**Purdue**

**Practical Tips for Avian Radiography**

Obtaining good-quality radiographs of sick birds can be a challenge, according to Steve Thompson, DVM, DABVP (Canine and Feline Practice), clinical associate professor of small animal community practice at the Purdue University College of Veterinary Medicine in West Lafayette, Indiana. Dr. Thompson heads the community practice elective block for fourth-year veterinary students and treats a variety of pets, managing a daily caseload that includes such exotics as parrots, bearded dragons, snakes, and hedgehogs.

Presenting at the 2017 Purdue Veterinary Conference, which was held on the Purdue University campus, Dr. Thompson provided an overview of avian radiography and shared tips to help veterinarians overcome some of the challenges associated with obtaining high-quality images.

**Endocrinology**

**Hyperadrenocorticism and Diabetes in Dogs**

A team of Argentinian researchers studying concurrent canine hyperadrenocorticism (HAC; Cushing disease) and diabetes mellitus identified several risk factors predisposing dogs with HAC to diabetes. The researchers believe this is the first study to identify such risk factors, thus adding new insight into HAC's well-known predisposition to diabetes.1

HAC and diabetes primarily affect middle-aged to senior dogs (Table). The diseases can appear independently or concurrently and share clinical signs (eg, polyuria/polydipsia) that can complicate diagnosis and treatment. Notably, HAC and diabetes concurrence... (continued on page 24)

**Special Feature**

**Enlisting Dogs in the War on Cancer**

*By Mark Cantrell*

In the thousands of years they've been domesticated, dogs have helped humans in many ways, from herding sheep and cattle to performing search and rescue duties after disasters. Now dogs have begun aiding us in what might be the most important way yet: finding new ways to fight cancer.

The National Cancer Institute (NCI) defines comparative oncology as “the study of naturally developing cancers in animals as models for human disease.” For years, mice have been the major preclinical model for oncologic studies, for... (continued on page 16)

**IVC Ves**

**Physical Medicine in Companion Animals**

Physical medicine, which uses the body’s physiology to facilitate healing, is gaining attention in the veterinary world. According to Bonnie Wright, DVM, DACVAA, this nonpharmacologic approach complements Western medicine's pharmacologic-based therapies. In fact, physical medicine helps when pharmacologic options are limited, said Dr. Wright, who lectured at the 2017 International Veterinary Emergency and Critical Care Symposium in Nashville.

Physical medicine can be especially helpful for relieving pain, which is very common in veterinary critical care patients. Uncontrolled pain has several negative consequences, including poor wound healing and immunosuppression. Pharmacologic solutions for pain control include opioids, nonsteroidal... (continued on page 10)

**NY Vet**

**Managing Seizures**

Treatment with anticonvulsants should be initiated early in veterinary patients to help prevent a cycle of further seizures, Andrew Linklater, DVM, DACVECC, told attendees at the 2017 New York Vet conference in New York City. His presentation covered the causes of seizures, indications for beginning antiepileptic drug treatment, and treatment options for patients presenting in status epilepticus, which is seizure activity lasting longer than 5 minutes or a succession of 2 or more seizures with no return to normal consciousness in between. “Our goals of therapy are not only to limit the frequency of seizures but [also] to limit clusters,” said Dr. Linklater, a clinical instructor at Lakeshore Veterinary Specialists in Wisconsin...

(continued on page 14)
REVOLUTIONARY!
The first diagnostic tool for early screening and monitoring of diabetes in felines and canines.

Start Screening Now!
A1Care (HbA1c) is an easy, accurate and cost-effective veterinary mail-in diabetes test for the early screening, diagnosis and long-term monitoring of canine and feline diabetes. Pre-screen at-risk populations: overweight, senior and pre-disposed breeds.

With a few drops of dried blood, A1Care determines the average blood glucose levels for the previous 70 days in felines and 110 days in canines thus scoring the patient as normal, pre-diabetic or diabetic.

<table>
<thead>
<tr>
<th>A1c (HbA1c) Levels</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Average/ Normal</strong></td>
</tr>
<tr>
<td>Feline 1.8</td>
</tr>
<tr>
<td>Canine 3.3</td>
</tr>
</tbody>
</table>

For more information go to:
baycomdiagnostics.com
800-213-1439
info@baycomdiagnostics.com
THE FIGHT AGAINST ANIMAL CRUELTY

A

nimal cruelty crosses all social, economic, and geographic boundaries. The appalling number of cases reported in the media—from the person who kills a neighbor's barking dog to the animal hoarder who does not provide adequate food, water, and shelter, to the many cases of pets freezing to death when left outdoors in frigid weather—are likely just the tip of the iceberg.

Unlike violence against humans, government agencies do not currently collect comprehensive data on animal abuse cases, making it difficult to determine exactly how pervasive the problem is. But that is changing, as are the laws against those who commit crimes against defenseless animals.

In 2016, the FBI began adding data on the specifics of individual acts of animal cruelty to its National Incident-Based Reporting System (NIBRS), a collection of detailed crime statistics from law enforcement agencies around the country. Prior to that, animal crimes data were only included in the FBI’s Uniform Crime Reporting (UCR) system, which simply noted that a crime occurred. Today, some states report crimes to UCR, some to NIBRS, and others to both. By adding animal cruelty offenses to NIBRS, law enforcement agencies and advocacy groups are hoping to glean a more complete picture of the nature of cruelty to animals.

In 1990, fewer than 10 states considered animal abuse a felony. Today, all 50 states have felony provisions for the gravest crimes against animals, solidifying the consensus that egregious animal abuse is a serious offense and should be treated as such. Many crimes against animals are still considered misdemeanors, however, and penalties for felony crimes vary by jurisdiction.

Another step forward in the fight against animal abuse is the institution of animal abuser registries. In 2015, Tennessee became the first state to adopt a nationwide animal abuser registry, which took effect in 2016. Registries have been instituted in a smattering of counties across the country, and at least 12 other states have statewide legislation pending.

In some states, registries are available only to law enforcement, animal control, and shelter facility personnel, while other states allow access to the public. Like registries for convicted sex offenders, animal abuser registries can offer law enforcement help in identifying convicted animal abusers, and assist animal shelters in preventing convicted abusers from adopting. Proponents argue that access to this information is crucial in keeping companion animals out of the hands of potential abusers.

Because veterinarians deal with animals and their owners every day, you are critical in the effort to thwart animal cruelty. Martha Smith-Blackmore, DVM, founder and president of Forensic Veterinary Investigations, LLC, who lectured at the 2017 American Veterinary Medical Association Convention in Indianapolis, Indiana, on how to deal with cases of neglect, notes that whether the situation you encounter is one of ignorance, neglect, or outright cruelty, turning your suspicion into action requires a careful approach and a collaborative effort (page 12). We hope you heed her advice if you suspect a client may be mistreating his or her pet, and support the states enacting legislation to fight against all forms of animal abuse.

Thank you for reading!

Mike Hennessy
Chairman and CEO

American Veterinarian® is published 8 times a year by Intellisphere LLC, 2 Clarke Dr, Suite 100, Cranbury, N.J. 08512. Application to mail at Periodicals price is pending at Trenton, N.J., and additional mailing offices. Postmaster: Send address changes to American Veterinarian®, 2 Clarke Dr, Cranbury, NJ 08512-3619.

Copyright © 2018 by Intellisphere, LLC. All rights reserved.

The content contained in this publication is for general information purposes only. The reader is encouraged to confirm the information presented with other sources. American Veterinarian® makes no representations or warranties of any kind about the completeness, accuracy, timeliness, reliability, or suitability of any of the information, including content or advertisements, contained in this publication and expressly disclaims liability for any errors and omissions that may be presented in this publication. American Veterinarian® reserves the right to alter or correct any error or omission in the information it provides in this publication, without any obligations. American Veterinarian® further disclaims any and all liability for any direct, indirect, consequential, special, exemplary, or other damages resulting from the use or misuse of any material or information presented in this publication. The views expressed in this publication are those of the authors and do not necessarily reflect the opinion or policy of American Veterinarian®.

Scan the QR code for complete back issues, clinical and research news, and expert video insight.

Let’s Talk!

twitter.com/Am_Veterinarian
facebook.com/AmericanVeterinarian
linkedin.com/company/11160752
info@AmericanVeterinarian.com

CHAIRMAN’S LETTER

SUBSCRIBE TODAY!

Mike Hennessy, Sr
Chairman and CEO
Choose a product that offers forgiveness

Because life happens, choose Advantage Multi® for Dogs. Heartworm protection that forgives if clients forget to apply on the same day every month.*

*If you forget and go over 30 days between treatments, just treat immediately and resume your monthly schedule.

CAUTION: Federal (U.S.A.) law restricts Advantage Multi® for Dogs (imidacloprid + moxidectin) to use by or on the order of a licensed veterinarian. WARNING: DO NOT ADMINISTER THIS PRODUCT ORALLY. For the first 30 minutes after application ensure that dogs cannot lick the product from application sites on themselves or other treated animals. Children should not come in contact with the application sites for two (2) hours after application. (See Contraindications, Warnings, Human Warnings, and Adverse Reactions, for more information.)

CONTRAINDICATIONS: Do not use this product on cats.

©2017 Bayer, Shawnee Mission, Kansas 66201. Bayer, the Bayer Cross and Advantage Multi are registered trademarks of Bayer. AM171807

Heartworms  Fleas
Microfilariae  Whipworms
Roundworms  Sarcoptic Mange
Hookworms
ADVANTAGE MULTI®

For dogs (imidacloprid + moxidectin) Topical Solution

Once-a-month topical treatment for the prevention and control of:

- Heartworm disease
- Flea infestations
- External parasites (sand flies, ticks, ear mites)

- Infection with sarcoptic mange (scabies)

- Infection with Uncinaria stenocephala (hookworms)

- Infection with Toxocara canis or Toxascaris leonina (roundworms)

- Infection with Trichuris vulpis (whipworms)

(6 R, 23 E, 25 S (E))-borated eas.
The Importance of Vitamin D in Canine Health
An exploration of current knowledge on this primary nutrient, including dietary recommendations and directions for future research.

Parallels between species have propelled collaboration and coordination in oncology research that is proving beneficial to both people and pets.

By Don Vaughan

Hyperadrenocorticism and Diabetes in Dogs
What is at play—and what is the outcome—when dogs with Cushing disease develop concurrent diabetes mellitus?

Rethinking your approach to the physical exam and incorporating some simple changes can have a monumental effect on patient and owner stress during visits.

The Importance of Vitamin D in Canine Health
An exploration of current knowledge on this primary nutrient, including dietary recommendations and directions for future research.

A look at some of the latest and greatest products in veterinary medicine.

Stay Connected. Save Time. Save Money.

Visit VMDtoday.com to continue your business education, one article at a time.
PACE Act to Strengthen Animal Fighting Prohibitions

By American Veterinarian® Staff

Although animal fighting is illegal throughout the United States, ambiguities in federal law have given animal fighters the ability to continue the practice in US territories. But newly proposed legislation—the Parity in Animal Cruelty Enforcement (PACE) Act—intends to clarify that territories are not exempt from the Animal Welfare Act’s provisions against dogfighting and cockfighting. Under the Animal Welfare Act, it is a federal misdemeanor to be a spectator at any animal fight, but it is a felony to:

- Sponsor or exhibit an animal in a fighting venture
- Buy, sell, deliver, possess, train, or transport an animal for fighting purposes
- Use the US Postal Service or other interstate means to promote animal fighting
- Buy, sell, deliver, or transport cockfighting implements
- Bring a minor to an animal fight

“Animal fighting is an atrocious activity that, for many years, has been banned in the United States,” said Representative Peter Roskam (R, Illinois), one of the legislators who introduced the PACE Act. “I’m introducing a bill that closes the loophole that, until now, has allowed this despicable practice to continue throughout our US territories.”

The PACE Act would have a direct impact on Puerto Rico, which has become a hub for American cockfighting. In territories such as this, birds are raised to participate in spectacles, outfitted with metal knives and other sharp weapons before fights, and treated inhumanely if they survive.

“We shouldn’t have 1 set of rules against animal cruelty for all 50 states and a different set of rules for US territories,” said Wayne Pacelle, president and chief executive officer of the Humane Society of the United States, which is a strong supporter of the PACE Act.

Besides these horrific acts of animal cruelty, cockfighting has been linked to the spread of several diseases, including exotic Newcastle disease in a 2002 outbreak, as well as bird flu throughout Asia.

By closing this loophole in the Animal Welfare Act, legislators will improve the lives of animals being forced to perform in inhumane spectacles and safeguard poultry suppliers from avian diseases. “Dogfighting and cockfighting are barbaric practices, more widely criminalized than any other form of animal cruelty in the world, and the prohibitions should apply to every part of the country,” Pacelle said. “The Humane Society of the US is grateful to Representative Roskam for leading this fight and working to stamp out animal abuse everywhere.”

