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May 2024

VET CANDY

Magazine.

INCREDIBLE JOURNEY OF

DR. NATOSHA RICHARDSON

LEAVE YOU INSPIRED!

HUMANS PASS MORE VIRUSES TO OTHER ANIMALS THAN WE CATCH FROM THEM

BREAKING: AI REVOLUTIONIZES CANINE CANCER DETECTION! GOLDEN RETRIEVERS LEAD THE WAY

CLIMATE CHANGE CATASTROPHE: HOW DEADLY ZOONOTIC DISEASES ARE ON THE RISE

ELEPHANT EMERGENCY: BREAKTHROUGH DISCOVERY REVOLUTIONIZES DISEASE DETECTION

+ much more

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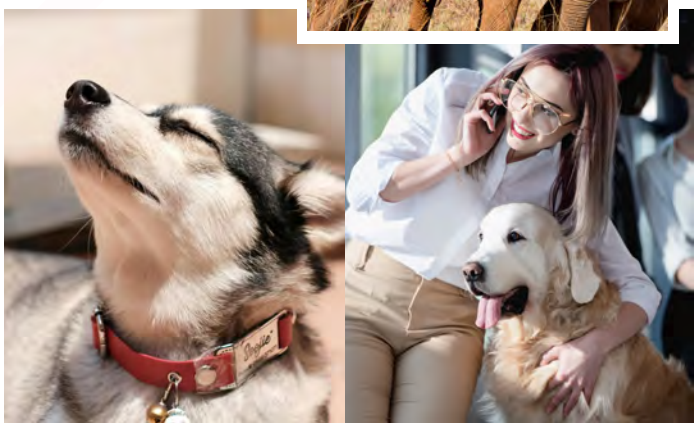
Editor's Note

Welcome to the world of VET CANDY

Dr. Jill Lopez

00 ELEPHANT EMERGENCY



Dear Vet Candy Community,

I am delighted to welcome you to the May issue of Vet Candy, brimming with insightful stories, groundbreaking research, and heartwarming tales from the field of veterinary medicine.

This month, our cover story features Dr. Natosha Richardson, an esteemed criticalist based in South Carolina. Dr. Richardson's unwavering dedication to emergency and critical care has earned her widespread recognition, and we are thrilled to showcase her journey, including her collaboration with Vet Candy on the Master Course in Urgent Care, supported by KRUUSE and Covetrus. Prepare to be inspired by Dr. Richardson's commitment to advancing the veterinary profession.

Within the pages of this issue, you will find a wealth of clinical updates and pioneering discoveries that are sure to captivate your interest. From intriguing insights into unique zoonotic situations highlighting the interconnectedness of humans and animals, to groundbreaking research on lymphoma risk assessment in our beloved pets, we delve deep into the latest advancements shaping veterinary practice.

But that's not all – we have curated compelling stories that shed light on important topics you won't want to miss. Have you ever wondered about the genetic factors behind cats' reactions to flea and tick products? We explore this fascinating subject, offering valuable insights that may change the way you view your feline patients.

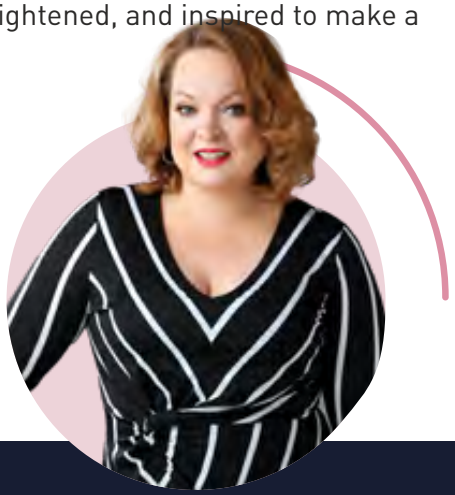
As you immerse yourself in this issue, we invite you to absorb the knowledge and inspiration it offers and join us in celebrating the profound bond between humans and animals. Together, let us continue to advocate for the welfare of all creatures, both large and small, and uphold the standards of excellence in our noble profession.

Thank you for being a valued member of the Vet Candy community. We trust that this issue will leave you feeling informed, enlightened, and inspired to make a difference.

Warm regards,

Dr. Jill Lopez

Editor-in-chief,
Vet Candy



Incredible Journey of Dr. Natosha Richardson Will Leave You Inspired!

Q/A with Dr. Natosha Richardson:

In the heart of Kentucky, amidst the rolling hills and verdant landscapes, a young girl dreamt of a future filled with purpose and compassion. Little did she know that her aspirations would lead her on a remarkable journey, shaping her into the compassionate and inspirational veterinarian she is today.

Dr. Natosha Richardson's story begins with a childhood steeped in a love for animals and a desire to make a difference. From a tender age, she knew that her path lay in the realm of veterinary medicine, a calling that would take her across oceans and continents in pursuit of her dreams. She identifies her time at the Royal Veterinary College in England as a transformative adventure that shaped her profoundly. Living abroad for four years challenged her in ways she never imagined, instilling resilience and fortitude that continue to shape her outlook on life. After earning her Doctorate in Veterinary Medicine, Dr. Natosha returned to her roots in Kentucky, eager to apply her newfound knowledge and skills. Her journey truly took flight during a transformative internship at Bluegrass Veterinary Specialists in Lexington, where she discovered her passion for emergency medicine—a field that would become her calling.

