels good.” Although pets typically react to a rechallenge within a few hours, Dr. Dell advises rechallenging with the suspect protein for 14 days or until a reaction is observed, whichever occurs first.

He does not recommend feeding over-the-counter diets during dietary trials, as these have a significantly higher risk for ingredient contamination compared with prescription diets. One recent study showed that many commercial pet diets contain proteins not included on the label. To further minimize the risk for cross-contamination during a dietary trial, Dr. Dell recommends washing stainless-steel or ceramic food bowls in the dishwasher on the highest temperature setting before use, and storing food in its original packaging. Flavored probiotic or lactic medications should be replaced with injectable or topical options for the duration of the trial, and vegan marshmallows should replace peanut butter and pill pockets for hiding medications. In general, he says, compliance is higher when clients are provided with “safe cheat options.” Some prescription allergy diets have matching treats available. Other times you might try placing the carbohydrate component—potatoes or oats, for example—in a Kong toy.

**Choosing a hypoallergenic diet**

Because related proteins often share similar molecular structures, pets may experience allergic reactions even without previous exposure to a particular meat. For example, a salmon-allergic cat may react to multiple types of fish. Similarly, allergic
pets may react to different diets if they contain the same hydrolyzed proteins. Most hydrolyzed proteins in commercial diets actually exceed the 10-kDa size limit and are therefore not truly hypoallergenic. An exception is Royal Canin Ultamino, which undergoes feed analysis to ensure protein size.

With regard to responsible options for clients who insist on feeding raw, homemade, or grain-free diets, Dr. Dell recommends keeping an arsenal of reputable literature on hand, including the World Small Animal Veterinary Association’s Global Nutrition Guidelines and the American College of Veterinary Nutrition’s resources. These publications explain the lack of published support for many alternative diet choices, as well as their associated health risks.

While raw diets offer no known nutritional benefit over other diets, they do increase the risk of foodborne illness to both pets and clients. Likewise, studies have demonstrated that not only are grain-free diets often less nutritious than other diets, they have been associated with the development of dilated cardiomyopathy (DCM) in pure and mixed-breed dogs, particularly golden retrievers. In one study, 90% of dogs presenting with DCM were fed diets whose top ingredients included peas, lentils, legumes, or potatoes. Unlike with feline DCM, a clear correlation between canine diet-associated DCM and taurine deficiency is not yet proven; however, taurine supplementation is currently recommended for suspect cases until the pathogenesis of this condition is more completely understood. And feeding of boutique, exotic protein, or grain-free diets is generally discouraged.

Interestingly, there are very few reports of diet-associated DCM from grain-free prescription diets, perhaps because such diets are required to meet strict quality standards. Dr. Dell recommends choosing these diets for pets with confirmed grain sensitivities, although grains are rarely a source of food allergy in dogs and cats.

Finally, if a client insists on feeding a home-cooked diet, Dr. Dell recommends enlisting the help of a veterinary nutritionist. Certain companies can also work with practitioners to customize diets to a patient’s individual health needs, thus ensuring optimal nutrition.

Dr. Stilwell received her DVM from Auburn University, followed by an MS in fisheries and aquatic sciences and a PhD in veterinary medical sciences from the University of Florida. She provides freelance medical writing and aquatic veterinary consulting services through her business, Seastar Communications and Consulting.

REFERENCES
What you need to know about today’s veterinary diet trends

A look at the advantages and disadvantages of raw, homemade, and vegan diets for dogs and cats.

By Lynsey Rivelli, DVM

Nutrition is a common topic in veterinary practices, and rightly so. A pet's nutritional needs change over time, and both age and health should play a role in diet selection. Diet trends are constantly evolving for both people and pets, and some of today's owners are looking for a more "natural" alternative to kibble or therapeutic diets—namely raw, homemade, and vegan diets.

It's important to be able to discuss both the positive and negative aspects of these types of diets with your clients so they are knowledgeable about the nutrients their pets need for optimal health. Due to the complexity of some patients' health care needs, general practitioners may consider referral to a veterinary nutritionist as needed.

Raw meat-based diets
Some raw meat-based diets (RMBDs) are marketed as "complete and balanced," and are meant to serve as the sole source of nutrition without supplementation of other proteins into the diet. Others are not marketed as complete or balanced, so they are typically fed as a rotation product rather than as the main diet. Both of these diet types are available commercially in fresh, frozen, and freeze-dried forms. In addition, pet owners can purchase individual raw diet ingredients rather than a branded diet.

Most clients feeding their pet a raw diet use a combination of RMBDs and traditional ingredients (eg, yogurt, eggs).1 This allows for supplemental feeding of carbohydrates, fiber, vegetables, and other sources of nutrition the pet needs.

Potential advantages
In a 2019 survey study, 94% of 218 dog owners who fed their pets RMBDs named a shinier coat, increased muscle mass, and cleaner teeth as the primary improvements observed in their pets.2 These owners, the majority of whom used the internet as their primary source of information about RMBDs, said they believe raw foods are "absolutely safe" for dogs.

There are no scientific data to support the proposed benefits of feeding an RMBD over commercial kibble or a homemade diet. Data comparing raw vs. cooked meals in performance dogs showed a difference of less than 1% in protein availability.3 There is some published evidence of increased digestibility of specific raw diets compared with other specific diet types, but the practical advantage of this is unclear.3,4

Disadvantages
Because RMBDs do not undergo proper treatment to reduce pathogenic organisms, the biggest concern surrounding them is the bacterial load they carry. Additionally, slaughter during feed processing poses a risk for high bacterial transmission as well. As a safety precaution, many veterinary practices segregate hospitalized pets on RMBDs from the rest of the patient population. Some hospitals refuse to store or handle RMBDs at all.

The presence of zoonotic bacterial and parasitic pathogens in RMBDs may be a source of infection for both pets and their owners. In a 2018 study, the pathogens found most commonly were Escherichia coli and Clostridium, Salmonella, Campylobacter, and Listeria spp.4 In a 2019 study, the most common bacterial overgrowth in RMBDs was that of Enterobacteriaceae, followed by Clostridium perfringens, Salmonella, and Campylobacter. These researchers identified several studies that found pathogenic bacteria in RMBDs did not pose a risk to the canine immune system, unless the immune system becomes compromised by some other mechanism.5 Other studies report that this is a myth, however, and that animals repeatedly exposed to diets high in bacteria will and have become compromised and sick.

Because there is insufficient published evidence to support feeding RMBDs, many veterinary nutritionists do not recommend them, particularly for young pets and those that are immune compromised. Concerns about feeding an unbalanced and incomplete diet remain at the forefront of most research.