Clinical Trial Shows Promise for FIP Treatment

By Kerry Lengyel

Investigators have spent years searching for a cure for feline infectious peritonitis (FIP), an uncommon but usually fatal immune response to feline coronavirus (FCoV). Now, a new clinical trial appears to have made a breakthrough. A team from Kansas State University in Manhattan and the University of California, Davis (UC Davis), investigated whether a novel antiviral drug could cure FIP.

“This research is the first attempt to use modern antiviral strategies to cure a fatal, systemic viral disease of any veterinary species,” said Niels Pedersen, DVM, PhD, BS, professor emeritus at the UC Davis School of Veterinary Medicine and co–lead investigator of the trial. “Our task was to identify the best candidates for antiviral treatment, and the best dose and duration of treatment.”

Launched in March 2016, the study included 20 client-owned cats with various forms and stages of FIP (14 cats presented with wet or dry-to-wet FIP; 6 with dry FIP). Each cat was given the 3C-like protease inhibitor GC376 every 12 hours at a dose of 15 mg/kg subcutaneously and evaluated at least twice daily for rectal temperature, pulse, respiration, appetite, and activity, along with routine blood testing.

Cats were discharged to their owners once a positive treatment effect was noted, usually within 5 days after receiving treatment. Owners were instructed on how to administer the antiviral drug twice daily and keep daily logs of their cat’s progress.

The study results revealed a dramatic and progressive health improvement in 19 of the cats during the first 1 to 4 weeks of treatment, and 7 were also categorized as potential treatment successes based on more than 12 weeks of remission.

“We found that most of [the] cats, except for those with neurologic disease, can be put into clinical remission quickly with antiviral treatment, but achieving long-term remission is challenging with chronic cases,” said Yunjeong Kim, DVM, PhD, DACVM, research assistant professor of virology at Kansas State University College of Veterinary Medicine and co–lead investigator in the clinical trial.

Kittens younger than age 18 weeks with acute-onset wet FIP or dry FIP limited to a mesenteric lymph node showed the best long-term treatment response in the trial. While the drug seemed to slow the progression of FIP in cats with neurologic disease, none of these cats achieved remission.

“These findings give us more insight into FIP pathogenesis and also underscore the importance of early diagnosis and early treatment,” Dr. Kim said.

All cats returned to normal health after receiving treatment with this antiviral drug, even if for just a few weeks or months. “Saving or improving the lives of even a few cats is a huge win for FIP research,” Dr. Pedersen said.

Although just one-third of the cats in the clinical trial were long-term survivors, the authors believe that their work provides a basis for future studies with this antiviral drug and similar ones that will eventually follow.

Safety and Efficacy of Intravenous Tranexamic Acid for Emesis Induction

By JoAnna Pendergrass, DVM

When a dog accidentally swallows certain substances, such as chocolate or onions, promptly inducing vomiting can remove the substance before the digestive system fully absorbs it. Traditional emetic agents include apomorphine, which can be administered via intravenous (IV) or conjunctival injection, and oral 3% hydrogen peroxide (H₂O₂). Both agents typically induce vomiting within 10 minutes and have just mild adverse effects.

Tranexamic acid, an antifibrinolytic agent used in human and veterinary medicine, can cause nausea and vomiting in humans. Unlike apomorphine, which stimulates the chemoreceptor trigger zone, and H₂O₂, which stimulates the oropharynx, tranexamic acid induces emesis by stimulating tachykinin neurokinin-1 receptors, which regulate the vomiting reflex.

A previous study reported tranexamic acid’s ability to dose dependently induce emesis in dogs. To date, though, no safety and efficacy profile for veterinary use of tranexamic acid has been determined. To address this knowledge gap, a Japanese research team investigated the safety and efficacy of IV tranexamic acid for inducing emesis in dogs.

The investigators evaluated the medical records of 137 dogs treated for accidental ingestion and collected the following information:

- Signalment: age, body weight, breed
- Ingested material: type, amount, location within digestive system
- Tranexamic acid administration: dose, number of administrations
- Emesis description: time to onset, duration, frequency
- Adverse effects

Overall, nearly 95% (129/137) of dogs vomited after receiving IV tranexamic acid (median dose, 50 mg/kg). Time to emesis ranged from about 2 minutes after the first dose to nearly 6 minutes after the third dose. On average, the dogs vomited twice after receiving tranexamic acid.

Approximately 85% of dogs vomited after a single dose. Efficacy decreased to about 65% for dogs receiving second and third doses. Some dogs that did not vomit after the first dose did not receive a second dose, because either they were only retching or more than 2 hours had elapsed since accidental ingestion. Several dogs that did not vomit after the second dose received either 3% H₂O₂ or no further treatment.

Age, body weight, and type of ingested material (eg, chocolate or clothing) did not appear to affect efficacy. However, the investigators suggested a need for further study of the association between these factors and tranexamic acid-induced emesis.

Adverse effects occurred after the first dose and were reported in just 2 dogs. One experienced a tonic-clonic seizure and fully recovered with diazepam treatment. This dog ingested cocoa powder, which contains theobromine, a substance that can induce seizures. Notably, tranexamic acid can inhibit inhibitory neurotransmitters like gamma-aminobutyric acid, so neuronal excitation could have caused seizure. “Further studies are warranted to investigate the proconvulsant effect of tranexamic acid in dogs,” the investigators wrote.

The second dog had bleeding at the IV catheter site, which may have occurred because dogs tend to be more hyperfibrinolytic than humans, according to the investigators. Applying tape at the site stopped the bleeding.

The investigators determined that tranexamic acid is safe and highly effective for inducing emesis in dogs after a single dose. Their conclusion: “The prompt and short-acting properties of tranexamic acid make it a good choice as an emetic.”


Focused Ultrasound in Veterinary Medicine

By American Veterinarian® Staff

In humans, focused ultrasound has been studied for its potential to transform the treatment of many medical conditions, including cancer, epilepsy, psychological disorders, cardiac arrhythmias, and Alzheimer’s disease. Possible uses are now being explored in the veterinary field.

Focused ultrasound is a noninvasive therapeutic technology that uses ultrasonic energy to target tissue in inaccessible areas without the need for incisions or radiation. An acoustic lens concentrates multiple intersecting ultrasound beams with extreme precision and accuracy on a target located deep in the body. There is no effect on tissue through which individual beams pass, but at the focal point, the merging of the numerous beams creates the possibility of treating medical disorders.

Several promising uses for focused ultrasound have the potential to change veterinary medicine: drug delivery, noninvasive spaying, wound healing, and relief of pain from arthritis and hip dysplasia. It offers advantages over traditional medical treatments because, as a noninvasive treatment option, there is no need for stitches (or, in turn, E-collars), it has a low rate of complications, and the risk of infection is greatly diminished. The technology is now being studied for its use in eliminating tumors; in fact, the Focused Ultrasound Foundation launched a veterinary program to treat naturally occurring soft tissue tumors in dogs using focused ultrasound, with the first study planned for early 2018.

Is Your Dog’s Tongue Telling You Something?

By Amanda Carrozza

More evidence that dogs may understand the emotional expressions of people: The results of a new study reveal that dogs lick their mouth as an involuntary response to angry human faces. Investigators in the United Kingdom and Brazil analyzed 17 healthy adult dogs of various breeds that were shown 1 positive and 1 negative expression from the same individual, either human or canine of either sex, along with a positive or negative sound from the same species and gender.

The findings revealed that dogs licked their mouth more frequently after seeing a negative facial expression than a positive one. The behavior occurred more often in reaction to faces of humans than of dogs. Interestingly, the reaction was specific to visual cues; audio clips of angry human voices did not produce the same response, indicating that mouth-licking may be a reaction to what dogs see, not to any form of negative context.

“Humans are known to be very visual in both intra- and interspecific interactions, and because the vision of dogs is much poorer than [that of] humans, we often tend to think of them using their other senses to navigate the world,” said Daniel Mills, FRVCS, coauthor of the study and a professor of veterinary behavioral medicine at the University of Lincoln in the United Kingdom. “But these results indicate that dogs may be using the visual display of mouth-licking to facilitate dog–human communication in particular.”

This study backs earlier research that dogs respond to emotional signals and supports what many pet owners have long believed: Pets possess abilities to communicate.
Physical Medicine in Companion Animals

Thermostatic and mechanical pressure techniques—with or without pharmacologic aids—can reduce pain in emergency and intensive care unit patients.

By JoAnna Pendergrass, DVM

Dr. Wright provided several tips for using cryotherapy tools, such as ice packs and small paper cups filled with crushed ice:

- Repeat cryotherapy every 4 to 6 hours.
- Apply tools cautiously in areas of thin skin or poor circulation.
- Use cryotherapy for 10 to 20 minutes for superficial tissues (1-2 cm deep) and up to 30 minutes for deeper tissues (2-4 cm).

To engage flaccid muscles in a dog, Dr. Wright suggested having the dog stand in a tray of ice cubes and water while someone rubs ice and water along its legs.

MECHANICAL PRESSURE MODALITIES

Mechanical pressure deforms body tissue, which stimulates healing by releasing growth factors, proteins, and neurotransmitters. Physical medicine modalities that involve the use of mechanical pressure include acupuncture, electrical stimulation, and exercise.

Acupuncture

By locally engaging muscles and fascia, acupuncture relieves pain, Dr. Wright said. It also interacts with the central nervous system to influence the release of neurotransmitters involved in pain modulation (eg, gamma-aminobutyric acid, cannabinoid, and glutamate). In addition, acupuncture modulates blood flow and immune function.

The paraspinal area is particularly important for acupuncture needle placement, because it is the exit point for many spinal nerves. Other acupuncture points for pain relief include the Golgi tendon organs and muscle spindle insertions.

Dr. Wright emphasized that acupuncture, and physical medicine in general, is most effective when it is applied bilaterally. Although there is a tendency for practitioners to treat only the injured...
Acupuncture, and physical medicine in general, is most effective when applied bilaterally.

Proper practice is essential, Dr. Wright emphasized. “Whatever you practice in the injured animal will be what you get in the long term,” she said. This is particularly important when reeducating a dog on normal posture. For example, an injured dog that learns to drag its back limbs when using a wheelchair will continue to move that way after the rehabilitation period.

Dr. Wright makes these recommendations for exercise:
• Choose exercises within the patient’s comfort zone.
• Continually challenge the patient with new exercises.
• Begin therapeutic exercise after pain is under control.
• Adapt the regimen according to factors such as owner schedule and lifestyle.

Mechanical pressure is also useful for managing gastrointestinal motility problems that can result from pharmacologic pain control in veterinary critical care patients. Physical medicine techniques such as abdominal massage after surgical deobstipation, as well as exercise, can stimulate and manage motility.

Other forms of physical medicine include therapeutic lasers and stem cell therapy, which are not commonly used in veterinary emergency medicine but are worth knowing about, Dr. Wright noted.

MASTERING PHYSICAL MEDICINE
Because veterinarians often feel overwhelmed when considering physical medicine tools, Dr. Wright suggested beginning with 1 tool and seeing how it works. Gaining physical medicine expertise can take 10 to 15 years, Dr. Wright said. She advised veterinarians to learn as they go, rather than wait to master all the skills.
How to Deal With Animal Neglect Cases

Veterinarians who suspect clients of mistreating their pets should tread lightly, gather and document evidence carefully, and collaborate with law enforcement.

By Nicola M. Parry, BVSc, MRCVS, MSc, DACVP, ELS

(continued from front cover)

these cases involve passive maltreatment that represents acts or crimes of omission, she said.

Presenting at the 2017 American Veterinary Medical Association Convention in Indianapolis, Indiana, Dr. Smith-Blackmore discussed the role of the veterinarian in dealing with cases of animal neglect.

A COLLABORATIVE EFFORT

Dr. Smith-Blackmore emphasized that effective management of animal neglect cases requires collaboration among veterinarians, law enforcement officers, and prosecutors.

She explained that veterinarians play a key role in recognizing and reporting cases of obvious or suspected animal neglect. This may require veterinarians to participate in crime scene investigations, perform diagnostic testing (such as laboratory work and radiography), interpret findings (including those from photographs), and ultimately provide opinions on what factors either did or did not contribute to an animal’s condition.

In contrast, law enforcement officers are responsible for investigating these cases, which may involve obtaining search warrants for an owner’s home and conducting interviews with an owner. Prosecutors will also advise on what charges might be applicable.

REPORTING SUSPICIONS OF ANIMAL NEGLECT

In an interview with American Veterinarian®, Dr. Smith-Blackmore provided pointers for veterinarians who need to report suspicions of animal neglect to law enforcement. If the officer taking the report is less than responsive, the veterinarian should call the agency directly and ask to speak with a detective, she advised. For example, “If an animal control officer doesn’t see a problem where you do, call the sheriff’s department,” she said. “If local law enforcement is less than thorough, call the prosecutor’s office. There is always someone, somewhere, who has the ability and interest to help launch an investigation into your concerns.”

Dr. Smith-Blackmore told American Veterinarian® that “when a veterinarian suspects animal maltreatment and reports that suspicion to the appropriate authorities, he or she has contributed one important piece to the justice puzzle. The investigation and potential prosecution that follow are where criminal responsibility is decided.”