Fuelled by an insatiable thirst for knowledge and a desire to provide the highest standard of care, Dr. Natosha pursued a rigorous three-year residency in Small Animal Emergency and Critical Care. Emerging as a Diplomate of the American College of Veterinary Emergency and Critical Care, she stood at the forefront of her field, armed with expertise and compassion. But Dr. Natosha's journey was not solely defined by professional accolades; it was also marked by moments of personal growth and reflection.

Amidst the challenges and triumphs, Dr. Natosha's unwavering commitment to kindness and empathy remained a guiding light. She believes in the power of individual actions to create meaningful change, emphasizing the importance of fostering compassion and understanding in our interactions with others.

For Dr. Natosha, purpose is paramount—a guiding force that anchors her in times of uncertainty and adversity. Whether it's through her career, her family, or her community, she finds fulfillment in making a positive difference, one small act of kindness at a time.

As she looks ahead to the future, Dr. Natosha approaches life with a sense of openness and anticipation, eager to embrace the journey wherever it may lead. While the path may be uncertain, one thing remains steadfast: her unwavering commitment to spreading joy and compassion in every space she enters.

In the tapestry of veterinary medicine, Dr. Natosha Richardson's story stands as a testament to the transformative power of passion, resilience, and purpose. Through her unwavering dedication and compassionate care, she continues to inspire others to pursue their dreams and make a meaningful difference in the lives of animals and their human companions.

If I wasn't a vet what would I be:

1

From the time I was in second grade, I've only ever really wanted to be a veterinarian. For a short period of time in college, I considered moving to human medicine and did a stint shadowing a human physician – it was definitely NOT for me. If I was being really honest with myself, I'd likely work in the non-profit arena. In college, the thing that brought me the greatest joy was serving as Co-chairman for our Relay for Life team. Cancer research is near and dear to my heart so I'd likely work with a non-profit organization that helps to provide care and funding for families dealing with cancer or other life-threatening diseases.

Best career advice I've received:

2

No hospital is perfect! I feel a lot of students/interns/residents finish school or their respective programs and think they are going to find that perfect job in the perfect hospital in the perfect location. If that happened for you, that's great! However, for many, that simply isn't realistic. When a co-worker/fellow veterinarian shared with me that I needed to find a hospital that generally matched my goals as a clinician in a location that made me happy and allowed me to enjoy my life OUTSIDE of work, it completely changed my perspective on my job and my hospital in general.

3

How did I make my first dollar:

Lemonade stand as a kid! My parents were having a garage sale and I asked if I could sell lemonade so I could buy whatever toy was popular at the time and they said yes.

Advice I have for my younger self:

4

This one is tough! Some combination of don't take life too seriously and work hard so you can play hard. There are a lot of things I would go back and do differently if I was younger but traveling more and experiencing life with friends is a big one. Oh – and take a financial planning course in college!

What is a change I would like to see in the world:

5

More kindness and patience, and I think that starts with us as individuals. It's very easy to forget that every action we take and word that we speak, particularly in the clinical or public setting, creates a ripple effect. We have the power as individuals to create significant change just by changing how we interact with a communication with those around us. A kind word or just listening to a co-worker can go a long way.

Want more?

Check out Dr. Natosha Richardson in Vet Candy's Master Course in Urgent Care, brought to you by KRUUSE and Covetrus:

www.myvetcandy.com/ce-ondemand

YUM AND DONE

IN A LABORATORY STUDY, DOGS PREFERRED*[1]

NexGard® PLUS (afoxolaner, moxidectin, and pyrantel chewable tablets)

OVER

SIMPARICA TRIO® (sarolaner, moxidectin, and pyrantel chewable tablets)

Contact your Boehringer Ingelheim Sales Representative to learn more.

*For dogs demonstrating a preference, they preferred *NexGard*® PLUS (afoxolaner, moxidectin, and pyrantel chewable tablets) over SIMPARICA TRIO® (sarolaner, moxidectin, and pyrantel chewable tablets).

IMPORTANT SAFETY INFORMATION: *NexGard*® PLUS (afoxolaner, moxidectin, and pyrantel chewable tablets) is for use in dogs only. The most frequently reported adverse reactions reported in clinical trials were diarrhea, vomiting, lethargy, and itching. *NexGard* PLUS contains afoxolaner, a member of the isoxazoline class, which has been associated with neurologic adverse reactions including tremors, ataxia, and seizures in dogs with or without a history of seizures. Use with caution in dogs with a history of seizures or neurologic disorders. The safe use of *NexGard* PLUS has not been evaluated in breeding, pregnant, or lactating dogs. Dogs should be tested for existing heartworm infection prior to starting a heartworm disease preventive. For more information, see full prescribing information or visit NexGardPLUSClinic.com.