Homemade diets
Owners may choose to feed their pet a homemade diet for a number of reasons, including mistrust of commercial diets. These diets may also be recommended by nutritionists for patients with comorbid conditions, including chronic kidney disease, diabetes mellitus, gastrointestinal disease, and cancer. Rechecks are often recommended 1 month after introducing a homemade diet, and any modifications should be reviewed with the veterinarian for best success.6 Homemade pet food recipes can be found online, in

Safe handling of RMBDs
According to the Centers for Disease Control and Prevention, about one in six Americans becomes sick each year from contaminated foods or beverages, and 3,000 die.10 Pets fed an RMBD may shed bacteria in their feces for up to 2 weeks after eating a contaminated product.

The risk to owners who feed RMBDs to their pets is highest when storing and handling the food, handling the pet’s feces, and using kitchen equipment to prepare pet meals.7 Because many owners are unaware of the risks involved, it is important to discuss them, especially when there are children, elders, or immunocompromised people living in the home. Pet owners should follow these guidelines:

- Keep all RMBD products frozen until use.
- Thaw RMBD products in the refrigerator (maximum temperature of 50 °F), not on the counter.
- Handle all RMBD products separately from food for human consumption.
- Avoid kissing the pet after feeding.

1. Feeding of carbohydrates, fiber, this allows for supplemental ingredients (eg, yogurt, eggs).1
6. Carminati G, et al. homemade pet food recipes can be found online, in
magazines and books, and from veterinarians themselves. As with RMBDs, most pet owners get their guidance about homemade pet foods from nonveterinary sources. Unless they are formulated properly, however, homemade diets may not provide balanced and complete nutrition for the pet. Proper formulation relies on the provider and the owner preparing the food.

**Potential advantages**

The advantages of feeding homemade diets are seen primarily in patients with conditions for which gut health is of most importance, such as chronic diarrhea or vomiting, diabetes, and cancer. In some cases, feeding a homemade diet has been noted to strengthen the human-animal bond. Client discussions about these diets should focus on the importance of essential nutrients (protein, fat, minerals, trace minerals, and vitamins). In cats, taurine should be supplemented as well. Neither cats nor dogs require carbohydrates, although carbohydrates may serve as a source of energy and help improve gastrointestinal health. Gut health is often what interests pet owners about homemade diets.

**Disadvantages**

An analysis of 200 published home-prepared recipes for adult maintenance in dogs written by both veterinarians (64.5%) and non-veterinarians (35.5%) revealed that at least one essential nutrient deficiency, according to National Research Council (NRC) or Association of American Feed Control Officials (AAFCO) guidelines, in the majority of diets. Another study of 27 homemade recipes for dogs with cancer found that none met all NRC or AAFCO nutrient recommendations for adult maintenance. Nutritional secondary hyperparathyroidism has been reported in both cats and dogs consuming unbalanced homemade diets; clinical signs include spontaneous fractures, muscle twitching, seizures, and limb deformities. The nutrients that have been noted most frequently to be absent in homemade diets include calcium, phosphorus, and vitamin D, the lack of which may cause tetanic seizures, hyperthermia, and humoral osteochondritis dissecans. Due to their rapid growth, puppies and kittens are generally more susceptible to nutrient deficiencies than are older dogs. Owners should be advised to consult with a veterinary nutritionist regarding proper formulation of homemade diets, particularly for pets with chronic or terminal illness.

**Vegan diets**

In the United States, about a quarter of vegan pet owners are interested in making a similar dietary change for their pets. Providing a complete and balanced vegan diet for pets can be challenging, however, because it requires that plant-based protein sources be fed to animals that rely on carnivorous proteins.

**Disadvantages**

There are no real advantages to feeding dogs or cats a vegan diet because these diets may be deficient in a number of nutrients these pets need. In a study published earlier this year, four commercial vegan diets (three for dogs and one for cats) were found to be deficient to varying degrees in calcium, potassium, phosphorus, protein, and arginine. Taurine deficiency was observed in the diets due to the high concentration of soybean meal. Whether this may lead to such cardiac abnormalities such as dilated cardiomyopathy is currently being studied. In addition, plant-based proteins have been shown to have lower digestibility compared with animal proteins, although this was not studied in this paper. Some of the diets studied had copper and zinc concentrations higher than the limits allowed by the AAFCO and NRC. Copper transition can sometimes lead to oxidative damage such as liver cell abnormalities or cell death. One diet had iron supplementation above European Pet Food Foundation upper limits. Low calcium levels and a calcium-to-phosphorus ratio below the minimum recommendation may result in secondary nutritional hyperparathyroidism in dogs and cats; none of the diets studied met the minimum requirements for this ratio. This is a very important consideration to make when feeding young and growing animals as well.

**Conclusion**

For owners interested in feeding their pets a raw, homemade, or vegan diet, it is incumbent on veterinarians to review the formulation for nutritional adequacy, advise the client, and/or refer the client to a veterinary nutritionist. Ask about feeding at home and educate about changes that may be needed to help create a healthy lifestyle for their pets. Based on available evidence, vegan, raw, and homemade diets are not recommended for long-term use in pets at this time. Further study is needed with regard to diet formulation and ingredient substitution.

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**AAFCO nutrient recommendations for pets**

The American Association of Feed Control Officials (AAFCO) guidelines include specific nutrient recommendations for pets. These guidelines are developed by a panel of experts and are regularly updated to reflect the latest scientific knowledge. The guidelines cover a wide range of nutrients, including protein, fat, carbohydrates, vitamins, and minerals, and are intended to ensure that pet foods meet the nutritional needs of different species and life stages. The AAFCO guidelines also provide information on the recommended levels of certain nutrients, such as calcium and phosphorus, to prevent conditions like parathyroidism. By following these guidelines, pet owners can ensure that their pets receive a balanced and complete diet, promoting their health and well-being. The guidelines are regularly updated to reflect the latest scientific knowledge, ensuring that pet owners have access to the most current and reliable information.
"I think because a lot of us don't work with neonate kittens very often, they kind of scare us a bit," said Amanda Dykstra, DVM, MPH, DABVP (Shelter Medicine Practice), former professor of shelter medicine at the University of Tennessee College of Veterinary Medicine and now medical director for a nonprofit and a shelter consultant, at a recent Fetch dvm360 conference.

But the fear goes beyond familiarity (or rather a lack thereof). "We can also get overwhelmed by the fact that we don't know what's going on with them half the time," she explained.

Dr. Dykstra insists this ignorance shouldn't cause feelings of inadequacy. She cited a 2015 study in which deceased kittens whose causes of death were unknown were sent to a pathologist for necropsy. "Even the specialist didn't know what was wrong with 72% of them," she said. "So, if you feel like you don't know what's going on with kittens, don't feel bad. Nobody does."