However, she also noted the uneven response across the country to allegations of animal abuse. Although “some jurisdictions are well prepared and will respond appropriately, other places may have departments or individuals who fail to respond with appropriate interest and vigor,” she said. “But as long as we veterinarians are reporting our suspicions and expecting appropriate responses, we are fulfilling our responsibility to animal health and welfare. The veterinarian who fails to advocate for his or her patient is a gatekeeper, preventing an appropriate response.”

She also discussed cases in which veterinarians might encounter “borderline care” of animals. In these instances, it is appropriate to exercise the due diligence of educating the client and giving the client the opportunity to improve an animal’s condition, she said. “Set reasonable deadlines for improvement, and document those expectations in the medical record. If the client then fails to show up for a recheck appointment, or if the animal is no better off at recheck, a report of suspected animal cruelty can be made,” she said.
THE CLINICAL EXAMINATION

Focusing on starvation as a form of neglect, Dr. Smith-Blackmore stressed the need for veterinarians to perform a thorough clinical or postmortem examination on any animal that they suspect has been abused.

When documenting their findings, veterinarians should include subjective observations (eg, the smell of the animal, the texture of its fur) and objective findings (eg, the animal’s weight, results of diagnostic tests), as well as observations about the severity and duration of any injuries (Figure 2).

Dr. Smith-Blackmore discussed some tools that veterinarians may find useful when recording their clinical examination findings. For example, body condition charts can help veterinarians document an animal’s body condition score. The Tufts Animal Care and Condition Scoring System also provides language for assessing body condition, as well as for physical care and weather and environmental safety. Muscle condition score charts are also available from the World Small Animal Veterinary Association, she said.4,5

Look for Evidence of Starvation

Hypoalbuminemia is a common finding in animals that have suffered starvation, Dr. Smith-Blackmore said. Other common findings include an elevated blood urea nitrogen (BUN) level, as a result of protein catabolism, as well as an elevated BUN:creatinine ratio. Additionally, a complete blood count may reveal findings such as anemia and low white blood cell count, she said. If the animal has demonstrated pica, the veterinarian should note this in the report because it indicates that the animal had an interest in eating, thus reducing the likelihood that inappetence led to emaciation.

Rule Out Medical Causes of Emaciation

However, Dr. Smith-Blackmore advised that when dealing with animals that are suspected to have been starved, veterinarians should nevertheless be careful to rule out underlying medical conditions that could have produced significant weight loss despite adequate nutrition. These include conditions such as cancer, protein-losing nephropathy, exocrine pancreatic insufficiency, and severe intestinal parasitism, she said.

Choose Language Carefully

Dr. Smith-Blackmore emphasized the need for veterinarians to think carefully about the language they use when recording clinical findings in a written report because this can have important implications during any future prosecution stage.

For example, she advised veterinarians to avoid using the term neglect when describing or interpreting any findings from a case involving an emaciated animal. Use of this term in a report could prevent prosecutors from charging a severe case of animal neglect as a felony, she explained. Instead, Dr. Smith-Blackmore suggested that veterinarians should use the term starvation abuse in these cases (Figure 2).

ANIMAL ABUSE AS A SOCIAL ISSUE

Dr. Smith-Blackmore discussed several cases, some of which also highlighted animal abuse as an important social issue with implications that extend beyond the effect on the animal. The veterinarian’s role in recognizing and reporting animal abuse is especially important because of the well-documented link between animal abuse and human violence and other forms of community violence.6,7

In addition to neglect resulting from an individual’s lack of empathy, she added that animal abuse sometimes results from an owner’s mental health issues, as in cases of animal hoarding, for instance. These scenarios can be extremely complex, she said, with various potential underlying issues. She discussed case examples such as the overwhelmed caregiver hoarder (who passively acquires an excessive number of animals), the rescue hoarder (who takes in abandoned, abused, and stray pets and often eventually suffers extreme compassion fatigue), and the greed-driven hoarder (who acquires animals purely for financial gain).

In these cases, as well as in other instances, when evidence may be insufficient to file charges, for example, Dr. Smith-Blackmore stressed that a restorative justice approach can often help both the people and animals involved. In contrast to more punitive approaches in which the main aim is retribution, restorative justice considers crime and wrongdoing to be an offense against an individual or community rather than the state, she said. This approach still holds offenders accountable, but the response focuses on healing rather than punishing.

Dr. Smith-Blackmore discussed using the Benchmark Animal Rehabilitative Curriculum in these cases. This court-ordered online course is designed to create positive change in the attitudes and actions of people who have mistreated animals and to reduce the likelihood that they will reoffend.

Because this course educates individuals about animal cruelty, animals’ basic needs, and responsible pet ownership, she noted, participation prevents individuals from claiming ignorance about these topics if they reoffend.

ADVANCING EFFORTS TO INCREASE REPORTING OF ANIMAL ABUSE

Overall, Dr. Smith-Blackmore emphasized the need for veterinarians to act on cases of suspected animal neglect or abuse. “When veterinarians decide not to report their suspicions, they have acted as investigator, judge, and jury—potentially condemning that animal or scores of animals to a lifetime of suffering,” she said.

An increasing number of publications in the medical literature about childhood injuries related to abuse played an important role in bringing child abuse to national attention in the 1960s. This ultimately contributed to most states having mandatory child abuse reporting laws by the 1970s. Reflecting on this, Dr. Smith-Blackmore noted that with respect to reporting of suspicions of animal abuse, veterinarians are currently in a similar position to that of pediatricians in the 1970s who were faced with reporting suspicions of child abuse.

Nevertheless, she stressed that mandated reporting of suspicions of animal abuse, with good faith reporting immunity, is needed across the United States. “This, along with universal training in veterinary schools on recognizing signs of criminal harm to animals and how to report them, will create the same change in veterinary medicine,” she concluded.8

References available at AmericanVeterinarian.com.
Managing Seizures

An overview of the current thinking, including when to initiate antiepileptic drugs, supportive care for patients with status epilepticus, and long-term seizure control.

By Laurie Anne Walden, DVM, ELS

(continued from front cover)

IDENTIFYING SEIZURES

Seizures occur when abnormal electrical activity in the brain causes excessive neuronal transmission, which can manifest as uncontrolled motor activity. Grand mal seizures are characterized by tonic/clonic limb movements, altered level of consciousness, lack of response to stimuli, and sometimes urination and defecation. The presentation of nonconvulsive (petit mal) seizures is variable and can include extensor rigidity, facial tics, or aberrant eye movements. Some patients with nonconvulsive seizures may be aware of their surroundings.

Although pet owners can usually describe grand mal seizures without difficulty, petit mal seizures are more difficult to recognize, Dr. Linklater said. Home video recordings of episodes can help differentiate seizures from syncope, weakness, neuromuscular disorders, and other conditions with seizure-like signs.

Most seizures have 3 phases: pre-ictal, ictal and post-ictal, he said. Subtle behavior changes, such as licking or staring, may be identified in the pre-ictal phase, but more often this goes unobserved. The ictal phase is typically characterized by being unaware of surroundings, uncontrolled muscular movements, or loss of consciousness. The post-ictal phase, which lasts minutes to hours, involves abnormal behavior such as circling, aggression, or hiding. Although owners may not notice a pre-ictal phase, they might be able to provide a history showing that a pet experienced ictal and post-ictal phases.

If the signs point to seizure activity, Dr. Linklater said, a clinician must consider the potential cause, which determines the seizure’s classification:

- **Primary**: idiopathic epilepsy, diagnosed when other seizure causes have been ruled out
- **Secondary**: due to intracranial disease (eg, brain tumor)
- **Reactive**: caused by metabolic disease (eg, hypoglycemia) or renal disease

Because many pet toxins also can cause seizures, Dr. Linklater recommended asking pet owners specific questions about exposure to toxic substances. Asking if a patient “got into anything toxic” will often yield a “no” because pet owners might not consider products such as over-the-counter medications to be toxins. He suggested asking instead if the patient had access to any nonfood items, medications, marijuana, and so forth.

DIAGNOSTIC TESTING

Patients presenting with seizures should undergo a thorough physical examination and diagnostic workup to rule out the many conditions that can cause or mimic seizures (Box 1). Initial emergency diagnostic tests for patients presenting in status epilepticus include checking blood glucose, electrolyte, ammonia, and creatinine levels; packed cell volume and total blood solids; and blood pressure.

Further workup is usually needed to eliminate possible causes of seizures. “Epilepsy is a diagnosis of exclusion,” Dr. Linklater said. Additional screenings are typically performed before proceeding to magnetic resonance imaging and cerebrospinal fluid analysis. The choice of tests depends to some extent on the patient’s suspected underlying disease (Box 2).

MANAGING SEIZURES

“A single seizure is not an indication to start antiepileptic drugs,” Dr. Linklater said. Anticonvulsant treatment should be initiated if a patient presents in status epilepticus, has cluster seizures (more than 1 seizure in 24 hours), or has more than 1 seizure every 4 to 8 weeks. Dr. Linklater suggested that the goal might be limiting a seizure to no more often than every 2 to 4 months.

Emergency Treatment of Patients in Status Epilepticus

For patients presenting in status epilepticus, veterinarians must first address airway, breathing, and circulatory problems, Dr. Linklater said. Some patients require supplemental oxygen or intubation. Prompt placement of an intravenous (IV) catheter allows for timely treatment of shock. Patients may also need treatment for hyperthermia or hypertension.

Patients in status epilepticus may be hypoglycemic and require IV dextrose administration. Patients with insulinoma should be given a lower initial dose than other
A constant-rate IV infusion of diazepam should be initiated for using benzodiazepines: Dr. Linklater discussed other considerations for using benzodiazepines:

- A constant-rate IV infusion of diazepam should be administered through a dedicated catheter because this drug does not mix well with other medications.
- Diazepam is not used for long-term seizure control because of its short duration. Also, it may cause hepatic necrosis in cats when given orally.
- Benzodiazepines should not be used as first-line seizure treatment in patients with suspected portosystemic shunts. Patients with portovascular anomalies may have increased benzodiazepine receptor sensitivity, and administering exogenous benzodiazepines can induce coma.

Patients that already take an antiepileptic drug but experience breakthrough seizures may need a higher dose or an additional drug. Dr. Linklater said. Measuring the blood level of the current drug can indicate whether a dose increase is warranted. With some antiepileptic agents, increasing the dose beyond a certain level is not likely to increase its effectiveness against seizures, he added.

Dr. Linklater noted that patients in status epilepticus often need loading doses of long-term antiepileptic drugs, such as phenobarbital or bromide. Injection raises blood levels of these drugs to therapeutic levels quickly but can cause sedation, so patients must be monitored carefully.

**Managing the Consequences of Seizures**

In addition to managing the seizures, clinicians must watch for and treat the consequences, Dr. Linklater said. Possible complications of status epilepticus include hyperthermia, which can cause secondary hypocoagulation, gastrointestinal signs, and organ failure; noncardiogenic pulmonary edema; self-induced trauma; cerebral edema; and temporary neurologic deficits.

**Box 2. Diagnostic Testing for Seizures**

Comprehensive diagnostic testing, the choice of which is based largely on the suspected underlying condition, can include the following:

- Abdominal ultrasound
- Bile acid measurement
- Coagulation profile
- Complete blood count
- Echocardiography
- Infectious disease screening
- Insulin level
- Serum chemistry profile
- Thoracic radiography
- Thyroid profile
- Toxicology screening
- Urinalysis

**Benzodiazepines are the first-line antiepileptic drugs for patients in status epilepticus.**

Visit AmericanVeterinarian.com to learn more about emergency medicine topics.
Practical Tips for Avian Radiography

Radiographs are integral to the diagnosis of many conditions in pet birds, but obtaining high-quality images can be difficult in these species.

By Nicola M. Parry, BVSc, MRCVS, MSc, DACVP, ELS

The opioid analgesic butorphanol is currently considered the most useful agent of its class for birds, Dr. Thompson said. Doses used for birds are much higher than those used for dogs and cats, and start at 0.5 to 1 mg/kg, although some species like Amazon parrots require doses of 2 to 3 mg/kg, typically administered intramuscularly in the keel.

The benzodiazepine midazolam can be a beneficial adjunctive therapy, he noted, allowing reduced doses of butorphanol when the 2 drugs are used in combination. Midazolam helps to reduce anxiety, and its dose in birds ranges from 0.2 to 0.5 mg/kg, also administered intramuscularly. Intranasal dosing is another option with midazolam.

Both drugs can be combined in the same syringe and given as a single injection, or they can be administered separately, starting with midazolam. If veterinarians choose to administer the drugs separately, Dr. Thompson advised that “if after 5 minutes you don’t see any effect, either give a higher dose of the first drug or add in the second drug.”

He reminded veterinarians that sedation is variable across patients. Typically, onset of sedation is rapid and occurs within 2 to 3 minutes, he said. However, its duration may last anywhere from just 20 minutes to 2 hours.