Boehringer Ingelheim

1. Data on file at Boehringer Ingelheim.

NexGard® PLUS
(afoxolaner, moxidectin, and pyrantel chewable tablets)

For oral use in dogs only

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

Description:
NexGard® PLUS (afoxolaner, moxidectin, and pyrantel chewable tablets) is available in five sizes of beef-flavored, soft chewables for oral administration to dogs and puppies according to their weight. Each chewable is formulated to provide minimum doses of 1.14 mg/lb (2.5 mg/kg) afoxolaner, 5.45 mcg/lb (12 mcg/kg) moxidectin, and 2.27 mg/lb (5.0 mg/kg) pyrantel (as pamoate salt).

Afoxolaner is a member of the isoxazoline family of compounds. Its chemical name is 1-Naphthalene-carboxamide,4-[5-[3-chloro-5-(trifluoromethyl)-phenyl]-4,5-dihydro-5-(trifluoromethyl)-3-isoxazolyl]-N-[2-oxo-2-[(2,2,2-trifluoroethyl)amino]ethyl.

Moxidectin is a semisynthetic macrocyclic lactone derived from the actinomycete *Streptomycetes cyaneogriseus noncyanogenus*. The chemical name for moxidectin is [6R,23E,25S(E)]-5-O-Demethyl-28-deoxy-25-(1,3-dimethyl-1-butenyl)-6,28-epoxy-23-(methoxyimino) milbemycin B.

Pyrantel is a member of the tetrahydropyrimidine family of compounds. Its chemical name is (E)- 1,4,5,6-Tetrahydro-1-methyl-2-[2-(2-thienyl) vinyl] pyrimidine 4, 4' methylenebis [3-hydroxy-2-naphthoate](1:1).

Indications:
NexGard® PLUS is indicated for the prevention of heartworm disease caused by *Dirofilaria immitis* and for the treatment and control of adult hookworm (*Ancylostoma caninum, Ancylostoma braziliense,* and *Uncinaria stenocephala*) and roundworm (*Toxocara canis* and *Toxascaris leonina*) infections.
NexGard® PLUS kills adult fleas and is indicated for the treatment and prevention of flea infestations (*Ctenocephalides felis*) and the treatment and control of *Ixodes scapularis* (black-legged tick), *Rhipicephalus sanguineus* (brown dog tick), *Dermacentor variabilis* (American dog tick), and *Amblyomma americanum* (lone star tick) infestations for one month in dogs and puppies eight weeks of age and older, weighing four pounds of body weight or greater.

Dosage and Administration:
NexGard® PLUS is given orally once a month at the minimum dosage of 1.14 mg/lb (2.5 mg/kg) afoxolaner, 5.45 mcg/lb (12 mcg/kg) moxidectin, and 2.27 mg/lb (5.0 mg/kg) pyrantel (as pamoate salt).

For heartworm disease prevention, give once monthly for at least six months after last exposure to mosquitoes (see **Effectiveness).**

Dosing Schedule:

Body Weight (lbs.)	Afoxolaner Per Chewable (mg)	Moxidectin Per Chewable (mcg)	Pyrantel* Per Chewable (mg)	Chewables Administered
4 to 8	9.375	45	18.75	One
8.1 to 17	18.75	90	37.5	One
17.1 to 33	37.5	180	75	One
33.1 to 66	75	360	150	One
66.1 to 132	150	720	300	One
Over 132	Administer the appropriate combination of chewables			

*As pamoate salt.

NexGard® PLUS can be administered with or without food. Care should be taken to ensure that the dog consumes the complete dose and that part of the dose is not lost or refused. If a dose is missed, administer NexGard® PLUS and resume a monthly dosing schedule.

Heartworm Prevention:
NexGard® PLUS should be administered at monthly intervals year-round or, at a minimum, administration should start within one month of the dog's first seasonal exposure to mosquitoes and should continue at monthly intervals until at least six months after the dog's last exposure (see **Effectiveness**). When replacing another monthly heartworm preventive product, the first dose of NexGard® PLUS should be given within a month of the last dose of the former medication.

Flea Treatment and Prevention:
NexGard® PLUS should be administered year-round at monthly intervals or started at least one month before fleas become active. To minimize the likelihood of flea reinfestation, it is important to treat all animals within a household with an approved flea control product.

Tick Treatment and Control:
NexGard® PLUS should be administered year-round at monthly intervals or started at least one month before ticks become active.

Intestinal Nematode Treatment and Control:
NexGard® PLUS treats and controls adult hookworms (*Ancylostoma caninum, Ancylostoma braziliense,* and *Uncinaria stenocephala*) and roundworms (*Toxocara canis* and *Toxascaris leonina*). For the treatment of adult hookworm and roundworm infections, NexGard® PLUS should be administered as a single dose. Monthly use of NexGard® PLUS will control any subsequent infections. Dogs may be exposed to and can become infected with hookworms and roundworms throughout the year, regardless of season or climate.

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

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

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

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

Treatment with fewer than six monthly doses after the last exposure to mosquitoes has not been evaluated and may not provide complete heartworm prevention.

Prior to administration of NexGard® PLUS, dogs should be tested for existing heartworm infection. At the discretion of the veterinarian, infected dogs should be treated with an adulticide to remove adult heartworms. NexGard® PLUS is not effective against adult *D. immitis*.