What it takes to be fit
But despite this vote of confidence in your kitten care abilities, Dr. Dykstra cautioned against jumping into a kitten foster care program too quickly as she's seen many well-meaning organizations get in over their heads. "Things can get messy fast," she explained. "I once did a consult for a shelter with a small facility and staff. They only had about 19 cats in the shelter, but when I asked how many cats they had in foster care, the number was over 700."

Kitten foster care programs require a lot of forethought because they aren't a one-size-fits-all endeavor. In fact, according to Dr. Dykstra, it can be an incredibly bad idea for some shelters. "If you're at a shelter where you're euthanizing healthy cats, a kitten foster program isn't the best use of your resources," she said. "You don't want to send this kitten through eight weeks of foster care only to have it euthanized in the end. But if all of your kittens and most of your cats are getting adopted, fostering could be a good option."

If your shelter falls into the latter category, you'll still need to think through the following resource needs.

Staff
Who's going to handle the medical care of these kittens? "If you're a contract veterinarian, or if you just sometimes work with the shelter, or even if you're full-time at the shelter but it has an intake of 4000 or so, you're probably busy enough," said Dr. Dykstra.

Here's why: In addition to providing intake exams, you'll need someone to be available for follow-up appointments, vaccinations, surgeries (which can extend beyond sterilization, as Dr. Dykstra described performing hernia surgery on a kitten weighing 0.8 lb), and perhaps even intensive and emergency care.

A properly functioning kitten foster care program also requires staff to recruit and train foster parents, field phone calls (Dr. Dykstra noted that foster parents of kittens tend to think a lot of things qualify as "emergencies"), keep up-to-date records and coordinate adoptions (preferably offsite). Dr. Dykstra said it can be helpful to designate either an employee or high-capacity volunteer to be the program's coordinator. As the main liaison between foster parents and the shelter, the

Take those intakes seriously
Intake exams are vitally important, so Dr. Dykstra recommends that shelters use either a veterinarian or a highly skilled veterinary technician. "What you don't want to do is send a sickly kitten home with a foster family that gets overly attached," she explained. "Then you'll be in the position of trying to treat a kitten that's probably not going to make it, spending a ton of money on a specialist, or euthanizing a kitten the foster family has come to love."
coordinator can help ensure that foster kittens move into their respective homes as quickly as possible.

**Foster parents**

Naturally, a successful kitten foster care program requires a solid supply of foster parents. And according to Dr. Dykstra, variety is key. “You’ll want to recruit a wide range of lifestyles and personalities to meet the different needs of the kittens in your program,” she explained. “For the kitten that needs to be fed every couple of hours, a young college student on summer break could be the perfect fit. But for the 3-week-old kitten in need of socialization, a retired person who can sit with it on their lap for a good portion of the day would be ideal.”

Dr. Dykstra also noted the importance of having informed foster parents. She recommended hosting foster orientations at the shelter to provide education to new recruits. According to Dr. Dykstra, one of the most crucial things you can do with this time is help set realistic expectations. “You need your foster families to know that not all kittens survive—the chances of it becoming a socialized housecat are very slim. “So, if you don’t have a lot of foster homes available, the kittens over 9 weeks old are the ones you’ll probably want to go ahead and send back out as a part of your trap-neuter-release program,” said Dr. Dykstra.

“Another thing is that kittens over 9 weeks old are the ones you’ll probably want to go ahead and send back out as a part of your trap-neuter-release program,” said Dr. Dykstra. “So, if you don’t have a lot of foster homes available, the kittens over 9 weeks old are the ones you’ll probably want to go ahead and send back out as a part of your trap-neuter-release program,” said Dr. Dykstra.

**Supplies**

Kittens are small, but their needs can be mighty. Everyday items like food and litter can add up fast (not to mention medical supplies). Though you don’t want to start up a program that’s wholly reliant on donations, Dr. Dykstra said kitten showers can be a great way to supplement your needs. “When starting a kitten foster care program at a shelter I worked at in Missouri, we kicked things off with a kitten shower, and it was amazing,” she said. “We made a flyer of things we needed, and we also created an Amazon wish list. On the day of the event, we had kittens in little playpens, and members of the community stopped by to bring in “presents” for them. All of our food, litter, and other resources like scales for that spring’s influx of kittens were taken care of by that shower.”

Other resources you’ll want to consider include a kitten foster manual to send home with foster parents and a contract. Dr. Dykstra said contracts are a good idea for every shelter. “I’ve seen shelters have foster kittens go out that they never see again, and I’ve seen foster parents refuse to bring their kittens back in for spaying and neutering or vaccinations,” she explained. “I’ve also had foster families neglect to come in and fill out the official adoption paperwork. The more I see this, the more I strongly recommend making them sign a contract saying that the animals are the responsibility of the shelter and that they will return the animals to the shelter when asked.”

Dr. Dykstra also noted the importance of including a clause about zoonotic diseases. “Again, this is why the intake exam is so important and why you need to have the proper equipment. If you unintentionally send a kitten with ringworm to a foster home and the kitten passes the fungal infection on to the foster family, it’s good to have some protection in your contract,” she said.

**Social support**

There’s one more thing you’ll need (or at least want to consider): Facebook. Love it or loathe it, Dr. Dykstra said, Facebook and other social media networks can be an effective way to recruit foster parents and solicit donations of supplies like food and litter. She also noted that foster parents would be wise to use social media to find homes for their kittens, as they’re in the best position to act as an ambassador for the animal.

Sarah Mouton Dowdy, a former associate content specialist for dvm360, is a freelance writer and editor in Kansas City, Missouri.

**REFERENCE**

The ABCs of veterinary dentistry: W is for waiting to treat

When it comes to dental care, sometimes the best course of action is no action at all.

By Jan Bellows, DVM, DAVDC, ABVP
I can vividly remember back in 1974 when one of my professors at Auburn University School of Veterinary Medicine advised us students to wait until a deciduous “double” tooth falls out by itself. Fast forward many years, and I now know that postponing the extraction of persistent primary teeth often causes harm to my patients.

Waiting to perform optimum dental care is sometimes the treatment of choice and at other times is a bad idea. This article covers some of the situations for which waiting is the best option. A second article will outline conditions for which treatment is more urgent and waiting is just wishful thinking.

Plaque and tartar without inflammation

Periodontal disease arises from gingivitis caused by plaque irritating the gingiva. When left to accumulate, plaque calcifies into rough calculus (tartar), which allows more plaque to collect on the crown. In predisposed dogs and cats, plaque inflames the gingiva (gingivitis) and eventually progresses to loss of support (periodontal disease).