Although sedation has now replaced isoflurane masking techniques as the preferred method to calm a pet bird when performing diagnostic procedures, Dr. Thompson said that if veterinarians choose to use isoflurane anesthesia, they should use nonrebreathing systems because of the small size of these patients. He discussed using a clear plastic bag, a clear syringe case mask, or a small nose cone, which may necessitate covering the bird’s entire head. He also advised veterinarians to provide supplemental oxygen via mask or flow, even to sedated birds, especially in cases of uncertain diagnosis or those involving trauma.

Positioning

Dr. Thompson noted that lateral and ventrodorsal radiographic views are typically used in avian radiography, just as they are in dogs and cats, with the right lateral view being used routinely. He advised (continued on page 18)
A COMPLETE NUTRITIONAL APPROACH TO ALLERGIC DERMATITIS

ULTAMINO®, the ultimate diagnostic tool, is a first choice for elimination diet trials. ULTAMINO® contains a unique protein source with 100% of peptides less than 1 kDa and 88% free amino acids.

A clinical study in dogs with confirmed or suspected food reaction demonstrated that 100% of the dogs had a significant improvement in skin condition based on veterinary assessment.¹

From diagnosis to long-term management, ROYAL CANIN® offers a canine diet for every phase of your clinical approach.

Find out more at royalcanin.com.

CANINE DERMATOLOGICAL FORMULAS:
- ULTAMINO®
- HYDROLYZED PROTEIN ADULT HP
- SKIN SUPPORT

¹Clinical trial on ULTAMINO® canine, 2011. Royal Canin data on file. © ROYAL CANIN® SAS 2017. All Rights Reserved.
Conference Coverage
PURDUE

Box. Unique Features of the Avian Skeleton

- The shoulder girdle comprises a well-developed clavicle and coracoid bones.
- The ulna is larger than the radius.
- The first phalanx is known as the alula and arises from the carpus.
- Two metacarpals and digits progress toward the distal wing extremity.
- The propatagium is the ligament that stretches from the shoulder to the carpus.
- The keel is the thin, bony protrusion that extends ventrally from the sternum.
- Fused leg bones include the tibiotarsus and tarsometatarsus.
- Most pet bird species have 3 metatarsals and 4 digits.

(continued from page 16) Veterinarians to pull the bird’s wings and legs away from the body to improve visualization of the coelom. “Dorsal extension of the wings on the lateral is often compromised in pet birds that don’t routinely fly and may have reduced range of motion of the shoulder,” he said. But he warned against forcing or overextending the humerus because this can be painful or cause rotation on the lateral view.

He emphasized the importance of always following the same procedure for the down extremity. Staff should always either position the downside leg forward (right leg and wing for a right lateral view) or use the “left is left behind” technique (positioning the left wing and left leg caudally) when taking left or right lateral views.

To help stabilize the humerus for positioning, Dr. Thompson suggested that veterinarians use lightly adherent tape that is less likely to adhere strongly to the feathers and thus prevents feather plucking when the tape is removed. Using a clear plastic plate or board will allow the bird to be positioned on a mobile plate when repeat radiographs are needed to improve positioning, or if the technique needs to be changed to improve the radiograph, he said.

RADIOGRAPHY OF DYSPNEIC BIRDS

Dyspneic birds are a particular challenge, Dr. Thompson said. He noted that these patients are now routinely examined initially with neither sedation nor anesthesia. He recommended allowing dyspneic birds to sit on a perch in a clear container that limits flight but allows use of the cross-table horizontal beam radiographic technique. However, he added that some dyspneic birds may require sedation to calm them. Butorphanol and midazolam can help to reduce the anxiety associated with the dyspnea and relax the bird. This can be less stressful to the patient than either handling or the proximity of many people.

The horizontal beam technique is simple, Dr. Thompson said, and “tells us a lot about a dyspneic animal before we even have to touch it.” However, evaluating air sacs is a major limiting factor of this technique, he said. Nevertheless, he noted that although air sac detail is severely compromised with the wings down against the body, it is still easy to rule in or rule out the presence of a shelled egg or effusion as the main cause of the dyspnea.

INTERPRETING AVIAN RADIOGRAPHS

According to Dr. Thompson, it is often easiest to evaluate the skeletal system first on a radiograph and then progress to evaluate the head, neck, and coelom. He highlighted some unique features of the avian skeleton (Box) that veterinarians should be aware of when evaluating radiographs of pet birds.

Evaluating the coelomic contents can also be challenging for veterinarians who are accustomed to dealing with patients that have a diaphragm. Dr. Thompson said. The trachea is often more prominent than in cats and dogs, and there is wide variation in its prominence depending on the species-related variation in syringeal anatomy. Bird lungs do not expand, he noted, but are visible adjacent to the thoracic spine on both the ventrodorsal and lateral views. However, the air sacs are visible around the viscera, and the clavicular air sac is located just below the shoulder joint overlies the muscles. The heart is easily seen on both ventrodorsal and lateral views, Dr. Thompson said, as are 2 prominent main arteries, although the lateral projection provides the best visualization of the vessels.

The crop is seen at the thoracic inlet and varies in size depending on the amount of food or fluid it contains. The proventriculus is seen overlying the liver on both radiographic views, but the liver itself is best visualized on the lateral projection, he stressed. The ventriculus is also visible on both lateral and ventrodorsal views.

Dr. Thompson also noted that improvements in digital radiography now routinely allow visualization of the spleen on the lateral radiographic view. They also allow routine evaluation of the kidneys adjacent to the lumbar vertebrae and sacrum, as well as ovaries and testes. In hens, reproductive structures can also be examined, he added, including ovarian follicles and calcified eggs in the shell gland. He noted that the lateral view is best to allow visualization of the cloaca.

OTHER IMAGING PROCEDURES

In conclusion, Dr. Thompson noted that ultrasound is typically of limited use in birds because of the presence of air sacs around the coelomic contents. Therefore, barium is still used routinely in pet birds to assess the gastrointestinal tract, especially the proventriculus and ventriculus, he emphasized.

However, he added that ultrasound does play some role in avian diagnostics. For example, the presence of effusion improves visibility and facilitates use of ultrasound to perform echocardiography to evaluate the heart and its potential involvement in causing the effusion, he said.
Enlisting Dogs in the War on Cancer

Parallels between species have propelled collaboration and coordination in oncology research that is proving beneficial to both people and pets.

By Mark Cantrell

(continued from front cover)

several reasons: They can produce 1 litter of 10 to 15 offspring per month, providing a steady supply of research subjects. Since 1 mouse year equals about 30 human years, studies can be conducted at an accelerated rate compared with human trials. And the mouse’s genetic makeup resembles humans’ in many ways.

OF MICE AND MODELS

“Mice are extraordinarily useful for working out pathways and investigating specific genes to learn how they work,” said Cheryl London, DVM, PhD, a research professor in the Ohio State University Department of Veterinary Biosciences. “But the reality is that for some diseases, mouse models have been completely ineffective at translation from what you see in the mouse to what you see in people.”

Tumors usually must be induced with radiation or chemicals in mice, because they don’t generally arise spontaneously, according to Robert B. Rebhun, BS, DVM, PhD, associate professor and researcher at the University of California, Davis, Center for Companion Animal Health. “Tumors can also be induced using xenografts,” he said, “where human cancer tissue is implanted in mice that have had their immune systems compromised to allow them to grow a human tumor.”

A recent study, however, has shown that implanting human cancer tissue in mice changes the tumor’s genome in ways that are not usually seen in the human body, making the possible benefits of investigative drugs difficult to determine. Mice raised in laboratory environments are often stressed, potentially affecting experimental outcomes, and rodent xenograft studies tend to be slow and expensive.

DOGS IN THE FIGHT

It turns out that an alternative has been literally lying at our feet. Because they get many of the same types of cancers humans do, dogs have long benefited from human oncology drugs, including chemotherapeutic agents. Now many of those benefits are beginning to flow back into human medicine as researchers increasingly employ canine patients in clinical cancer trials.

Matthew Breen, PhD, CBiol, FRSB, is uniquely positioned to understand the synergistic opportunities presented by the dog model: His laboratory aided in sequencing the canine genome in 2004. “It was a phenomenal thing for me to be involved in, because I started my career working on the human genome project in the early 1990s,” he said. Dr. Breen, the Oscar J. Fletcher distinguished professor of comparative oncology genetics in the Department of Molecular Biomedical Sciences at North Carolina State University (NCSU) College of Veterinary Medicine in Raleigh, was struck by the remarkable similarities.

The discovery verified what veterinarians had suspected for years, said Amy K. LeBlanc, DVM, director of the NCI’s Comparative Oncology Program. “Veterinarians have been drawing parallels between dogs and humans for decades, observing certain clinical patterns as to where tumors grow, how they spread, and how they respond to therapy,” she said. “Our challenge now is to understand the molecular and genetic underpinnings of canine cancer to help understand where they share landscape with human tumors.”

One reason dogs make effective models is that they live with us, said Douglas Thamm, VMD, Barbara Cox Anthony professor of oncology and director of clinical research at the Flint Animal Cancer Center at Colorado State University in Fort Collins. “They drink the same water we do, sometimes eat the same food, and walk around on the same grass that’s been exposed to the same chemicals,” he said. Dr. Thamm also noted that, unlike in mice, canine tumors arise spontaneously, as human carcinomas do, with the same kind of heterogeneity. Cancer in dogs can develop resistance to therapy, as in human cancer treatment, and can metastasize in similar ways. And dogs have a fully intact immune system, making it easier and more effective to study new immunotherapeutic agents.
A PROLIFIC PROBLEM

The statistics of canine cancer are sobering. "Dogs generally get about 10 times as much cancer as people do," Dr. Breen said. "In this country, it's estimated that there are about 80 to 85 million pet dogs and about 6 million new diagnoses of cancer every year, so it's a huge problem." If there's a silver lining, he said, it's the opportunity for investigators to study cancers that are relatively common in dogs but rare in humans, such as osteosarcoma.

Primary Areas of Comparative Oncology Research

Comparative oncology research is conducted primarily in 3 areas, according to Douglas Thamm, VMD, of the Flint Animal Cancer Center at Colorado State University:

- **Genomics:** "It's not necessarily looking at the heritable genes that cause cancer but [at] the tumors themselves, the genetic mutations they acquire, and how that compares and contrasts with what's seen in human tumors."

- **Experimental therapeutics:** "Many of the drugs being developed for humans are target-ed agents, designed to hone in on a specific protein or modification that tumor cells have undergone. It's critical for us to understand which cancers in dogs have the same kind of modifications that might serve as a good target for a particular drug."

- **Immunotherapy:** "The idea is to find ways to turn off some of the breaks that the tumor had turned on in the immune system, to encourage the body's own defenses to recognize the tumor as foreign and attack it."

Fewer than a thousand cases of bone cancer are diagnosed in children each year, according to Dr. Breen. "On the one hand," he said, "we're glad a large number of children aren't affected by it, but because there are so few, it's more difficult to study." However, in the canine population, there are more than 50,000 cases a year, he said, providing a large pool of subjects to analyze and the hope that new drugs and treatments can be created to benefit both the canine and human populations.

One advantage of conducting clinical studies in dogs is that it can be done less expensively than with human trials, explained Michael Kastan, MD, PhD, executive director of the Duke Cancer Institute in North Carolina. "With some of the new therapies, it's extraordinarily challenging and expensive to figure out how to use these agents in the human population," he said. "Figuring out how to dose, schedule, and combine these agents—and most will need to be combined—is a long, long process in the human clinical oncology arena. In humans, a new agent can't be used until the patient has relapsed multiple times, but with dogs, you can use it on a newly diagnosed patient or after a single relapse. So it's much more predictable of where you'll eventually be using these drugs."

Investigations can proceed more rapidly due to dogs' shorter life spans, noted Dr. Breen. "The progression of disease can be a lot faster in dogs than in people. We think of a dog's life span as lot faster in dogs than in people. We think of a dog's life span as long, long process in the human clinical oncology arena. In humans, a new agent can't be used until the patient has relapsed multiple times, but with dogs, you can use it on a newly diagnosed patient or after a single relapse. So it's much more predictable of where you'll eventually be using these drugs."

ENSURING ANIMAL WELFARE

That's not to say that because humans aren't involved in trials, there are no constraints. Federally mandated institutional animal care and use committees (IACUCs) are the corollary to institutional review boards in human medicine, charged with reviewing and approving clinical studies of dogs and other animals. To be eligible for grants, IACUCs must report annually to the Office of Laboratory Animal Welfare of the National Institutes of Health (NIH).

Just as some human populations tend to get specific types of cancer, certain breeds of dogs are predisposed to certain kinds of tumors. "Golden retrievers have about a 1 in 5 chance of being diagnosed with a particularly nasty cancer called hemangiosarcoma," Dr. Breen said, "and 1 in 8 will develop sarcoma. Bernese mountain dogs are devastated by histiocytic neoplasm. Larger breeds, such as Irish wolfhounds, Scottish deerhounds, and rottweilers, are severely impacted by bone cancer. In clinical studies, the genetic predispositions of a single breed can be compared with cancer-inducing genetic mutations in humans, without the necessity of examining every breed.