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

Adverse Reactions:
In a field safety and effectiveness study, NexGard® PLUS was administered to dogs for the prevention of heartworm disease. The study included a total of 272 dogs (134 administered NexGard® PLUS and 138 administered active control) treated once monthly for 11 treatments. Over the 330-day study period, all observations of potential adverse reactions were recorded. The most frequent reactions reported in the NexGard® PLUS group are presented in the following table.

Table 1. Dogs With Adverse Reactions

Clinical Sign	NexGard® PLUS n = 134 Number (Percentage)	Active Control n = 138 Number (Percentage)
Diarrhea	9 (6.7%)	7 (5.1%)
Vomiting	6 (4.5%)	7 (5.1%)
Lethargy	3 (2.2%)	5 (3.6%)
Itching	3 (2.2%)	3 (2.2%)
Dermatitis	2 (1.5%)	1 (0.7%)
Anorexia	1 (0.7%)	4 (2.9%)
Muscle tremor	1 (0.7%)	1 (0.7%)

One dog in the NexGard® PLUS group was reported to exhibit muscle tremors along with nausea and depression for one day after the Day 0 treatment. The dog remained in the study and muscle tremors were not reported after any subsequent treatments.

Contact Information:
For a copy of the Safety Data Sheet (SDS) or to report suspected adverse drug events, contact Boehringer Ingelheim Animal Health USA Inc. at 1-888-637-4251 or www.nexgardforpets.com.

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

Clinical Pharmacology:
Mode of Action:
NexGard® PLUS (afoxolaner, moxidectin, and pyrantel chewable tablets) contains the three active pharmaceutical ingredients afoxolaner, moxidectin, and pyrantel (as pamoate salt).

Afoxolaner is a member of the isoxazoline family, shown to bind at a binding site to inhibit insect and acarine ligand-gated chloride channels, in particular those gated by the neurotransmitter gamma-aminobutyric acid (GABA), thereby blocking pre- and postsynaptic transfer of chloride ions across cell membranes. Prolonged afoxolaner-induced hyperexcitation results in uncontrolled activity of the central nervous system and death of insects and acarines. The selective toxicity of afoxolaner between insects and acarines and mammals may be inferred by the differential sensitivity of the insects and acarines' GABA receptors versus mammalian GABA receptors.

Moxidectin is an endectocide in the macrocyclic lactone class. Moxidectin acts by interfering with chloride channel-mediated neurotransmission in susceptible parasites, which results in paralysis and death of the parasite.

Pyrantel is a nematocide belonging to the tetrahydropyrimidine class. Pyrantel acts as a depolarizing, neuromuscular-blocking agent in susceptible parasites, causing paralysis and death or expulsion of the parasite.

Pharmacokinetics:
Following a single oral administration of a near-final formulation of NexGard® PLUS (at mean doses of 3.9 mg/kg afoxolaner, 18.8 mcg/kg moxidectin, and 7.8 mg/kg pyrantel pamoate) in fed and fasted Beagle dogs (10 to 21 months of age), afoxolaner and moxidectin were more rapidly absorbed in the fasted state with a time to maximum concentration (Tmax) of 2 to 3 hours.

The afoxolaner mean maximum plasma concentrations (Cmax) in the fed and fasted states were 1610 and 2200 ng/mL (CV=33 and 16%) and the moxidectin mean Cmax values were 11.1 and 15.5 ng/mL (CV=39 and 24%), respectively. The area under the curve (AUC) for afoxolaner and moxidectin were similar between fed and fasted states. Post-dose pyrantel plasma concentrations were quantifiable out to 24 hours.

Following six oral administrations of NexGard® PLUS at 1, 3, and 5X the maximum exposure dose of 5 mg/kg, 24 mcg/kg, and 10 mg/kg afoxolaner, moxidectin, and pyrantel pamoate, respectively, every 28 days in 8-week-old Beagle dogs, afoxolaner and moxidectin Tmax ranged from 2 to 6 hours. The observed mean Cmax and AUC at steady state in the 1X dose group were 2230 ng/mL and 19000 days*ng/mL for afoxolaner and 14.8 ng/mL and 55.2 days*ng/mL for moxidectin, respectively. Based on mean Cmin, afoxolaner and moxidectin accumulated by less than 4-fold at steady state. Afoxolaner and moxidectin exposure increased in a dose proportional manner between the 1X and 3X dose groups but was less than dose proportional in the 5X dose group.

Pyrantel pamoate is poorly absorbed into systemic circulation. Pyrantel pamoate is intended to remain in the gastrointestinal tract to allow effective concentrations to be delivered to gastrointestinal nematodes.

Effectiveness:
Heartworm Prevention:
In two well-controlled laboratory studies, NexGard® PLUS was 100% effective against induced *D. immitis* infections when administered for six consecutive months.

In a well-controlled US field study consisting of 120 dogs administered NexGard® PLUS and 124 administered an active control, no dogs treated with NexGard® PLUS tested positive for heartworm disease. All dogs treated with NexGard® PLUS were negative for *D. immitis* antigen and blood microfilariae at study completion on Day 330.

Flea Treatment and Prevention:
In a well-controlled laboratory study, NexGard® PLUS demonstrated ≥99.8% effectiveness against adult fleas 24 hours after weekly infestations for one month.

In a separate well-controlled laboratory study, afoxolaner alone began to kill fleas four hours after initial administration and demonstrated >99% effectiveness at eight hours.