Periodontal disease cannot occur without gingivitis, but gingivitis can occur without progressing to periodontal disease. Regardless, once calculus contacts the gingiva and inflammation is noted, it is time for an anesthetized professional oral hygiene visit that includes dental scaling, irrigation, and polishing; tooth-by-tooth probing; full-mouth intraoral imaging; and treatment for any underlying disease discovered. Waiting will only increase patient discomfort and the extent of disease (Figure 1).

If calculus is clinically present but inflammation is not, the professional oral hygiene visit to remove the accumulated plaque and calculus can wait either until inflammation becomes apparent or a year has passed since the last professional oral hygiene visit.

**Stage 2 external root resorption confined to the subgingiva**

External root resorption can occur anywhere on a cat’s or dog’s tooth but starts in the periodontal ligament space. Many root resorptions are discovered via intraoral radiographs obtained during the anesthetized professional oral hygiene visit. Even though external root resorption is considered progressive, immediate extraction is not necessary when the resorption is shown clinically and radiographically to be located far below the gingival margin in the apical third of the tooth. Once external root resorption is exposed to the oral cavity, bacterial contamination of dentin and pulp results in painful inflammation. In these cases, extraction is the treatment of choice (Figure 2).

Internal root resorption is a different story in that by its nature the pulp is infected and considered painful. For internal root resorption, waiting is not an option. The treatment of choice is root canal therapy or extraction.

**Supernumerary and malpositioned teeth**

Extra teeth in large-breed dogs often can be accommodated without causing harm or requiring extraction. Small-breed dogs and most cats do not have this luxury. Supernumerary teeth in small- and medium-sized breeds can cause tooth crowding, leading to gingivitis and periodontal disease resulting from the accumulation of food and oral debris between the teeth irritating the gingiva. Immediate extraction of the tooth (teeth) causing crowding is indicated in these cases (Figure 3).

Not all teeth erupt in normal positions. Malpositioned teeth may be secondary to birthing trauma, inherited defects, or trauma after birth. The decision to treat or wait to move or extract abnormally positioned teeth should be made after an examination that includes probing and intraoral radiographs. If the malpositioned tooth is functional and not causing discomfort, waiting to extract is the best option (Figure 4).

Generally, whether to extract abnormally located teeth can present a conundrum. If no obvious mucosal penetration is causing discomfort, a wait-and-see approach is appropriate.

**Abrasión y attrition**

Chronic abrasion (ie, tooth wear caused by contact with a nondental object, such as from self-grooming or chewing on tennis balls) and attrition (caused by contact of a tooth with another tooth from misaligned opposing teeth) may result in excessive wear and direct or indirect trauma to the pulp. Repeated low-grade trauma stimulates odontoblasts to produce tertiary (reparative) dentin for repair and protection. Tertiary dentin often appears as a reddish-brown shiny spot in the center of the worn surface. As long as the rate of wear is gradual, reparative dentin production will keep up with loss of tooth structure without causing pulpal exposure. When the rate of wear is faster than the rate of tertiary dentin production, the pulp becomes exposed, leading to bacterial invasion pulpitis and eventually pulp necrosis. Probing the worn area with an explorer and radiographic examination will help evaluate endodontic and periodontal involvement of worn teeth to see whether therapy is indicated. In cases of pulp exposure, treatment (root canal therapy or extraction) is indicated because pain and infection usually result (Figure 5).
Adverse vaccine reactions in veterinary medicine: An update

Although rare, several forms of adverse reactions have been documented after vaccination in dogs and cats. Here’s what veterinary teams need to know today.

By Natalie Stilwell, DVM, MS, PhD

While approved vaccination protocols are considered safe for the vast majority of canine and feline patients, adverse vaccine reactions can occur in veterinary medicine. Many cases are associated with either misuse of the vaccine or overvaccination.

In an updated overview of the various forms of adverse vaccine reaction,1 Laurel J. Gershwin, DVM, PhD, DACVM, a longtime immunology professor at the University of California, Davis, described the current understanding of adverse vaccine reactions in veterinary medicine, including type I and type III hypersensitivities, vaccine-associated fibrosarcoma, vaccine-associated disease enhancement, and formation of autoimmune disease.

**Type I hypersensitivity**

A type I hypersensitivity vaccine reaction, consisting of an immunoglobulin E (IgE) response to nontarget proteins, most commonly occurs after administration of inactivated, adjuvanted viral vaccines. Nontarget proteins are not associated with the virus itself, but rather originate either in the growth medium used to amplify the virus (eg, fetal bovine serum or egg protein) or from the addition of stabilizers (including gelatin and casein) to aid storage of the vaccine. While it is not uncommon for a small amount of IgG production to occur against these nontarget proteins, animals that are prone to hypersensitivity-associated diseases, including horses and dogs, are more likely to stimulate inappropriate IgE production. IgE antibodies function by binding to Fc receptors on basophils as well as mast cells located in the skin and mucous membranes of the respiratory and intestinal tracts. When an adverse vaccine reaction occurs, nontarget antigen in the vaccine binds to IgE, resulting in mast cell degranulation, histamine release, and activation of the lipoxygenase and cyclooxygenase pathways. In dogs, type I hypersensitivity results in increased capillary permeability and smooth muscle contraction, causing swelling and urticaria of the muzzle and, in severe cases, anaphylaxis. Horses experiencing type I hypersensitivity after vaccination may display colic or anaphylactic shock. Hypersensitivity usually repeats with subsequent vaccinations, as different vaccines often contain the same nontarget antigens.

In one experimental population of beagles, administration of a rabies vaccine containing alum adjuvant resulted in increased IgE production against not only vaccine antigens but also bovine serum proteins.2 Results from another study involving a population of Maltese-beagle crossbred dogs known to be allergic to corn and soy showed that administration of core vaccines caused a significant increase in IgE production against the food allergens.3 This study’s results implied that vaccination may worsen food allergies in susceptible individuals. Finally, a third study found that dogs that reacted adversely to vaccines had relatively high amounts of circulating IgE against vaccine adjuvants and stabilizers compared with nonreactive dogs.4 A similar study determined that horses that were highly reactive to vaccination also reacted to adjuvant on intradermal testing.5

Dr. Gershwin suggested two alternatives to vaccination for small animal patients that are suspected to react adversely to the rabies vaccine, a required immunization in all 50 states. Some states allow serum antibody titer measurement to substitute regular administrations of the rabies vaccine. Alternatively, 0.1 mL of the vaccine can be administered as an intradermal skin test, using histamine as a positive control and either vaccine diluent or sterile saline as a negative control. If a wheal develops after 15 to 20 minutes, then the patient is generating an IgE response and is likely to experience an adverse reaction upon vaccination.