CONSORTIA AND PARTNERSHIPS

To provide a framework for comparative oncologic studies nationwide, the NIH established the Comparative Oncology Trials, a network of 22 academic research institutions across the country. "We act as a mechanism to link researchers on the human side with access to veterinarians who care for our canine patients that develop cancer," Dr. LeBlanc said. "The program is designed not only to benefit dogs but [also] to translate those findings to helping people with cancer, as well."

Clinical trials require test subjects and tissue samples, which aren't always available on a timely basis. To address that issue, the nonprofit Canine Comparative Oncology and Genomics Consortium (CCOGC) was formed in 2004 with the goals of aiding strategic partnerships in the field, advocating for the study of cancer in dogs, developing ways to share reagents and other resources among researchers, and—perhaps most important—establishing a biospecimen repository of tumor samples from osteosarcomas, lymphomas, melanomas, pulmonary tumors, mast cell tumors, soft tissue sarcomas, and hemangiosarcomas. The CCOGC’s ultimate goal is to gather tumor samples from 3000 dogs and make them available to the research community.

Pfizer donated more than $1 million to get the project off the ground, with additional donations from the Morris Animal and American Kennel Club Canine Health Foundations. The cancer types selected were those that present major problems in the canine population and also offer comparative opportunities in human studies. The physical repository is housed in a 33,000-sq ft facility in Frederick, Maryland, and contains tumor tissue, normal tissue, serum, plasma, peripheral blood mononuclear cell preparations, genomic DNA, RNA, and urine samples.

The repository began releasing samples to the research community in 2013 and issues periodic requests for proposals. To request tumor samples, investigators are encouraged to submit brief project descriptions on an application form available at ccogc.net. "NCI manages the repository, and we're in the process of supplying these tumor tissues to interested researchers," Dr. LeBlanc said. "We are matching up interested researchers with biospecimens they can use in their work."

Many schools of veterinary medicine have established partnerships with local human cancer centers for synergistic purposes. The NC State College of Veterinary Medicine in Raleigh and Duke Cancer Center in Durham, North Carolina, created the Consortium for Canine Comparative Oncology (C3O) in 2015 for this reason. "We have the goal of coordinating our research activities, particularly in the translational and clinical research space, to facilitate drug development and utilization in both patient populations," Dr. Kastan said.

"Scientists and researchers on both the human and veterinary sides are now sitting around the same metaphorical table," Dr. Breen said. "Everyone is bringing to it something of importance, whether their specialty is animals or humans, so we've become a huge melting pot of information. That means that we're all looking at cancer as a problem that affects everyone in our households, not just the 2-legged members." (continued on page 23)
They already have a lot to remember. Give them one less thing to forget.

No matter how busy life gets, at least you’ll know your patients are protected from fleas and ticks with BRAVECTO®

Prescription-only BRAVECTO® provides up to 12 weeks* of extended protection against fleas and ticks with just one dose. Good for patients, good for compliance, good for your practice.

Ask your Merck Animal Health Rep about BRAVECTO® or visit Bravectovets.com

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

Important Safety Information

BRAVECTO Chews for Dogs: The most common adverse reactions recorded in clinical trials were vomiting, decreased appetite, diarrhea, lethargy, polydipsia, and flatulence. 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 lone star ticks beyond 8 weeks after dosing. Please see Prescribing Information on following page.

Copyright © 2018 Intervet Inc., d/b/a Merck Animal Health, a subsidiary of Merck & Co. Inc. All rights reserved.
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 (25 mg/kg) body weight.
The chemical name of fluralaner is (Z)-4-[2-(3,5-dichlorophenyl)-5-(trifluoromethyl)-4-(2-dihydroisoazol-3-yl)-2-methenyl-N-(2-¢-cyclo-2,2¢-trifluorophenyl)ethyl] benzamide.

Indications:
Bravecto kills adult fleas and is indicated for the treatment and prevention of flea infestations (Ctenocephalides felis) and the treatment and control of tick infestations (Ixodes scapularis (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 should be administered orally as a single chew every 12 weeks according to the Dosage Schedule below to provide a minimum dose of 11.4 mg/lb (25 mg/kg) body weight.
Bravecto may be administered every 8 weeks in case of potential exposure to Amblyomma americanum ticks (see Effectiveness). Bravecto should be administered with food.

<table>
<thead>
<tr>
<th>Body Weight Ranges (lb)</th>
<th>Fluralaner Content (mg)</th>
<th>Chews Administered</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.4 - 9.9</td>
<td>117.5</td>
<td>One</td>
</tr>
<tr>
<td>&gt;9.0 - 22.0</td>
<td>250</td>
<td>One</td>
</tr>
<tr>
<td>&gt;22.0 - 44.0</td>
<td>500</td>
<td>One</td>
</tr>
<tr>
<td>&gt;44.0 - 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 used. 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.

Precautions:
Bravecto has not been shown to be effective for 12-weeks duration in puppies less than 6 months of age. Bravecto is not effective against Amblyomma americanum ticks beyond 8 weeks after dosing (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 163-day period and in dogs treated with the active control over an 84-day period. The most frequently reported adverse reaction in dogs in the Bravecto and active control groups was vomiting.

<table>
<thead>
<tr>
<th>Percentage of Dogs with Adverse Reactions in the Field Study</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>7.7</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 hypertrophy 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.

For technical assistance or to report a suspected adverse drug reaction, contact Merck Animal Health at 1-888-522-5204. Additional information can be found at www.bravecto.com. For additional information about adverse drug experience reporting for animal drugs, contact FDA at 1-888-FDA-VETS or online at http://www.fda.gov/AnimalVeterinary/SafetyHealth.

Clinical Pharmacology:
Peak 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, Bravecto should be administered with food.

Mode of Action:
Fluralaner is for systemic use and belongs to the class of isoxazoline-substituted benzamide 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 five fleas and Ixodes ricinus ticks on dogs by >98% within 12 hours for 12 weeks. In a well-controlled laboratory study, Bravecto demonstrated 100% effectiveness against adult fleas 48 hours post-infestation for 12 weeks. In well-controlled laboratory studies, Bravecto demonstrated >98% effectiveness against Dermacentor variabilis, Ixodes scapularis and Rhipicephalus sanguineus ticks 48 hours post-infestation for 12 weeks. Bravecto demonstrated >98% effectiveness against Amblyomma americanum 12 hours post-infestation for 8 weeks, but failed to demonstrate >98% 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 improvement in erythema, alopecia, papules, scales, crusts, and excoriation as a direct result of eliminating flea infestations.

Potability:
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 6.8% refused the dose or required forced administration.

Animal Safety:
Margin of Safety: 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 (OX) 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 5X treatment group was observed to be dull, inappetant, with evidence of alopecia diarrhea, vomiting, and weight loss beginning five days after the first treatment. One dog in the 5X treatment group vomited food 4 hours following the first treatment.
Reproductive Safety: Bravecto was administered orally to intact, reproducibly-sound male and female Beagles at a dose of up to 168 mg/kg (equivalent to 3X the maximum labeled dose) on three to four occasions at 8-week intervals. The dogs in the control group (OX) 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 dogs) or histopathology (findings adult dogs and puppies). One adult treated dog suffered a seizure during the course of the study (45 days after the second 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 cleft palate (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 71).
In a well-controlled field study Bravecto was used concurrently with other medications, such as vaccines, anthelminthic, 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 plastic paper backed foil/stock.
Product may be packaged in 1, 2, or 4 chews per package.
NADA 141-426, Approved by FDA

Distributed by:
Intervet Inc (a division of Merck Animal Health)
Madison, NJ 07940
Made in Austria
Copyright © 2014 Intervet Inc., a subsidiary of Merck & Company Inc.
All rights reserved
15454S R1
(continued from page 20)

CURRENT STUDIES

At NCSU, Dr. Breen’s team identified a tumor cell mutation in dogs with urothelial carcinoma, leading to the first liquid biopsy assessment tool to detect the disease. “More than a million dogs present to veterinarians each year with signs that could indicate bladder cancer,” Dr. Breen said. “They’re usually treated for more common ailments such as bladder stones or a urinary tract infection. But if it’s cancer, it will continue to advance.” He noted that before the liquid biopsy was available, some 20% of affected dogs had distant metastases by the time of diagnosis.

“Since we can now detect those cancers early, we can monitor how dogs respond to different types of therapy,” Dr. Breen said. Those findings might, in turn, be used to inform human therapeutic interventions. “To me, it crystallizes the concept of comparative oncology,” he said.

Dr. London is working with Katherine Janeway, MD, of Dana-Farber Cancer Institute and Boston Children’s Hospital Boston in Massachusetts, on investigations into bone cancer. “We’re looking into the genome, or DNA changes, in osteosarcoma in dogs and comparing them with the mutations that occur in people,” said Dr. Janeway, a pediatric hematologist-oncologist and investigator with a research focus on pediatric sarcomas.

“Because the similarities in dogs and humans are so great, we have an important tool in terms of bringing new therapies to this cancer, which really needs new treatment approaches.”

It’s difficult to test immunotherapeutic agents for cancer in humans, according to Dr. London, who has a dual appointment at Tufts Medical Center in Boston and the Cummings School of Veterinary Medicine in North Grafton, Massachusetts. “Chemotherapy is so effective that nobody wants to take it away,” she said. “But in veterinary medicine, our chemotherapy isn’t that effective, so we can try immunotherapy up front.” Dr. London currently holds grants to study bone cancer and lymphoma.

The Flint Animal Cancer Center also has partnered with a human medical institution. “We have a formalized consortium agreement with the University of Colorado Cancer Center in Denver,” Dr. Thamm said. “Many of the faculty here are full members of the cancer center, as well.” The center’s successes include development of a limb-sparing surgical procedure in dogs with osteosarcoma, which has been adapted for humans, and the first compound approved by the FDA for canine lymphoma.

THE IMPORTANCE OF PUBLIC RELATIONS

Much of the public remains unaware of the benefits of comparative oncology for both pets and people, so getting the word out is crucial, Dr. Kastan said. “Locally, with the C3O activity between Duke and NCSU, we’ve gotten quite a bit of press,” he said. “But the best way to get the public’s attention is through program successes. That attracts more marketing, and word begins to spread, which is why this needs to be a national effort, not just local.

It’s not just the public that needs education about comparative oncology; even clinicians in the human medicine field can be misinformed, according to Dr. Breen. “Thankfully, it’s beginning to change, but I’m still shocked at the number of times I stand before an audience of human doctors to talk about cancer in dog populations, and invariably someone says, ‘You mean dogs get cancer?’ Well, yes—6 million a year do. It may be that because medical students have such a heavy workload, they just don’t have time to learn much about veterinary medicine,” he said.

More worrisome is when those charged with relaying information to the public get it wrong. “I speak to groups of journalists all the time,” Dr. Breen said, “and occasionally one of them will say, ‘I can’t believe you’re giving dogs cancer.’ I have to keep emphasizing that these are naturally occurring tumors.”

Some of the public wrongly assume that canine comparative oncology employs lab animals. “It’s very important that people understand that the dogs involved in trials are not research animals; they’re people’s pets—family members,” Dr. Kastan said. “And the families are eager to be able to try the latest therapies available to extend the lives of their pets.”

The upside: Because dogs are often considered members of the family, owners are much more likely to get them into studies, especially considering recent advances in veterinary medical technology. “Fifty years ago, a diagnosis of cancer in your pet usually meant euthanasia,” Dr. Rehbun said. “Today, pet owners are looking for therapy, and if they’re not happy with the outcomes of standard treatment, they’ll look elsewhere. Even though it may be a gamble, they’ll enroll in a clinical trial if it has a chance of helping their pet. If it also has the potential to help people, that’s just a bonus.”

For Dr. Breen, the future looks bright. “Times are definitely changing,” he said, “and as more professionals engage in the comparative aspects of cancer, we expect that discoveries benefiting both human and canine patients will accelerate.”

REFERENCE

Hyperadrenocorticism and Diabetes in Dogs

What is at play—and what is the outcome—when dogs with Cushing disease develop concurrent diabetes mellitus?

By JoAnna Pendergrass, DVM

(continued from front cover)

has been studied extensively in human and veterinary medicine. In dogs, the percentage of HAC and diabetes concurrence ranges widely, likely due to diagnostic challenges.

Glucocorticoids, namely cortisol, antagonize insulin function. Such antagonism may cause pancreatic beta cells to secrete more insulin, eventually causing beta cell exhaustion and potential diabetes development. Interestingly, a previous study named glucocorticoids “diabetogenic.”

Unlike in human medicine, there is no consensus on prediabetes parameters for dogs. A comparative analysis of obesity-related metabolic dysfunction in dogs and human metabolic syndrome determined a cut-off fasting blood glucose level of 5.6 mmol/L (100 mg/dL) for dogs.

DIAGNOSIS AND TESTING

From January 2011 to December 2015, researchers evaluated 235 dogs with HAC. Pituitary-dependent HAC (PDH) was diagnosed using clinical signs and elevated urine cortisol:creatinine ratio (UCCR) on a combined UCCR and low-dose dexamethasone suppression test. Adrenal-dependent HAC (ADH) was diagnosed using clinical signs, increased UCCR, and lack of suppression on a high-dose dexamethasone suppression test. If a dog had previously diagnosed diabetes, testing to confirm HAC was delayed until the diabetes was controlled adequately. Following diagnosis, HAC was treated with adrenalectomy (ADH) or medical therapy (PDH).