In an additional well-controlled laboratory study, afoxolaner alone demonstrated 100% effectiveness against adult fleas 24 hours post-infestation for 35 days and was ≥93% effective at 12 hours post-infestation through Day 21 and on Day 35. On Day 28, afoxolaner alone was 81.1% effective 12 hours post-infestation. Dogs in both the afoxolaner-treated and control groups that were infested with fleas on Day -1 generated flea eggs at 12 and 24 hours post-treatment (0-11 eggs and 1-17 eggs in the afoxolaner-treated dogs, and 4-90 eggs and 0-118 eggs in the control dogs, at 12 and 24 hours, respectively). At subsequent evaluations post-infestation, fleas from dogs in the afoxolaner-treated group were essentially unable to produce any eggs (0-1 eggs), while fleas from dogs in the control group continued to produce eggs (1-141 eggs).

In a 90-day US field study conducted in households with existing flea infestations of varying severity, the effectiveness of afoxolaner alone against fleas on the Day 30, 60, and 90 visits compared with baseline was 98.0%, 99.7%, and 99.9%, respectively.

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

Tick Treatment and Control:
In well-controlled laboratory studies, afoxolaner alone demonstrated >97% effectiveness against *Dermacentor variabilis*, >94% effectiveness against *Ixodes scapularis*, and >93% effectiveness against *Rhipicephalus sanguineus*, 48 hours post-infestation, for one month. At 72 hours post-infestation, NexGard® PLUS demonstrated ≥97% effectiveness against *Amblyomma americanum* for one month.

Intestinal Nematode Treatment and Control:
Elimination of adult roundworms (*Toxocara canis* and *Toxascaris leonina*) and hookworms (*Ancylostoma caninum, Ancylostoma braziliense*, and *Uncinaria stenocephala*) was demonstrated in well-controlled laboratory studies.

Target Animal Safety:
Margin of Safety:
NexGard® PLUS was administered orally at 1, 3, and 5X the maximum exposure doses at approximately 28-day intervals for six treatments to 8-week-old Beagle puppies. Dogs in the control group were sham-dosed. There were no clinically relevant, treatment-related effects on body weights, food consumption, clinical pathology (hematology, coagulation, serum chemistry, and urinalysis), gross pathology, histopathology, organ weights, or ophthalmic examinations. Mild, self-limiting diarrhea (with and without blood) was possibly related to treatment, as there were more incidences in the NexGard® PLUS groups than the control group throughout the study, including within 48 hours after treatment.

Avermectin-Sensitive Collie Safety:
NexGard® PLUS was administered orally at 1, 3, and 5X the maximum label dose to MDR1-deficient Collies once on Day 0, with a second administration to the 1X group on Day 28. Dogs in the control group were sham-dosed on Days 0 and 28. No clinical signs of avermectin toxicity were noted in any dog at any time during the study. Vomiting was observed in some dogs in the 3X and 5X groups and resolved without treatment. Diarrhea, with or without blood, was observed in some dogs in all of the NexGard® PLUS groups and resolved without treatment.

Heartworm-Positive Safety:
NexGard® PLUS was administered orally at 1X and 3X the maximum exposure doses at approximately 28-day intervals for three treatments to Beagle dogs with adult heartworm infections and circulating microfilariae. Dogs in the control group were sham-dosed. Diarrhea was observed in one dog in the 1X group and in three dogs in the 3X group, and vomiting was observed in two dogs in the 3X group. No signs of avermectin toxicity were observed at any time during the study. There were no clinical signs associated with death of the microfilariae observed in any of the dogs.

Field Safety:
In a well-controlled field study, NexGard® PLUS was used concurrently with other medications such as vaccines, antibiotics, non-steroidal anti-inflammatory drugs (NSAIDs), anesthetics, sedatives, analgesics, steroids, anthelmintics, antiemetics, and antipruritics. No adverse reactions were associated with the concurrent use of NexGard® PLUS and other medications.

How Supplied:
NexGard® PLUS is available in five strengths of beef-flavored soft chewables formulated according to the weight of the dog (see **Dosage and Administration**). Each chewable size is available in color-coded packages of 1, 3, or 6 chewables.

Storage Information:
Store in original package at or below 25°C (77°F) with excursions permitted up to 40°C (104°F).

Approved by FDA under NADA # 141-554

Marketed by: Boehringer Ingelheim Animal Health USA Inc., Duluth, GA 30096

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Boehringer Ingelheim

Humans pass more viruses to other animals than we catch from them

Humans pass on more viruses to domestic and wild animals than we catch from them, according to a major new analysis of viral genomes by UCL researchers.

For the new paper published in Nature Ecology & Evolution, the team analysed all publicly available viral genome sequences, to reconstruct where viruses have jumped from one host to infect another vertebrate species.

Most emerging and re-emerging infectious diseases are caused by viruses circulating in animals. When these viruses cross over from animals into humans, a process known as zoonosis, they can cause disease outbreaks, epidemics and pandemics such as Ebola, flu or Covid-19. Given the enormous impact of zoonotic diseases on public health, humans have generally been considered as a sink for viruses rather than a source, with human-to-animal transmission of viruses receiving far less attention.