**Type III hypersensitivity**

The Arthus reaction, or type III hypersensitivity response, is characterized by the formation of antigen-antibody immune complexes. Specific IgG circulating at the time of vaccination binds to target or nontarget protein antigens, leading to mast cell degranulation, neutrophil chemotaxis, and
subsequent local hemorrhage and inflammation.

Arthus reaction occurs locally at the injection site within 24 hours of vaccination and, while the site may be swollen and painful, the response is usually not serious and resolves within 2 to 3 days. Dr. Gershwin recommended measuring serum antibody titer in patients that experience type III hypersensitivity before giving additional doses of the suspect vaccine.

Vaccine-associated fibrosarcoma

Sometimes referred to as injection-site sarcoma, vaccine-associated fibrosarcoma was first reported in cats in 1991.6,7 This adverse reaction is rare, with an estimated occurrence in cats of 0.01% to 0.1%. It is most commonly associated with administration of adjuvanted, killed vaccines such as rabies and feline leukemia virus (FeLV). The incidence of vaccine-associated fibrosarcoma has apparently not decreased significantly despite the recent addition of a nonadjuvanted rabies vaccine to the market.8

Vaccine-induced disease enhancement

In rare cases, vaccine administration can induce a pathogenic immune response. In veterinary medicine, this effect has occurred in calves vaccinated against bovine respiratory syncytial virus (BRSV), with research showing that the killed form of the vaccine stimulates a T-helper type 2 response involving IgE antibody production rather than the more appropriate T-helper type 1 response necessary for antibody production rather than the more appropriate T-helper type 1 response necessary for antibody production.

Despite little evidence for an association between vaccination and autoimmune disease, it is undeniable that many dog breeds are predisposed to certain autoimmune diseases, such as Samoyeds and diabetes mellitus. Detailed research found that differences in canine histocompatibility antigen haplotypes likely account not only for diabetes in Samoyeds but for genetic predispositions of other breeds to other autoimmune diseases as well.13 Therefore, Dr. Gershwin emphasized that the causes of autoimmune disease are likely multifactorial and include genetic and environmental factors as well as immune dysfunction.

Recent changes in vaccination guidelines

Many professional veterinary organizations have instituted changes to vaccination guidelines to further minimize the risk for adverse vaccine reaction development. The Vaccine-Associated Feline Sarcoma Task Force (VAFSTF) and AAFP now indicate that core feline vaccines should be administered in specific anatomic locations. The rabies vaccine is to be administered as distally as possible on the right rear limb and the FeLV vaccine on the distal left rear limb. All other vaccines should be administered to the right shoulder, but not the midline or intrascapular space. In the event of fibrosarcoma formation, the suspected vaccine can be identified and the affected limb can be amputated if these guidelines are followed.

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Prevention and treatment of heartworm disease in dogs

Veterinary clients who understand the importance of prophylaxis and what’s involved with treatment may be more likely to protect their dogs year-round.

By Sean Stapleton, DVM, and Erika Sweigard, VMD

Heartworm (Dirofilaria immitis) infection in dogs has maintained a slow and steady spread throughout the United States, with almost all regions of the country seeing a rise in new cases—including more cases that seem to be resistant to preventives. It is more important than ever for veterinarians to advocate for year-round heartworm prevention and to be prepared when a heartworm-positive dog walks into the veterinary clinic.

Preventing heartworm infection

Fortunately, heartworm prevention has become increasingly convenient and affordable for owners. Veterinarians should strive for all patients to remain on year-round prevention,1 and client education is a mainstay of ensuring this.

Ideally, prevention should be started at 6 to 8 weeks of age; puppy wellness and vaccination appointments are the perfect time to provide information about the importance of keeping prevention on board even during colder months. It is important to explain the potentially life-threatening severity of heartworm infection, the hardness of mosquito vectors, and the unpredictability of weather patterns that allow for their re-emergence at almost any point of the year.

With a busy schedule and short appointment times, it is easy for this conversation to go by the wayside when veterinarians are “picking battles” with regard to other issues they want to discuss with clients (eg, obesity, dental disease). Providing an informative handout for the client to read while waiting is a great way convey the ease and simplicity of combating heartworm disease.2

Heartworm preventives containing macrocyclic lactones (ivermectin, moxidectin, selamectin, milbemycin oxime) are the most effective and widely used on the market.1,3 Monthly oral (ivermectin, moxidectin, or milbemycin oxime) and topical (moxidectin or selamectin) products or annual/biannual injectables (moxidectin) are effective and considered highly safe across the board.1,3 A major decision point, therefore, should be in selecting a product that will encourage compliance among individual pet owners.

Monthly oral or topical preventives may be more feasible for owners who are unable to invest the one-time higher cost of injectables. However, topicals can be malodorous and greasy for a few days following administration, and some clients may have difficulty getting their pets to eat oral preventives. Injectables are labeled for dogs at least 1 year old,4 so younger animals will need to be started on oral or topical products. Relatively new to the market, the one- or twice-yearly injectable moxidectin (ProHeart—Zoetis PetCare) may increase owner compliance comparable to that of annual vaccinations.

Dogs should be screened for heartworm infection as a means of judging prevention efficacy. Combining annual antigen (enzyme-linked immunosorbent assay [ELISA]) and microfilaria (modified Knott’s) testing in all dogs over 7 months of age is the gold standard for maximizing sensitivity.1,3 Albeit a relatively low risk, the microfilaricidal action of macrocyclic lactones may induce anaphylactic
reactions in microfilaremic dogs when treated. This makes screening even more important for patients not receiving year-round prevention as it will help determine whether these patients should receive an antihistamine and/or glucocorticoid in conjunction with the preventive as a precautionary measure.

Some practices may elect to not prescribe heartworm prevention without first conducting a screening ELISA at minimum. In our experience, this has led to clients declining prevention altogether even during peak mosquito season due to the additional expense of testing and lack of understanding as to why screening is necessary in asymptomatic or regularly treated animals. When screening is declined, preventives should still be offered provided the appropriate risks are explained to and accepted by the owner; a cautious practice may even have owners sign a release documenting their acknowledgment of the risks or prescribe prophylactic short courses of antihistamine/glucocorticoid combinations to prevent anaphylaxis. Ultimately, ELISA alone does not detect microfilariae (therefore, it cannot appropriately gauge the risk of anaphylaxis), so this screening step should not be a barrier for owners to obtain heartworm prevention for their pets, especially in asymptomatic animals or those that receive year-round heartworm prevention.