Diabetes was diagnosed using clinical signs and diagnostic test results (glucosuria, elevated fasting blood glucose levels). Treatment was twice-daily insulin and a commercial diabetic diet. Dogs with HAC were divided into 3 groups according to fasting blood glucose levels:

- Group A (n=146): <100 mg/dL
- Group B (n=70): 100–180 mg/dL
- Group C (n=19): >180 mg/dL

The researchers assessed body condition score and measured blood levels of UCCR, glucose, triglycerides, and total cholesterol.

RESULTS

Group Demographics

Groups were homogeneous in age, breed, and gender distribution. For example, each group had a median age of 9 to 10 years and was approximately two-thirds female. More dogs were overweight or obese in groups B and C (78%) than in group A (62%). However, excessive weight was not significantly associated with diabetes development.

Diabetes Findings

Thirty-two dogs with HAC—14% of the study population—also had diabetes, which was diagnosed before, after, or at the time of HAC diagnosis. The researchers noted that determining whether diabetes or HAC comes first can be challenging. For example, diabetes may be diagnosed first because it is easier to detect, but it may not have been the first condition present.

Nearly 95% of the dogs with diabetes had PDH, suggesting a greater predisposition to diabetes in dogs with PDH than ADH, potentially because PDH not treated with hypophysectomy prolongs hypercortisolism.

Measurements and Risk Factors

About 10% of dogs with HAC had fasting blood glucose levels greater than 120 mg/dL, the upper limit of normal, but did not have clinical diabetes. Total cholesterol and triglycerides were highest in group C, supporting previous findings that HAC disrupts lipid metabolism. Also, UCCR was higher in groups B and C than in group A.

Key risk factors for diabetes in dogs with HAC were as follows:

- PDH
- Intact female
- UCCR >100 × 10⁶
- Triglycerides >45 mg/dL
- Total cholesterol >164 mg/dL
- Fasting blood glucose >100 mg/dL

The study’s intact females were in persistent anestrus due to chronic hypercortisolism, making it difficult to determine whether circulating sex hormones contributed to increased diabetes risk.

Compared with HAC, concurrent HAC and diabetes drastically reduced life expectancy (28 vs 14 months). In fact, 2 study dogs had diabetic ketoacidosis and died within days of hospitalization.

FOR THE FUTURE

Looking forward, the researchers proposed rapid detection and control of the risk factors identified in the study, allowing for “implementation of preventive therapy to reduce the incidence of diabetes in dogs with HAC.”

References available at AmericanVeterinarian.com

Table. Canine Hyperadrenocorticism: Disease Overview

<table>
<thead>
<tr>
<th>TYPES (CAUSE)</th>
<th>SIGNALMENT</th>
<th>CLINICAL FINDINGS</th>
<th>DIAGNOSTIC TESTS</th>
<th>TREATMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pituitary-dependent (PDH)</td>
<td>Most affected dogs aged 6 years or older (median, 10 years)</td>
<td>Most common clinical signs: Polyuria/polydipsia, Polyphagia</td>
<td>Urine cortisol: creatinine ratio</td>
<td>Dependent on type (ie, PDH, ADH, iatrogenic)</td>
</tr>
<tr>
<td>Adrenal-dependent (ADH; adenocortical adenocarcinoma or adenoma)</td>
<td>Predisposed breeds (PDH); miniature poodles, dachshunds, boxers, terriers, and beagles</td>
<td>Abdominal enlargement (pot-belly), weight gain, Pancreatitis and hypertriglyceridemia</td>
<td>Low-dose dexamethasone suppression test</td>
<td>Medication: mitotane, ketoconazole, triphenyl, l-deprenyl, prednisone</td>
</tr>
<tr>
<td>Iatrogenic (eg, excessive glucocorticoid administration)</td>
<td>Occurs more commonly in females</td>
<td>Recurrent urinary tract infection, Dermatologic abnormalities (alopecia, comedones, thinning skin, hyperpigmentation)</td>
<td>ACTH stimulation test, High-dose dexamethasone suppression test</td>
<td>Surgery: adrenalectomy</td>
</tr>
</tbody>
</table>

ACTH, adrenocorticotropic hormone; ADH, adrenal-dependent hyperadrenocorticism; CT, computed tomography; MRI, magnetic resonance imaging; PDH, pituitary-dependent hyperadrenocorticism.
America’s Premier Pet Cloning and DNA Storage Provider.

Offer Your Clients the Option of DNA Storage and Pet Cloning in the U.S.A. by America’s Pet Cloning and Genetic Preservation Experts.

888-876-6104 • viagenpets.com/veterinarian
715 Discovery Boulevard, Suite 410 • Cedar Park, TX 78613
**Clinical Focus**

**BEHAVIOR**

**Fear Free Basics**

Rethinking your approach to the physical exam and incorporating some simple changes can have a monumental effect on patient and owner stress during visits.

*By Amanda Carrozza*

“Fear Free” might seem like a new catchphrase, but it captures an idea long held by many veterinarians. “As veterinary behaviorists, we have been lecturing about Fear Free under different names for 20 years,” said Lisa Radosta, DVM, DACVB, owner of Florida Veterinary Behavior Service in West Palm Beach. “Now it’s an actual movement that is organized and structured, and it has taken hold of veterinary medicine.”

With Fear Free—which promotes regular visits with patients in an environment that eliminates fear, anxiety, and stress—veterinarians are rethinking their approach to pet examinations and transforming the patient-client appointment experience.

“The emotional and mental [states] of our patients are finally becoming recognized and valued as equally important as their physical health,” said Julie Shaw, RVT, VTS (Behavior), owner and director of Stepping Stone Animal Training, LLC, in Lafayette, Indiana.

Some pets associate extreme fear with veterinary practices, and the anxiety sets in long before an exam begins. That’s why the Fear Free experience originates at the pet’s home and extends to nearly every facet of a veterinary practice.

To truly adopt the Fear Free mind-set, it’s recommended that all veterinary staff members complete the Fear Free Certification Program, which covers the background of the initiative and demonstrates each employee’s role in creating a relaxing and positive atmosphere for pets. To date, more than 11,000 veterinary professionals have become Fear Free certified.

If you’re not ready to commit to the comprehensive course quite yet, you can easily incorporate a number of low-cost Fear Free basics into your veterinary practice.

**REIMAGINE THE EXAMINATION**

A patient’s fear and anxiety typically culminate during the physical exam. Veterinarians may struggle with an aggressive or fractious pet, increasing the risk of injury to the pet and everyone else in the room. This is why it’s vitally important that veterinarians and veterinary technicians rethink how exams are conducted.

**Slip-Free Surfaces**

Being removed from its carrier and placed on a cold metal table can be terrifying for a pet, so always use slip-free surfaces, such as blankets or rubber mats. Veterinarians are also becoming increasingly open to alternative exam locations, such as on the floor or in the pet owner’s lap.

**Cat Carriers**

Dr. Radosta recommends leaving stressed pets, especially cats, inside their carriers throughout the examination. If that’s not possible, remove the top, rather than tipping the carrier or straining to pull out the cat. This may take a minute or 2 more, but the exam will go much more smoothly.

**New Environment**

Sometimes a pet may need to be removed from the exam room altogether. Shaw recounted an experience with a young dog that was too fearful even to be touched. After spending a considerable amount of time trying to work with the dog, someone on the veterinary team suggested taking the dog outside—and that changed everything. The dog was suddenly happier and much more receptive to being examined outdoors.

**CONSIDER THE SENSES**

A dog possesses up to 300 million olfactory receptors in its nose, and the part of the canine brain that is devoted to analyzing smells is 40 times larger than that in humans. It’s not unlikely, then, that the smells in a veterinary office could affect a pet’s demeanor.

For starters, Shaw said, veterinarians and staff should refrain from applying heavily scented lotions and perfumes (although deodorant is encouraged) that a dog will pick up on immediately. Smokers should remove lab coats before cigarette breaks and wash their hands thoroughly upon returning to work.

On the other hand, using calming scents can sway a pet’s experience toward the positive. Products that mimic the naturally calming pheromones in cats and dogs are widely used throughout Fear Free veterinary practices through diffusers and as topical sprays. “Our staff is trained to spray themselves twice a day,” Shaw said. While a pet waits to be examined, spray a towel with a pheromone product,
Animals are motivated by food, so Fear Free encourages specifically for pets at iCalm (icalmpet.com). You can choose from a line of classical music near the cages of boarded animals. To combat this, Shaw recommends playing chatter will add to the stress of an already anxious animal. To combat this, Shaw recommends playing such as Feliway for cats, and place it with the animal or over the carrier to initiate stress reduction.

As a veterinary office grows busier throughout the day, staff may become immune to background noises that can upset their patients, especially animals in recovery. Slamming doors, barking dogs, and general chatter will add to the stress of an already anxious animal. To combat this, Shaw recommends playing classical music near the cages of boarded animals and in exam rooms. You can choose from a line of portable speakers and musical collections created specifically for pets at iCalm (icalmpet.com).

MAKE POSITIVE ASSOCIATIONS
Animals are motivated by food, so Fear Free encourages veterinarians to offer treats—Shaw calls them “dog money”—throughout the exam. Begin by laying treats near a pet or by the carrier to create a positive initial impression without getting too close when you enter the room.

Treats also make a great distraction tool. Shaw recommends smearing peanut butter on the wall or table so a dog focuses on lapping up the treat rather than on what the veterinarian is doing during the examination. “Fear Free actually shows that it’s OK for dogs to have a little food before a procedure,” Shaw said. “It’s better for them.”

She also recalled a Fear Free video of 2 technicians who took a unique approach to removing sutures from a dog by using food to divert attention. One technician remained near the dog’s head and offered treats, and the other laid on the floor and took out the stitches upside down. “That’s exactly what you should be doing,” Shaw added. “Make sure the patient feels secure.”

ELIMINATE THE WAITING ROOM
Shaw stated it simply: “Waiting rooms are for humans, not dogs or cats. I don’t think pets should be in waiting rooms, because it causes stress.”

Dr. Radosta shares that sentiment. Whenever possible, she said, her staff moves a patient from the waiting room directly into an empty exam room, explaining to the client that although the doctor won’t be in right away, the private room is better for the stressed pet.

Practices that don’t have empty rooms to spare can get creative. Dr. Radosta sometimes instructs clients with fearful pets to wait in the car. “We [can] text right through our messaging system: ‘Your exam room is ready—come on in,’” she said.

Becoming resourceful may mean having a patient wait in an empty hallway or setting up a chair behind the reception desk away from other patients, Shaw said. For long-term solutions, veterinary offices can incorporate barriers—say, a row of plants—to separate waiting patients and install shelves or platforms for carriers to keep cats off the floor and out of the way.

CREATE A PLAN OF ACTION
As Shaw pointed out, 2 of the most important aspects of Fear Free are knowing what to do next and planning for the future. A veterinarian who recognizes the signs of increased anxiety in an animal should already have a plan for what can be done immediately to calm the pet.

“Does it mean going into a different room? Does it mean covering the dog’s eyes?” Shaw asked. “[It means] whatever it’s going to take at that moment to decrease what is happening [with that pet].” That might even mean halting the exam entirely. “Say to the owner, ‘Take home this gabapentin, take home this Feliway, and please come back in a week,’” Dr. Radosta said. “It’s not a matter of what I can do today; it’s a matter of what I should do ethically for your cat.” That’s what is most important, she added.

WORK WITH PET OWNERS
Some pets, especially cats, never make it to the veterinary office due to the owner’s perception of the pet’s reaction to the visit, as well as the client’s own stress about dealing with the situation, Dr. Radosta said. Fear Free addresses both factors by including clients in the stress-reduction process.

For example, if the sight of a carrier sparks an instant negative reaction, the client should help the pet become familiar with it at home. The veterinarian should instruct the owner to leave the carrier out regularly so the animal becomes comfortable around it, rather than associating it only with frightening experiences.

Additionally, a veterinarian might recommend spraying pheromones on a towel and placing it in the carrier with the pet while traveling to the clinic. Fear Free also suggests that pet owners limit food prior to an appointment, increasing the effectiveness of treats as rewards, and bring the pet’s favorite treats to the visit.

Veterinarians need to talk with clients about the known signs of pet anxiety (eg, excessive licking, tucked tail, or visible tension) and how to detect these signs early. Engaging pet owners in the Fear Free experience and providing them with easy solutions and guidance creates a harmonious approach to pet care that can make clients comfortable.

“We can’t provide the best medical care if they don’t show up,” Dr. Radosta said. “Fear Free is going to be the tidal wave that pushes them into the practice.”