For the study, the research team developed and applied methodological tools to analyse the nearly 12 million viral genomes that have been deposited on public databases to date. Leveraging this data, they reconstructed the evolutionary histories and past host jumps of viruses across 32 viral families, and looked for which parts of the viral genomes acquired mutations during host jumps.

The scientists found that roughly twice as many host jumps were inferred to be from humans to other animals (known as anthroponosis) rather than the other way round. This pattern was consistent throughout most viral families considered. Additionally, they found even more animal-to-animal host jumps, that did not involve humans.

The team's work highlights the high and largely underappreciated fact that human viruses frequently spread from humans into wild and domestic animals.

Co-author Professor Francois Balloux (UCL Genetics Institute) said: "We should consider humans just as one node in a vast network of hosts endlessly exchanging pathogens, rather than a sink for zoonotic bugs.

"By surveying and monitoring transmission of viruses between animals and humans, in either direction, we can better understand viral evolution and hopefully be more prepared for future outbreaks and epidemics of novel illnesses, while also aiding conservation efforts."

The findings also show that, on average, viral host jumps are associated with an increase in genetic changes, or mutations in viruses, relative to their continued evolution alongside just one host animal, reflecting how viruses must adapt to better exploit their new hosts.

Further, viruses that already infect many different animals show weaker signals of this adaptive process, suggesting that viruses with broader host ranges may possess traits that make them inherently more capable of infecting a diverse range of hosts, whereas other viruses may require more extensive adaptations to infect a new host species.

"Lead author, PhD student Cedric Tan (UCL Genetics Institute and Francis Crick Institute) said: "When animals catch viruses from humans, this can not only harm the animal and potentially pose a conservation threat to the species, but it may also cause new problems for humans by impacting food security if large numbers of livestock need to be culled to prevent an epidemic, as has been happening over recent years with the H5N1 bird flu strain.

Additionally, if a virus carried by humans infects a new animal species, the virus might continue to thrive even if eradicated among humans, or even evolve new adaptations before it winds up infecting humans again.

"Understanding how and why viruses evolve to jump into different hosts across the wider tree of life may help us figure out how new viral diseases emerge in humans and animals."

Cell entry is generally seen as the first step for a virus to infect a host. However, the team found that many of the adaptations associated with host jumps were not found in the viral proteins that enable them to attach to and enter host cells, which points to viral host adaptation being a complex process that remains to be fully understood.

Co-author Dr Lucy van Dorp (UCL Genetics Institute) said: "Our research was made possible only by the countless research teams that have openly shared their data via public databases. The key challenge, moving forward, is to integrate the knowledge and tools from diverse disciplines including genomics, epidemiology, and ecology to enhance our understanding of host jumps."

Breaking:

AI Revolutionizes Canine Cancer Detection! Golden Retrievers Lead the Way

A novel canine cancer study funded by Morris Animal Foundation and the Golden Retriever Foundation® is leveraging artificial intelligence to pioneer an innovative approach to early detection and prevention for dogs susceptible to developing diffuse large B-cell lymphoma, the most common form of this deadly cancer. A team of researchers at the University of Minnesota is testing a new approach coined "test and intervene," using AI to analyze pieces of DNA fragments in blood.

Findings may help identify dogs at higher risk for DLBCL. The team plans to provide pet owners and veterinarians with intervention strategies to help lower the risk in identified dogs. "Morris Animal Foundation is proud to continue our partnership with the Golden Retriever Foundation® and extend the impact of the Golden Retriever Lifetime Study with this important research on canine lymphoma," said Kathy Tietje, Chief Program Officer for Morris Animal Foundation. "When given the opportunity to provide significant funding for this study, the Golden Retriever Foundation® was excited to be a part of LyRA (project) as well as a continued partnership with Morris Animal Foundation," said Christine Miele, President of the Golden Retriever Foundation.

"Lymphoma sadly affects about one in eight dogs and results in both expense and loss of companionship. We are looking forward to the day of early detection and the application of prevention and treatment." The research team will develop the test using a comprehensive evaluation of a large group of dogs and an analysis of samples from Morris Animal Foundation's Golden Retriever Lifetime Study to identify DNA patterns in the blood before cancer development. This initiative sets itself apart from similar projects by attempting to assess canine cancer risk through a

Lymphoma Risk Assessment test to help veterinarians and pet owners make informed care decisions and reduce the impact of lymphoma on dogs. "The LyRA test will categorize dogs into low or high risk for developing this form of cancer and will guide in the creation of prevention strategies for dogs deemed high risk," said Jaime Modiano, the study's principal investigator and Perlman Professor of Oncology and Comparative Medicine, and the Director of Animal Cancer Care and Research Program at the University of Minnesota. Beyond its direct impact on dogs, this research effort could influence numerous research avenues in other mammals, including cats, endangered species and even humans, Modiano added. The approach may also provide insights into aging, cancer risk and chronic conditions, extending the study's significance beyond companion dogs. "We want to be very mindful about how everything we do has the potential to promote graceful aging, not only for our domestic companions but also for other animals that make the world a place that we all want to live in," Modiano said.