**Treating heartworm disease**

**Slow kill**

Administering ivermectin, selamectin, or moxidectin products monthly has demonstrated some efficacy as a “slow-kill” or “soft-kill” approach to treating heartworm-positive patients for whom financial constraints limit pursuit of the recommended adulticidal therapy. Ultimately, this is not an advisable strategy, especially as a clinician’s go-to treatment plan, because of the low rate of efficacy and potential for prolonged lung damage from persistence of worms in the vasculature. This protocol also places considerable onus on the owner to administer preventives monthly and to take action if they believe their pet is declining.

**Fast kill**

The following are highlights and important considerations for heartworm treatment as recommended by the American Heartworm Society.

- **Microfilaricidal therapy:** Once a heartworm infection is diagnosed, but 2 months in advance of adulticidal therapy, it is important to ensure that circulating microfilariae are eliminated by administering a macrocyclic lactone preventive. Topical moxidectin is the only medication approved by the FDA for eliminating circulating microfilariae. As a precaution, a tapering course...
of oral prednisone (1 mg/kg) and one dose of intramuscular diphenhydramine (2 mg/kg) can be administered to minimize the risk for anaphylactic reaction.1

Almost as important as killing the adult worms is ensuring that patients will be restricted from activity throughout treatment with the exception of short leashed walks.

- **Doxycycline:** Doxycycline (10 mg/kg) administered orally twice daily for 4 weeks 2 months before adulticidal therapy has been shown to disrupt the life cycle of adult heartworms by eliminating the worms’ symbiotic bacteria of the Wolbachia genus. This has the effect of minimizing the overall burden and some associated pathology following adulticide treatment.

- **Adulticidal therapy:** The only FDA-approved adulticidal therapy is mellarosine dihydrochloride injected into the deep epaxial musculature in the region of the L3-L5 vertebrae. For mild, moderate, or asymptomatic heartworm infections, a three-dose protocol is recommended:1 The first dose is administered 2 months after diagnosis, the second dose 1 month later, and the third dose 24 hours after that. Providing mild intravenous or intramuscular sedation (we use 0.4 mg/kg butorphanol intravenously) can increase patient comfort before mellarosine injection and help ensure that the patient does not move during injection. Tapering courses of oral prednisone (1 mg/kg) should be administered following each injection to mitigate inflammation from adult worm die-off.

- **Exercise restriction:** Almost as important as killing the adult worms is ensuring that patients will be restricted from activity throughout treatment with the exception of short leashed walks. Upon diagnosis, it is critical to begin decreasing activity as much as possible in the months leading up to adulticide therapy. Between and following mellarosine injections (6 to 8 weeks at minimum), crate rest or restriction to a small room in the home is imperative to minimize cardiovascular damage, inflammation, and potential pulmonary thromboembolism. Trazadone or gabapentin (or both) may be used as needed for their sedative effects.

- **Pain management:** Local pain from the mellarosine injection should be addressed. Gabapentin, if prescribed to facilitate cage rest, will help in achieving this goal. Owners can be instructed to apply ice to the injection site for 5 to 10 minutes as well. Extreme pain following injection is rare, but in these cases oral codeine, buprenorphine, or other adjunctive pain medication may be considered.

- **Resistance and repel lants:** It is generally accepted that resistant heartworm infections exist, but it is challenging to tease out the cases of heartworm disease that are truly resistant from those that arise due to poor owner compliance or improper administration of preventives. For dogs that have received monthly preventives appropriately and on schedule but still demonstrate circulating microfilariae, a microfilarial suppressor test (MFST) may be performed to investigate for resistance, although the test cannot definitively confirm it. Ultimately, animals that are MFST positive should still receive the standard treatment protocol, but it is more important to administer an EPA-registered monthly oral mosquito repellent such as permethrin to minimize the risk for disseminating resistant infection into the environment via mosquito bites.1,6 For cases in which the slow kill treatment is elected, veterinarians must consider that this protocol may select for resistant infections or that pre-existing resistance may contribute to treatment failure.

Year-round heartworm prevention should be continued following the full adulticidal treatment regimen. It may take up to a month for adult worms to die following adulticide therapy, and antigenemia may exist for 6 months following death of all worms. It is therefore recommended that a dog be tested for the presence of heartworm antigen and microfilariae 9 months after the last mellarosine injection. Dogs that still test antigen positive should be treated with oral doxycycline (10 mg/kg) for 28 days followed by two doses of intramuscular mellarosine (2.5 mg/kg) administered 24 hours apart.1

Dr. Stapleton earned his DVM from Cornell University College of Veterinary Medicine. During veterinary school, he conducted research and lectured about zoonotic diseases, antimicrobrial resistance, and population medicine. He also interned with the Centers for Disease Control and Prevention, USDA, and Department of Homeland Security. He practices at Mount Laurel Animal Hospital in Mount Laurel, New Jersey.

Dr. Sweigard earned her VMD from the University of Pennsylvania School of Veterinary Medicine, after which she practiced both farm animal and small animal medicine. Today, Dr. Sweigard heads the Primary Care Department at Mount Laurel Animal Hospital and still cares for some hooved patients, including potbellied pigs. Her professional interests include canine and feline surgery and dentistry, and any and all “bully” breeds.

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Alternative therapies for managing osteoarthritis

OA is a painful, debilitating condition that affects countless animals. Here’s a look at alternative treatments being used in veterinary practices across the country.

By Christopher Shapley, DVM, CVA

The goals of osteoarthritis (OA) management in companion animals are aimed at improving quality of life by controlling pain and restoring mobility to the extent possible. Traditional modalities for accomplishing these goals include dietary manipulation, physical therapy, surgery, and pharmaceutical agents (nonsteroidal anti-inflammatory drugs, corticosteroids, disease-modifying osteoarthritis drugs, and nutraceuticals).

But veterinary clients are inquiring with increasing frequency about alternative modalities for managing OA in their pets. As veterinarians, we hold the keys to safe and effective treatments for patients suffering from this debilitating disease. Here’s a brief overview of some alternative modalities that can be used for primary or adjunctive OA management.

Nutrition

The connection between OA and overweight/obesity is undeniable. According to Banfield’s 2019 State of Pet Health Report, 52% of dogs and 41% of cats with OA cared for in 2018 at Banfield practices were obese.1 Overweight and obesity increase the load on joints, in turn increasing the risk of disease progression, and patient discomfort. Results of a lifelong study of 48 Labrador retrievers showed that restricted feeding (vs. feeding ad libitum) delayed or prevented the development of radiographic signs of hip OA.2 With this in mind, evaluating a patient’s diet is an important first step in managing OA.