**Box 1. The Fear Free Patient Chart**

<table>
<thead>
<tr>
<th>With a Fear Free approach, it should be standard that each patient chart includes the following information:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• History of physical and emotional behavior</td>
</tr>
<tr>
<td>• Fear, Anxiety, and Stress Scale score (Box 2)</td>
</tr>
<tr>
<td>• Names of staff present at appointment</td>
</tr>
<tr>
<td>• Steps taken to reduce anxiety</td>
</tr>
<tr>
<td>• Mechanisms to which the pet responded best</td>
</tr>
<tr>
<td>• Favorite treats</td>
</tr>
</tbody>
</table>

These factors should shape all future appointments to avoid instances of extreme stress.

**Box 2. Fear, Anxiety and Stress (FAS) Scale**

The Fear, Anxiety, and Stress Scale gives veterinarians indicators of increased stress levels in pets, along with recommendations on how to proceed, depending on the pet’s behavior in the exam room.

**PROCEED WITH THE APPOINTMENT**

- Level 0: Displays no signs of FAS
- Level 1: Displays 1 or 2 mild signs (eg, avoids eye contact, turns head, licks lips) less than 4 times in 1 minute; chooses to interact with team members

**PROCEED WITH CAUTION**

- Level 2: Displays 1 or 2 moderate signs (ears slightly back, brow furrowed, slow movements) and still solicits interactions with team members
- Level 3: Displays more than 2 moderate signs more than 4 times in 1 minute; may be hesitant to interact with team members but is not actively avoiding them

**STOP THE APPOINTMENT**

- Level 4: Severe signs without aggression (immobility, escaping behavior, increased respiratory rate, tail twitching); may show avoidance of team members
- Level 5: Severe signs with aggression (growling, lunging, hissing, snapping); intolerant of procedures

AmericanVeterinarian.com | 27
The Importance of Vitamin D in Canine Health

An exploration of current knowledge on a primary nutrient, including dietary recommendations and directions for future research.

By Natalie Stilwell, DVM, MS, PhD

Vitamin D is a known contributor to bone health due to its relationship with calcium and phosphorus acquisition. Study findings have demonstrated osteomalacia (rickets) in puppies fed a diet lacking supplemental vitamin D, even when participants were exposed to UVB light. At the opposite extreme, puppies fed more than 10 times the AAFCO maximum recommended amount experienced impaired endochondral ossification.

Chronic kidney disease (CKD) and concurrent hyperparathyroidism in humans are linked to impaired vitamin D metabolism because the metabolite 1,25(OH)2D is produced in the kidneys. Similarly, dogs with CKD may show decreased blood and serum 25(OH)D concentrations, which continue to decrease as CKD increases in severity. As a result, dietary vitamin D supplementation is a component of CKD treatment in both humans and dogs.

Human patients with inflammatory bowel disease (IBD) often have low vitamin D status, and canine research shows that serum 25(OH)D is significantly lower in dogs with protein-losing enteropathies compared with healthy dogs and those affected by IBD alone.

Vitamin D may play a role in human cardiovascular disease, with evidence suggesting that increasing plasma 25(OH)D levels correspond with decreased cardiovascular disease risk. Similarly, suboptimal serum 25(OH)D levels in dogs have been associated with congestive heart failure, cardiac remodeling, severe cardiovascular disease, and increased risk of cardiovascular events.

In humans, increased cancer risk is linked to low vitamin D intake and blood 25(OH)D concentrations. Also, 1,25(OH)2D demonstrates a variety of anticancer activities in both humans and dogs, such as inducing apoptosis and reducing cancer cell growth. Canine osteosarcoma and mast cell tumor tissues possess vitamin D receptors, and decreased vitamin D status and/or serum 25(OH)D is associated with additional canine cancers, including neoplastic spirocercosis and lymphoma.

FUTURE RESEARCH

Despite recent advances, the authors caution that further understanding of vitamin D in dogs requires several areas of targeted research. First, future studies must measure dietary vitamin D intake in participants to account for the wide range of concentrations in manufactured and client-prepared diets. Although serum 25(OH)D is used increasingly as a marker of various canine diseases, including CKD and cancer, its relationship with dietary vitamin D intake is not well established in dogs. Finally, using vitamin D status to manage or minimize risk of disease will not be possible until dietary vitamin D intake and blood 25(OH)D reference ranges are clearly defined for all canine life stages.

REFERENCE


(continued from front cover)

human-based research suggests that vitamin D plays an even larger role in multiple aspects of extraskeletal health, including disease risk reduction, treatment efficacy, and disease prognosis. Several countries, including the United States and Canada, now mandate vitamin D fortification of certain human foods (such as dairy milk) to address vitamin D deficiency.

VITAMIN D METABOLISM AND INTAKE REQUIREMENTS

The 2 forms of vitamin D—ergocalciferol (D2) and cholecalciferol (D3)—are created by plants and the skin, respectively, in response to ultraviolet (UV) light exposure. It is believed that dogs acquire most of their vitamin D through diet, with UV-mediated production in the skin serving an insignificant role. The relative efficiency of dietary vitamin D2 versus D3 absorption in dogs is unknown.

Vitamin D is stored in adipose and muscle tissues, and cytochrome P450 enzymes convert vitamin D to 25-hydroxyvitamin D (25[OH]D) in the liver. As one of the most stable vitamin D metabolites, with a long half-life of 10 to 21 days, 25(OH)D is commonly measured in humans and animals as a marker of vitamin D status and its association with disease. It is also the precursor to 1,25-dihydroxyvitamin D (1,25[OH]2D), the most biologically active vitamin D metabolite. Despite performing important roles, including control of the body’s calcium and phosphorus levels, 1,25(OH)2D is a less reliable marker of vitamin D status due to its short half-life and is thus measured less frequently.

As researchers work to develop human vitamin D intake recommendations with greater confidence, it is becoming clear that a one-size-fits-all approach excludes important factors, including age and genetics. Similarly, the canine dietary vitamin D intake requirements set by the National Research Council (NRC), American Association of Feed Control Officials (AAFCO), and European Pet Food Industry Federation (FEDIAF) indicate a broad acceptable range for adult dogs, although safe upper limits for maintenance, growth, gestation, and lactation are not clearly defined. All 3 organizations specify vitamin D as an essential dietary nutrient for dogs; the NRC lists the minimum adequate intake for dogs receiving purified diets, while AAFCO and FEDIAF published minimum recommended allowances for dogs fed commercial pet foods.

Minimum requirements are chosen based on published studies; however, studies often fail to provide vitamin D content and energy density information for the basal diets of participants. Because AAFCO and FEDIAF guidelines list a wide range of recommended intake in the canine diet, the actual amount of added vitamin D in a specific food depends largely on manufacturer choice and often does not account for endogenous vitamin D content of ingredients. Also, homemade diets are at high risk of being vitamin D deficient.

It is becoming clear that a one-size-fits-all approach excludes important factors.
Increase Revenue
Proven to reduce cancellations and no shows

Trigger Compliance/Adherence
Cost effective, timely prompts to remind about medications, appointments, and care instructions

Reduce Phone Calls and Postcards
Dramatically cut the costs of communicating with clients

Improve Workflow
Free up staff resources. Increase your frequency of touch. Keep your clients bonded to your practice

Popular Use Cases of two-way texting with PROMPT

Use PROMPT to notify Clients when:
- procedures went well and pets are ready to go home
- lab results have returned and are normal
- medications are available for pickup
- pets have upcoming surgery and should avoid food and water
- facilities are closed due to weather (staff can be notified of this too)
- payment is past due

Use PROMPT to enable Clients to text you back:
- to confirm appointment
- to request an appointment
- to request medication, refill and pick-up
- to provide feedback about visit

Save Time & Money with PROMPT™
Learn more about Dialog Health’s two-way mobile messaging solution.
Call or Text 615-429-4252 to speak with a representative or email Brandon@DialogHealth.com
How Canine Brain Cancer Studies Could Help Humans, Too

Research in dogs is informing the design of cancer studies in people, particularly with respect to immunotherapy.

By Kerry Lengyel

Gliomas are the most common primary intracranial tumors in humans, representing over 80% of malignant brain tumors. Glioblastoma, the most aggressive and deadly of the gliomas, carries a median 2-year survival rate of less than 30%. In dogs, gliomas are the second most common type of primary brain tumor. As in people, dogs with this cancer have poor prognosis—the average survival time with symptomatic therapy is about 2 months.

But researchers from the Virginia-Maryland College of Veterinary Medicine at Virginia Tech and University of Minnesota (UMN) College of Veterinary Medicine are hoping to improve those statistics by studying immunotherapies that may slow growth or even shrink gliomas in dogs and, ultimately, humans.

VIRGINIA-MARYLAND COLLEGE OF VETERINARY MEDICINE

So far, 12 dogs have participated in the ongoing Molecular Combinatorial Therapy for Canine Malignant Gliomas trial. And additional funding has been granted by the National Institutes of Health (NIH) National Cancer Institute to start a new round of clinical trials this year.

The recently awarded $9.2 million 5-year NIH grant will fund 4 approaches to treating brain cancer—specifically glioblastoma—being applied by research teams at Virginia Tech and Wake Forest University. All the funded projects include cancer therapies that have been tested in dogs.

“The projects of the grant are novel in that they use newer, improved versions of the technologies or drugs based on results obtained in the lab as well as in clinical trials,” said John Rossmeisl, DVM, MS, professor of neurology at the Virginia-Maryland College of Veterinary Medicine at Virginia Tech and lead researcher of the canine clinical trials. “We are evaluating various combinations of these unique approaches as they may have synergistic and additive anticancer effects.”

The treatment being studied involves convection enhanced delivery (CED) of molecularly targeted cytotoxins to the patient’s brain tumor. With CED, cytotoxins are delivered through specialized catheters inserted directly into the tumor and infused slowly over several hours.

The goal for the study is to improve the lives of dogs with brain cancer and use the canine spontaneous brain tumor model to then develop novel therapeutics for humans with this type of brain cancer. Since the trial began, treated dogs have fared better than controls. Dr Rossmeisl said some of the tumors shrank, and some dogs lived a year longer than expected.

The research team hopes to enroll dogs into the clinical trial as quickly as possible once they have determined eligibility. To be eligible, dogs must meet the following criteria:

- Any age, breed, or sex
- Weight between 3 and 43 kg (6.6 to 99 lb)
- Clinical signs of mild to moderate neurologic dysfunction referable to the brain
- MRI evidence of a single telencephalic intra-axial mass lesion consistent with a glioma
- No clinical or other diagnostic evidence of other significant systemic disease

Dogs with uncontrollable seizures and those not expected to survive the 3-week study period based on clinical tumor progression are ineligible for the study.

According to Mindy Quigley, clinical trials coordinator at the Virginia-Maryland College of Veterinary Medicine, the current NIH study is likely to continue and transition into the new study this year with the same enrollment criteria but a different version of the chemotherapy drug.

“The current version of the drug targets 2 cell surface proteins that are present in glioma cells but not in healthy brain tissue,” Quigley said. “The team has since identified 2 additional markers, and the new version of the drug will target those additional markers, for a total of 4. That gives the drug 4 proteins to seek out and ‘grab.’”

With this rare of a cancer, participant recruitment alone can take several years. It will likely be many years before the research team can understand whether this new chemotherapy drug is effective, and several more years before human clinical trials are approved.

Quigley said there will almost definitely need to be more rounds of clinical trials because there are many different types of brain tumors that present in myriad ways. Gliomas also have several subtypes.

The research has a long way to go, but Quigley hopes that this study will be successful. “We have strong reason to believe the new version of the drug will be even more effective in identifying and killing the tumor cells,” she said.

Jake Pratt, a 5-year-old shepherd mix, was all smiles upon discharge from the Veterinary Teaching Hospital at Virginia Tech in March 2015 after undergoing surgery to treat a glioblastoma. Jake is pictured with his care team and owners (left to right): fourth-year veterinary student Melissa Robinson, Dr. Rossmeisl, Teresa and Todd Pratt of Knoxville, TN, and fourth-year veterinary student Katelyn Somers.
In addition, the research team is striving to learn as much as it can about the type of immune cells that kill tumor cells and delay disease progression, and whether molecular changes in tumor cells occur in response to immunotherapy. At least 30 dogs with confirmed spontaneous glioma are needed for the study. The eligibility criteria are similar to those for the Virginia-Maryland study. Although dogs with meningioma are no longer being recruited, the university is offering to treat dogs diagnosed with meningioma using surgery and vaccine-based immunotherapy, which can provide tumor control for years.

References available at AmericanVeterinarian.com.

UNIVERSITY OF MINNESOTA COLLEGE OF VETERINARY MEDICINE

A new 5-year research project at the University of Minnesota (UMN) College of Veterinary Medicine will study canine high-grade glioma to help find ways to improve treatment for dogs and, ultimately, humans. The project has received a $2.7 million grant funded as part of the 21st Century Cures Act by the National Cancer Institute to give researchers more insight into glioblastoma to apply to human trials.

The research team involved in the Canine Brain Tumor Clinical Trial Program has treated more than 200 dogs to date. They have been experimenting with various treatments to better understand what does and does not work.

Previously, the team created vaccines from each dog's own tumor cells—called tumor lysate—that incited a specific immune response against tumor cells. They also experimented with adenoviral-mediated gene therapy that prolonged progression-free times and overall survival of the dogs with no adverse effects.