Say Goodbye to Noncompete Agreements:

FTC Votes to Ban Most Restrictions

In a landmark decision, the Federal Trade Commission (FTC) has taken a significant step toward reshaping the landscape of employment contracts by voting to ban nearly all noncompete agreements. These agreements, which typically prevent workers from joining competing businesses or launching their own ventures, have long been a contentious issue in the labor market.

The decision comes after the FTC received an overwhelming response from the public, with more than 26,000 comments submitted in the months leading up to the vote. Chair Lina Khan highlighted some of the stories shared by workers, illustrating the detrimental impact of noncompete agreements on individual liberties and economic freedom.

"We heard from employees who, because of noncompetes, were stuck in abusive workplaces," Khan stated in a story on **NPR**. "These accounts pointed to the basic reality of how robbing people of their economic liberty also robs them of all sorts of other freedoms."

The scope of noncompete agreements is vast, with an estimated 30 million people—equivalent to one in five American workers—being bound by these contracts. The FTC believes that eliminating these restrictions could lead to a significant boost in wages, totaling nearly $300 billion per year, by encouraging greater job mobility.

"By banning most noncompete agreements, the FTC has taken a crucial step towards empowering workers and fostering a more equitable employment landscape. This decision not only protects individual liberties but also opens doors to greater opportunities and fairer compensation for employees across industries." - Omar A. Lopez, ESQ, New Jersey Employment Attorney and owner of **The Lopez Firm**.

For many workers, the existence of noncompete agreements only becomes apparent when they attempt to change jobs. The ban, which will take effect later this year, aims to address this issue by prohibiting most noncompete agreements, except those negotiated by senior executives.

However, the decision was not unanimous. The vote, split 3 to 2 along party lines, drew criticism from dissenting commissioners Melissa Holyoke and Andrew Ferguson, who argued that the FTC was exceeding its authority. Holyoke expressed skepticism about the ban's legal standing and predicted it would face challenges in court.

Shortly after the vote, the U.S. Chamber of Commerce announced its intention to sue the FTC in an effort to block the rule. The Chamber has long opposed the ban, asserting that noncompete agreements are essential for protecting trade secrets and fostering employer investment in workforce training.

According to a breakdown of the rule by employment lawyer, Eric Myers of Pierson Ferdinand LLP:

- The rule prohibits employers from entering into new noncompetes with all workers as of the effective date. The term "worker" includes employees and individuals classified as independent contractors and other kinds of workers. However, franchisor/franchisee non-competes are exempted. The final rule also includes an exception that allows noncompetes between the seller and buyer of a business.

- In another departure from the proposed rule, the FTC's final rule allows existing noncompetes for senior executives to remain in force. The final rule defines senior executives as workers earning more than $151,164 annually and who are in policy-making positions. Employers, however, cannot enter into or enforce new noncompetes with senior executives.

- If employers have existing noncompetes in place when the final rule takes effect 120 days after publication in the Federal Register, they do not need to modify them by formally rescinding them. However, under the final rule, employers must notify those workers that the company will not enforce the noncompete in the future. The Commission has included model language in the final rule that employers can use to communicate to workers on paper, by mail, by email, or by text, stating that the employer will not enforce any non-compete clause against the worker.

- The new rule does not generally impact NDAs or non-solicitation agreements unless they prohibit a worker from, penalize a worker for, or function to prevent a worker from seeking or accepting work or operating a business.

- If states have more restrictive rules governing noncompetes, they will continue to apply.

As the debate over the ban continues, its implications for both employers and workers remain uncertain. While proponents argue that it will promote economic mobility and increase wages, opponents warn of potential legal challenges and adverse effects on business operations. Ultimately, the fate of noncompete agreements in the American labor market will be shaped by ongoing legal battles and broader policy discussions.

A link to the new rule can be found here:

TB VACCINE MAY ENABLE ELIMINATION OF THE DISEASE IN CATTLE BY REDUCING ITS SPREAD

Vaccination not only reduces the severity of TB in infected cattle, but reduces its spread in dairy herds by 89%, research finds.

The research, led by the University of Cambridge and Penn State University, improves prospects for the elimination and control of bovine tuberculosis (TB), an infectious disease of cattle that results in large economic costs and health impacts across the world.

This is the first study to show that BCG-vaccinated cattle infected with TB are substantially less infectious to other cattle. This remarkable indirect effect of the vaccine beyond its direct protective effect has not been measured before.

The spillover of infection from livestock has been estimated to account for about 10% of human tuberculosis cases. While such zoonotic TB (zTB) infections are most commonly associated with gastro-intestinal infections related to drinking contaminated milk, zTB can also cause chronic lung infections in humans. Lung disease caused by zTB can be indistinguishable from regular tuberculosis, but is more difficult to treat due to natural antibiotic resistance in the cattle bacteria.

TB remains endemic in many countries around the world, including in Europe and the Americas, where its control costs farmers and taxpayers hundreds of millions of dollars each year.

The study is published today in the journal Science.

In the study, carried out in Ethiopia, researchers examined the ability of the vaccine, Bacillus Calmette-Guérin (BCG), to directly protect cattle that receive it, as well as to indirectly protect both vaccinated and unvaccinated cattle by reducing TB transmission. Vaccinated and unvaccinated animals were put into enclosures with naturally infected animals, in a novel crossover design performed over two years.