A number of therapeutic diets are available to aid in weight control and OA management. These diets are often lower in calories than typical diets and contain high levels of omega-3 fatty acids, which help support joint health and mobility by reducing inflammation, as well as glucosamine and chondroitin, which help slow cartilage deterioration.3

Acupuncture

The use of acupuncture for treating OA has become more common in general practice in recent years, as it is often requested by clients as an alternative to pharmaceuticals. Acupuncture is a form of traditional Chinese medicine that is performed by introducing thin, specialized needles into acupoints.

Multiple techniques, including dry needling, aquapuncture, moxibustion, electroacupuncture, and laser acupuncture, may be used either alone or in combination to stimulate acupoints. Aquapuncture is the introduction of sterile fluid into an acupoint as an alternative to setting dry needles. Moxibustion incorporates the burning of moxa (small cones of dried herbs) to apply heat safely to acupoints. Electroacupuncture, which combines mechanical and electrical effects, is commonly used to relieve pain associated with OA.4 Laser acupuncture involves the use of a low-intensity laser to stimulate acupoints. Laser acupuncture and aquapuncture are ideal for patients that cannot tolerate dry needling or electroacupuncture.

Herbal formulations

A number of Chinese herbal formulations containing boswellia and turmeric have been proven safe and effective for reducing OA pain and inflammation in dogs.5,6 In my experience, Chinese herbal formulations are best used in combination with acupuncture to increase the effectiveness of treatment.

Stem cells

Commercially available autologous adipose-derived mesenchymal stem cells have been used by veterinarians since 2003 to treat joint disease as well as tendon and ligament injuries in horses.6 This modality is becoming more common in small animal medicine as well, particularly for improving mobility and quality of life in dogs with OA. In a 2007 study, dogs with hip OA treated with stem cells showed a significant improvement in mobility and pain scores.7,8

Cannabinoids

Research on the use of cannabinoids in veterinary medicine—and the endocannabinoid system as a whole—is flourishing. One of the primary areas under study is the use of cannabinoids to treat pain and inflammation in OA patients. In a study published in April, cannabidiol (CBD) was shown to induce broad anti-inflammatory effects in vivo and to greatly reduce proinflammatory tumor necrosis factor-alpha in vitro.9 Legislation regarding cannabinoids varies widely, with restrictions in most states on discussing and prescribing cannabinoids for veterinary patients, but with further research cannabinoids could become a viable treatment option for animals.

Conclusion

The prevalence of OA, combined with a shift in client perceptions and the desire to treat with alternative modalities, pose a unique challenge to veterinarians. The good news is that safely and effectively improving quality of life in these patients is now possible when surgery and pharmaceuticals are not options. As always, the modalities selected should be tailored to the patient’s specific needs and the owner’s ability to remain consistent in their role as caregiver.

References available at dvm360.com
**CubexPMP**

**Prescription Monitoring Program software**

CubexPMP software automates the Prescription Monitoring Program (PMP) recording and submission process for veterinary teams, saving time, improving accuracy, and reducing risk. CubexPMP uses an automated process to enter owner, patient, and provider demographics. Integration with veterinary practice management software allows all transactional data to be captured electronically and sent to CubexPMP. Complete, accurate records are submitted automatically in the time frame required by the state. If any data are missing, the record is flagged. Additionally, real-time status dashboards allow easy viewing of submission status and practice compliance. CubexPMP is available via monthly subscription.

*For more information, visit cubex.com/software/cubexpmp*

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**Necoichi Raised Food Bowl**

**Elevated food dish for cats**

As cats age or weaken from illness, postural changes can cause discomfort during mealtime. This Raised Food Bowl from Necoichi was designed with the comfort of older cats in mind. Just shy of 3 inches tall, the bowl is a comfortable height for adult cats, and helps prevent backflow and reduce the risk for vomiting from swallowing too quickly. It may also help to reduce neck strain. In addition, the bowl’s inner lip keeps food from getting on the floor, and the curved shape keeps food centered in the bowl. It is made with FDA-approved non-absorbent porcelain and is dishwasher and microwave safe.

*For more information, visit necoichi.com/Products/detail/id=4407*

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**Haimer Face Shield**

**Face protection equipment**

The Haimer Face Shield was designed during COVID-19 to protect health care and manufacturing workers from droplet infection. Made of high-quality plastic, this lightweight, transparent shield prevents potentially harmful droplets from splashing into the eyes, nose, and mouth. The shield offers a 360-degree field of view, is easy to clean, features flexible size adjustment, and is suitable for those who wear glasses (including safety glasses). Interchangeable visors and forehead pads make it sustainable and environmentally friendly. Two models are available, one with a reinforced visor.

*For more information, visit haimer-usa.com*

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**Aquapaw Pro**

**Grooming tool for larger dogs**

Aquapaw Pro was designed to help owners of larger dogs with thicker coats bathe their pet efficiently from the comfort of their home. The combined sprayer/scrubber allows owners to brush and rinse their pet’s coat concurrently. Additionally, the two-stage button mechanism allows the user to click the sprayer to low, high, and off with just one hand. Aqua Pro has two settings (gentle and strong); features an 8-foot, heavy-duty hose; is made with 100% FDA-grade silicone, and comes with a shower adapter and garden hose adapter.

*For more information, visit aquapaw.com*
Save the date!

NOVEMBER 12-14, 2020

Fetch dvm360® Conference is hosting our second virtual event of 2020.

What you can expect:

- 3 full days of industry-leading CE sessions
- New career-enhancing strategies and techniques
- Networking opportunities with expert speakers and colleagues
Here are the CE opportunities coming in the next few months

**Fetch dvm360 virtual veterinary conference August 26-31**

AMID THE MANY CONFERENCE CANCELLATIONS and postponements related to the COVID-19 pandemic, dvm360 is proud to announce the launch of our first virtual Fetch dvm360 conference. This exciting event, which will be held August 26-31, 2020 on a screen near you, will combine three of our six annual live events — Hospital Design 360, Fetch Kansas City and Fetch Baltimore — in a single virtual conference.

This unique virtual event will feature a robust mix of prerecorded, live and interactive sessions featuring a wide array of clinical, business, and practice management topics that entire veterinary teams have come to rely on for relevant, practical, continuing education. Participants will also have access to a virtual live exhibit hall.

Conference attendees have the opportunity to earn nearly 250 CE credits, with sessions available on demand for two weeks after the conference. Hospital Design 360 content will be aired on August 26 and 27, followed by four days of Fetch dvm360 conference content.

“Although, we won’t be able to physically be together, we will have the opportunity to interact in virtual lounges and in a chat room,” says dvm360 Chief Veterinary Officer Adam Christman, DVM, MBA. “This will be an immersive experience for everyone in the veterinary field, from veterinarians and students, to veterinary technicians and assistants, to hospital managers and more. This year, we are proud to be hosting sessions on canine, feline, bovine, equine, small ruminant, and pocket pet care.”