Although these treatments demonstrated beneficial effects for most canine patients, the tumors still recurred over time, usually by 7 or 8 months.

That's when Michael Olin, PhD, assistant professor in the Department of Pediatric Hematology and Oncology at UMN, discovered that the tumors secrete a substance that acts as a checkpoint inhibitor blocking the body's natural immune response, called CD200, and created a canine-specific peptide that can override this interaction and allow a normal immune response.

For this newly funded project, investigators hope to demonstrate how a combination of immunotherapy with this newly created CD200 peptide and vaccines or gene therapy will prove safe and highly effective in dogs with high-grade gliomas and extend tumor-free and overall survival times to well over a year.

In addition, the research team is striving to learn as much as it can about the type of immune cells that kill tumor cells and delay disease progression, and whether molecular changes in tumor cells occur in response to immunotherapy.

At least 30 dogs with confirmed spontaneous glioma are needed for the study. The eligibility criteria are similar to those for the Virginia-Maryland study. Although dogs with meningioma are no longer being recruited, the university is offering to treat dogs diagnosed with meningioma using surgery and vaccine-based immunotherapy, which can provide tumor control for years.

References available at AmericanVeterinarian.com.

Box 1. Study Participation
If you suspect that one of your patients meets the criteria for either of these studies and you'd like to learn more about participation, contact:

**MOLECULAR COMBINATORIAL THERAPY FOR CANINE MALIGNANT GLIOMAS STUDY**
Mindy Quigley, Clinical Trials Coordinator
Phone: 540-231-1363
Email: vettrials@vt.edu
Dr. John Rossmeisl, Principal Investigator
Email: jrossmei@vt.edu

**CANINE BRAIN TUMOR CLINICAL TRIAL PROGRAM**
Kathleen Stuebner, Clinical Trials Coordinator or Sara Pracht, Clinical Trial Technician
Phone: 612-624-2485
Email: vtic@umn.edu
Dr. G. Elizabeth Pluhar, Principal Investigator
Phone: 612-625-1162
Email: pluha006@umn.edu
To Err Is Human

Mistakes in practice are inevitable. It is what we do after making an error that can help foster—or dissuade—the culture of infallibility that permeates our profession.

By Linda Fineman, DVM, DACVIM (Oncology)

As I slowly injected 5 mL of an antibiotic I’d never heard of into a favorite patient, I couldn’t shake a nagging feeling of unease. I finished the treatment and continued with the rest of my duties in the primary care practice where I worked each evening. The next day, Dr. Jones called me into his office and told me that the patient I’d treated the night before had received a 10-fold overdose of a nephrotoxic drug. I had misread a poorly placed decimal point. I barely held it together through the remainder of my shift, then went home and spent the next 48 hours in the fetal position, in tears.

That mistake happened in 1986, but I still remember exactly what the treatment sheet and patient looked like. We are all human, we all make mistakes, yet I shouldn’t have.

We’ve all felt the overwhelming sense of shame and guilt that accompanies a medical error. When mistakes happen, we say to ourselves, “I’ll work harder. I’ll be more diligent. If I try harder, it won’t happen again.” The truth is, the way to reduce medical errors is to give ourselves permission to be human—to err.

Virtually everyone working in veterinary practice will make a mistake that has the potential to affect a patient’s health negatively, so it makes sense to focus on ways to reduce the risk to patients and simultaneously minimize “collateral damage” to the people involved. Medical errors don’t just affect the patient and client—they have an impact on us, our families, and our staff, as well. In turn, the stress and shame we experience after an error lead to an even higher risk of error.

BREAKING THE CYCLE

The first step in reducing mistakes and breaking the cycle is to start talking about the errors we make. Opening up about our mistakes allows us to focus on how we can reduce the risk of future errors through improved teamwork, communication, and systems. Shifting the practice culture away from “blame and shame” and instead focusing on what we can learn from every error enables us to build systems and processes that help prevent mistakes—or at least catch them earlier. Creating a culture of openness helps make it feel safe to talk about what went wrong and why. Burnout, compassion fatigue, and mental illness are enormous challenges to our profession, and working in a culture that demands infallibility is a predisposing factor that we can and should address. By disclosing errors to our clients, we live our professional values and ethics, model appropriate behavior and standards to our coworkers, and reduce our personal suffering after a mistake occurs.

We can learn a lot from human medicine, in which studies show that medical errors are currently the third leading cause of death in the United States. Poor communication within teams is a major factor, and burned-out caregivers are more likely to make mistakes. Despite numerous studies showing that patients and their families want to hear about what happened and why, only about a third of medical errors are disclosed. Professional standards clearly indicate that physicians must reveal errors, yet fear of lawsuits and stigma remains a barrier. Ironically, the risk of board complaints and lawsuits decreases when doctors are open, compassionate, and direct in talking about mistakes.

The limited research in veterinary medicine shows that we have a long way to go. In one study of veterinarians in practice less than 5 years, 78%
admitted to making a mistake that affected a patient, yet only 40% disclosed the error.\(^\text{5}\)

One reason for the silence may be fear of creating emotional trauma for a client. By having simple tools to facilitate conversations, however, veterinarians can reduce the lasting impact of mistakes on clients and team members. Failure to respond openly, honestly, fairly, and with empathy can lead to greater client disappointment than the error itself caused. Clients want to know what happened and why, what it means for their pet, who was responsible, and how a similar mistake will be avoided in the future. They also want to hear a sincere apology and know how they will be compensated.

A few things must occur before that conversation, however. First, address the patient’s immediate needs, and then take care of yourself and your team members. An initial assessment of what may have happened and why will help you prepare for the client discussion. Remember that adverse outcomes can happen in the absence of an error. Being clear in your own mind about what occurred is important for framing conversations with clients and staff. Finally, before approaching the client or picking up the phone, take time to manage your emotions. Shame can lead to minimizing an error or telling a lie of omission. Guilt can result in self-blame that may be inappropriate. Talking with your team and your insurance provider can help you gather your thoughts and bring your emotional reactions into perspective.

**THE CLIENT CONVERSATION**

The TEAM model may be a helpful way to organize the conversation with clients: **T** = truth, **E** = empathy, **A** = apology, **M** = managing through to resolution

*Truth*

It may be helpful to prepare your client for bad news with a simple statement such as “I’m sad to say that I need to have a difficult conversation with you.” Share the basics of the situation in 2 or 3 sentences, then pause and ask for permission to continue. Acknowledge that the client must be feeling a barrage of different emotions, and ask what he or she would like to hear from you next. In your explanation, include what you know about what happened, what’s being done for the pet, and the steps being taken to better understand why the error occurred.

*Empathy*

Empathizing with the client can help rebuild trust and restore a fractured relationship. Use reflective listening to ensure that the client feels heard, his or her emotions are validated, and any concerns are acknowledged. Be sure the client’s thoughts, feelings, and needs are all addressed.

*Apology*

A genuine, heartfelt apology is critical when an error has resulted in patient harm. It can have a powerful impact in reducing anger and suspicion. Be mindful of the difference between an apology of sympathy (“I’m sorry this happened to you and your pet”) and a true apology; in which you take responsibility and acknowledge that a mistake was made.

**Managing Through to Resolution**

In human medicine, there is clear evidence that patients and families want to know that something good will come out of their suffering and that others won’t go through the same thing.\(^\text{6}\) Part of managing through to resolution requires learning from the mistake and taking steps to prevent future similar errors. This is where a discussion with the medical team comes in. Making small changes in systems and empowering everyone to have a voice in reporting what they see and think helps prevent many errors. In human medicine, for example, the use of surgical checklists has reduced patient morbidity and mortality by 30% to 50%.\(^\text{7,8}\)

Making reparations is also important, and that is not just about waiving appropriate fees. Ask the client what more you and your staff can do to help. Give the client a voice, and listen closely for how you can meet his or her needs.

If handled appropriately, medical errors need not result in board complaints, lawsuits, or negative online posts. By being open, direct, honest, and empathetic, we can lower the risk of lasting negative repercussions and defuse anger. Within our profession, we have an ethical and moral imperative to change our culture to one in which we are open when we make mistakes. Instead of asking “Who did that?” ask “What factors led to that mistake?” By examining the risk factors, we can begin to build in the double-checks that save lives: our patients’ and our own.

**THE CULTURE OF INFALLIBILITY**

Brian Goldman, MD, an author and emergency physician at Mount Sinai Hospital in Toronto, Ontario, Canada, has made it his life’s mission to address what he calls the culture of infallibility. His TED talk is incredibly powerful, and I hope that watching it will inspire you to make changes that will help us all learn to thrive, not just survive, in our chosen profession.\(^\text{9}\)

When I reflect on how I suffered after overdosing my patient early in my career, I wonder how much my burden would have been lightened knowing that others in my practice had made errors and that we were taking steps to prevent something similar from happening again. Being part of creating a system to decrease the risk of a medication error might have been a first step on the path to healing. As our profession battles the growing risk of suicide and the extreme effects of the stress we face daily, we can begin by being brave enough to have difficult conversations with our teams and with our clients.

I challenge you to go back to your practice and ask yourself: “What can I do to create a culture of openness? How will I handle the situation the next time I or someone in my practice makes an error? What systems are in place now to prevent errors, and how are those systems being used? What new systems can I put in place to reduce the risk of error? How can I foster a nonjudgmental and safe environment in which others feel comfortable sharing what they see or think? What conversations will I have with my team?”

We can all contribute to making medicine safer for patients and practicing medicine safer for our own well-being. \(^\text{1}\)

*References available at AmericanVeterinarian.com.*
**VANGUARD CIV H3N2/H3N8**

Marketed By: Zoetis

Vanguard CIV H3N2/H3N8 helps protect dogs against the 2 strains of canine influenza virus known to be circulating in the United States—H3N2 and H3N8. This bivalent vaccine has demonstrated safety and efficacy for protection against these strains in healthy dogs aged 8 weeks and older.

**Dosing:** 2 doses (1 mL each) given 3 weeks apart; yearly revaccination recommended

For More Information: vanguardciv.com

---

**ENTYCE**

Marketed By: Aratana Therapeutics, Inc.

As the only FDA-approved veterinary therapeutic for appetite stimulation in dogs with acute and chronic conditions, Entyce (capromorelin oral solution) mimics the effect of the hunger hormone ghrelin to cause the feeling of hunger. This first-in-class ghrelin receptor agonist is available as a flavored oral solution in 10-, 15-, and 30-mL bottles for dogs only.

**Dosing:** 3 mg/kg (1.4 mg/lb) given once daily

For More Information: entyce.aratana.com

---

**ALENZA**

Marketed By: Bayer DVM

Alenza supports active and aging medium to large dogs that need help managing general aches resulting from normal daily activities. Alenza provides whole-body comfort, helps maintain a healthy inflammatory response, and aids in the normal recovery and rehabilitation process.

**Dosing:** Chewable tablet given during or after meals

For More Information: bayerdvm.com

---

**SILEO**

Marketed By: Zoetis

Sileo (dexmedetomidine oromucosal gel) is the first and only FDA-approved medication indicated for the treatment of noise aversion in dogs aged 16 weeks and older. Sileo calms without sedating, so the dog remains fully functional and interacts normally with others. Provided in a 3-mL syringe.

**Dosing:** Oral gel (0.1 mg/mL) administered between the cheek and gum

For More Information: zoetisus.com

---

**TRI-HEART PLUS CHEWABLE TABLETS**

Marketed By: Merck Animal Health

Tri-Heart Plus (ivermectin/pyrantel) protects dogs from heartworm disease by eliminating the tissue stage of the heartworm larvae for a month after infection. It also treats and controls ascarids and hookworms. Tri-Heart Plus is approved for use in dogs and puppies aged 6 weeks and older.

**Dosing:** Beef-flavored chewable tablet given on the same day each month

For More Information: merck-animal-health-usa.com

---

**CATEGO**

Marketed By: Ceva Animal Health

Designed specifically for cats, Catego protects against fleas, ticks, and chewing lice. The unique combination of dinotefuran, fipronil, and pyriproxyfen works fast and kills fleas within 6 hours. Available in 3- and 6-dose packs, Catego is for use in cats and kittens weighing more than 1.5 lb and older than 8 weeks of age.

**Dosing:** Monthly topical solution

For More Information: categocat.com
Help protect your staff against accidental needlesticks with innovative sharps safety devices from Terumo

Don’t Take Risks. Practice Safe Sticks.

Surshield® Safety Winged Infusion and Blood Collection Sets

SurGuard® 3 Safety Hypodermic Needles and Needles with Syringe
#1 USED PET GLUCOMETER

See what makes AlphaTRAK® 2 the #1 prescribed pet glucometer at AlphaTRAKmeter.com. For full support or to order, call 1-888-ZOETIS-1.

1. Data on file. Zoetis Market Research: Blood Glucose Monitoring Report, July 2017. Zoetis Inc. All trademarks are the property of Zoetis Services LLC or a related company or a licensor unless otherwise noted. © 2017 Zoetis Services LLC. All rights reserved. ATK-00175