For additional details and to register, visit fetchdvm360.com. And stay tuned on our website and social media channels for conference updates, announcements and surprises!

**NOTE:** Many 2020 CE events are now being held online. Please visit individual event websites for details.

### 2020

**August 14-15**  
Veterinary Summit 2020  
Chicago, IL  
212-305-2500  
vetsummitchicago.com

**August 20-22**  
AVMA Virtual Convention  
avma.org  
800-248-2862

**August 29-September 3**  
ExoticsCon  
Denver, CO  
exoticscon.org

**September 21-22**  
VMC’s Human Resources Boot Camp  
Philadelphia, PA  
vmc-inc.com  
303-674-8169

**September 30-October 3**  
ConneXity 2020  
Denver, CO  
aaha.org

**October 2-4**  
Pacific Northwest Veterinary Conference  
pnwv.wsvma.org  
info@wsvma.org  
800-399-7862

**October 7-10**  
Wild West Vet Show  
Reno, NV  
wildwestvetshow.com  
646-437-9080

**October 15-18**  
ABVP Symposium  
Chicago, IL  
abvp.com/symposium  
800-697-3583  
abvp@navc.com

**October 29-November 1**  
Veterinary Dental Forum  
Dallas, TX  
veterinarydentalforum.org  
208-661-9045

**November 3-4**  
Beyond Basics: Modern Diagnostic & Therapeutic Techniques in Equine Dentistry – A 2-Day Practical Course  
Hamilton, ON (near Toronto)  
vetpd.com  
office@vetpd.com  
844-870-6097

**November 5-6**  
New York Vet  
New York, NY  
newyorkvetshow.com  
646-437-9080  
newyorkvet@closerstillmedia.com

**November 6-7**  
Evidence-Based Podiatry for Equine Practitioners – A 2-Day Practical Course  
Sheridan, IN  
vetpd.com  
office@vetpd.com  
844-870-6097

**December 5-9**  
AAEP 2020  
Las Vegas, NV  
aaep.org  
859-233-0147  
aeoffice@aaep.org

### 2021

**January 7-10**  
AVMA Leadership Conference  
Chicago, IL  
avma.org/events/veterinary-leadership-conference

**January 16-20**  
Veterinary Meeting & Expo  
Orlando, FL  
navc.com/vmx

**February 11-14**  
Midwest Veterinary Conference  
Columbus, OH  
mvconline.org  
info@mvconline.org
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**Drill-Aire Plus High Speed Dental Air Unit**
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Quiet, please!

When a client won't stop talking for long enough to allow you to complete your diagnostic evaluation, sometimes you have to resort to strange measures.

There are times when practicing veterinary medicine that you just need to stop and think for a bit about the patient you are examining. It is during these moments that a little peace and quiet would be nice. For me, unlocking the mystery of upper hind end lameness in a horse often requires a tremendous amount of contemplation. I enjoy these cases, but I have been known to just sneak off to my office for a few minutes to assimilate the accumulated clues to make a logical decision about the problem and what should be done. The more difficult the case, the more quiet I require.

One of my clients is a barrel racer who has some world-class horses and is a blast to be around. When Tera shows up with a lame horse, it usually requires my full concentration. The problem is…Tera is a talker.

When I say she is a talker, I mean she can't stand a moment of silence. It is almost like Tera has a pathologic aversion to being in the presence of others with no conversation occurring. She will see to it that something is being said at all times, largely by asking questions. This means that you have to be involved in the process of stamping out quiet with her.

One particular day found me working up a very difficult lameness case for her. I was digging deep into my gray matter trying to piece together the clues to why her 7-year-old gelding was 0.3 second off, but the answer was slow in coming. Every time I began to ponder the results of the last portion of the exam, she would sense that things were too quiet and hit me with a volley of questions.

The last thing I wanted to do, of course, was hurt her feelings by asking her to be quiet, so I began looking around for something that would occupy her as I thought about the problem at hand. She was rambling on about some horse she had ridden 10 years ago that acted a little like this one when it occurred to me that her constantly moving hands were a vital part of her talking arsenal. I began to wonder if the talking would stop if I could somehow still those hands.

As she entered her fifth or sixth paragraph about the horse from 10 years ago, I simply handed her an empty syringe case. She never stopped talking or moving her hands; she simply accepted the case and continued on with the story without so much as a comma. Next, I handed her an empty bottle of Carbocaine, which she gladly accepted with her other hand and just rolled right on with the story.

This was actually getting kind of fun. I was beginning to wonder how many things she would hold before she actually looked down to see what they were. So, I handed her a hoof tester, which is used to determine the location of a painful area in the foot of a lame horse. The tester was heavier than the other items, and Tera had no readily empty hand to hold it in. This stopped the chatter momentarily, but she simply took the instrument and placed it under her left arm and continued on with the story.

I maintained eye contact with her and made occasional head movements to make her feel as if I were listening intently; all the while handing her more things: an earpiece from an otoscope that was sitting on the counter, then an extension set (still in the package), followed by a digital thermometer and the case it came in. She was still going with the story but her tempo had slowed just a bit. It was now becoming almost impossible to move her hands, which obviously was causing the conversation cortex in her brain to sputter a bit.

I stopped handing her stuff for a second to see if she would notice all the things she was holding for me. Nope. Time to hand over some more. There was little room left to accept things. She had arranged them in various places to make holding them easier, but still had no idea what she was holding. I handed her a package of 2-0 Vicryl suture material, still in the plastic, then a pair of rubber gloves I had just taken off. Not enough? How about a 3-inch stack of 4x4 gauze?

Finally, Tera lost all ability to move her hands. She was now holding enough stuff that she had to mash some of it between her arms and abdomen. When this happened, all talking came to a standstill. But she still had not looked to see what all I had given her.

A few moments passed with no noise coming from either of us. I just stood there looking at her and finally couldn't maintain a straight face. She asked what I was giggling about.

“Thanks for holding all that for me,” trickled out the corner of my now laughing mouth. When she looked down to assess what she was holding, Tera started laughing, too. Pretty soon we were both laughing so hard that others in the clinic came over to find out what was going on.

“I guess you figured out that I can't talk if I don't move my hands. Well, I was just getting to the good part of that story when you handed me all this stuff,” she said, as she started setting it all down on the counter.

“Oh no!” I bellowed before she could get her hands empty. “You have to hold all that until I have had enough quiet time to figure out what is wrong with your horse. Then you can set it all down and start telling me the story again!”

Every time she comes to the clinic now, I greet her with an armful of meaningless stuff and tell her if she can't be quiet, she is going have to hold it all until I am done.
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