"Our study found that BCG vaccination reduces TB transmission in cattle by almost 90%. Vaccinated cows also developed significantly fewer visible signs of TB than unvaccinated ones. This suggests that the vaccination not only reduces the progression of the disease, but that if vaccinated animals become infected, they are substantially less infectious to others," said Andrew Conlan, Associate Professor of Epidemiology at the University of Cambridge's Department of Veterinary Medicine and a corresponding author of the study.

Using livestock census and movement data from Ethiopia, the team developed a transmission model to explore the potential for routine vaccination to control bovine tuberculosis.

HOW SIZE MATTERS:

THE SHOCKING TRUTH ABOUT CANCER RISKS FOR MEDIUM-SIZED DOGS

Medium-sized dogs have a higher risk of developing cancer than the very largest or smallest breeds, according to a UC Riverside study.

The study, **published** in the Royal Society Open Science, set out to test a model of how cancer begins. This model, called the multistage model, predicts that size is a risk factor for cancer. As it turns out, it is, but only when considering size variation within a single species.

It is common for cells to acquire errors or mutations as they divide and form copies of themselves. Bigger animals, and those that live longer, have more cells and a longer lifespan during which those cells divide. According to the multistage model, that means they have more opportunities to acquire mutations that eventually become cancer.

"The question that arises is why, then, don't we get more cancer than a mouse? We don't. There is no increase in cancer risk as animals increase in size from species to species," said UC Riverside evolutionary biologist and study author Leonard Nunney.

However, this isn't true for animals of the same species. "Studies on humans show that tall people get more cancer than short people. It's about a 10% increase over the baseline risk for every 10 centimeters in height," Nunney said.

For more insight into these risk factors, Nunney required a species with a bigger difference between the smallest and biggest individuals.

"Testing this in dogs is even better because you can compare a tiny chihuahua to a great Dane. That's a 35-fold difference in size, and people can't come close to that," Nunney said.

Surveying their mortality rates with three different data sets, Nunney found the smallest dogs, including Pomeranians, miniature pinschers, shih tzus and chihuahuas have about a 10% chance of dying from cancer.

By comparison, many relatively large dogs, such as Burmese mountain dogs, have more than a 40% chance of death from cancer.

There were some outliers in the study. Flat-coated retrievers had the highest mortality from cancer, getting a type of sarcoma with higher frequency than they should have for their size. Scottish terriers seemed to get more cancer than other small dog breeds. "Terriers in general get more cancer than expected for their size," Nunney said. In general, however, the study supports the idea that size is a major risk factor for cancer.

However, the very largest breeds, such as great Danes, have less cancer than medium-sized breeds. That is because of a well-known but as yet unexplained phenomenon: the life expectancy of dogs gets shorter with size.

"For every pound increase in typical breed size you lose about two weeks of life. A very big dog, you're lucky if they live past nine years, whereas small dogs can go about 14," Nunney said. Cancer is predominantly a disease of old age so by having a reduced lifespan the largest dogs have a reduced cancer risk.

According to the study, dog breeds are a clear fit with the multistage model of cancer acquisition that says larger size and longer lives offer more opportunities for cells to mutate. "I was surprised how well dogs fit the model," Nunney said. "But that doesn't happen when you compare a mouse to an elephant or a human to a whale. So, does that undermine the model in some way?"

Nunney believes that an animal's ability to avoid cancer increases with the size of the species. "My argument is that preventing cancer is an evolving trait, so a whale will have more ways of preventing cancer than a mouse does," he said.

While data are limited about the occurrences of cancer in whales, there is more information about rates in elephants, because they are kept in zoos.

"Elephants don't get much cancer. Their ancestors, long before mastodons, were much smaller, so how, en route to today's size, did they avoid cancer?" he wondered. "The secret to preventing cancer could lie within the biology of larger animals."

Climate Change Catastrophe:

How Deadly Zoonotic Diseases Are on the Rise

Lead author George R. Thompson, a distinguished professor at UC Davis School of Medicine, sounded the alarm on the escalating danger posed by climate-driven infectious diseases. Thompson stressed the critical need for clinicians to adapt to the evolving infectious disease landscape, emphasizing the vital role of education and training in mitigating the impact of climate change on public health.

A Changing Contagion Landscape:

The study highlights the complex interplay between climate change and disease transmission, uncovering disturbing trends in the emergence and spread of pathogens. Vector-borne diseases, carried by vectors like mosquitoes and ticks, are surging in prevalence and expanding their geographic reach due to shifting rain patterns and rising temperatures. Diseases once confined to specific regions are now spreading to new territories, posing a grave threat to vulnerable populations worldwide.

Rising Tides of Risk:

Of particular concern is the resurgence of vector-borne illnesses such as malaria and Lyme disease, driven by climate-induced changes in vector behavior and distribution. The study underscores the urgent need for enhanced surveillance and preparedness measures to stem the tide of infectious diseases fueled by climate change.

A Call to Action:

In the face of this mounting crisis, the medical community must heed the clarion call for action. The study calls for a multifaceted approach, including bolstered infectious disease surveillance, enhanced clinician training, and advocacy for policies to combat climate change. By taking decisive steps to confront this existential threat, clinicians can play a pivotal role in safeguarding public health for generations to come.

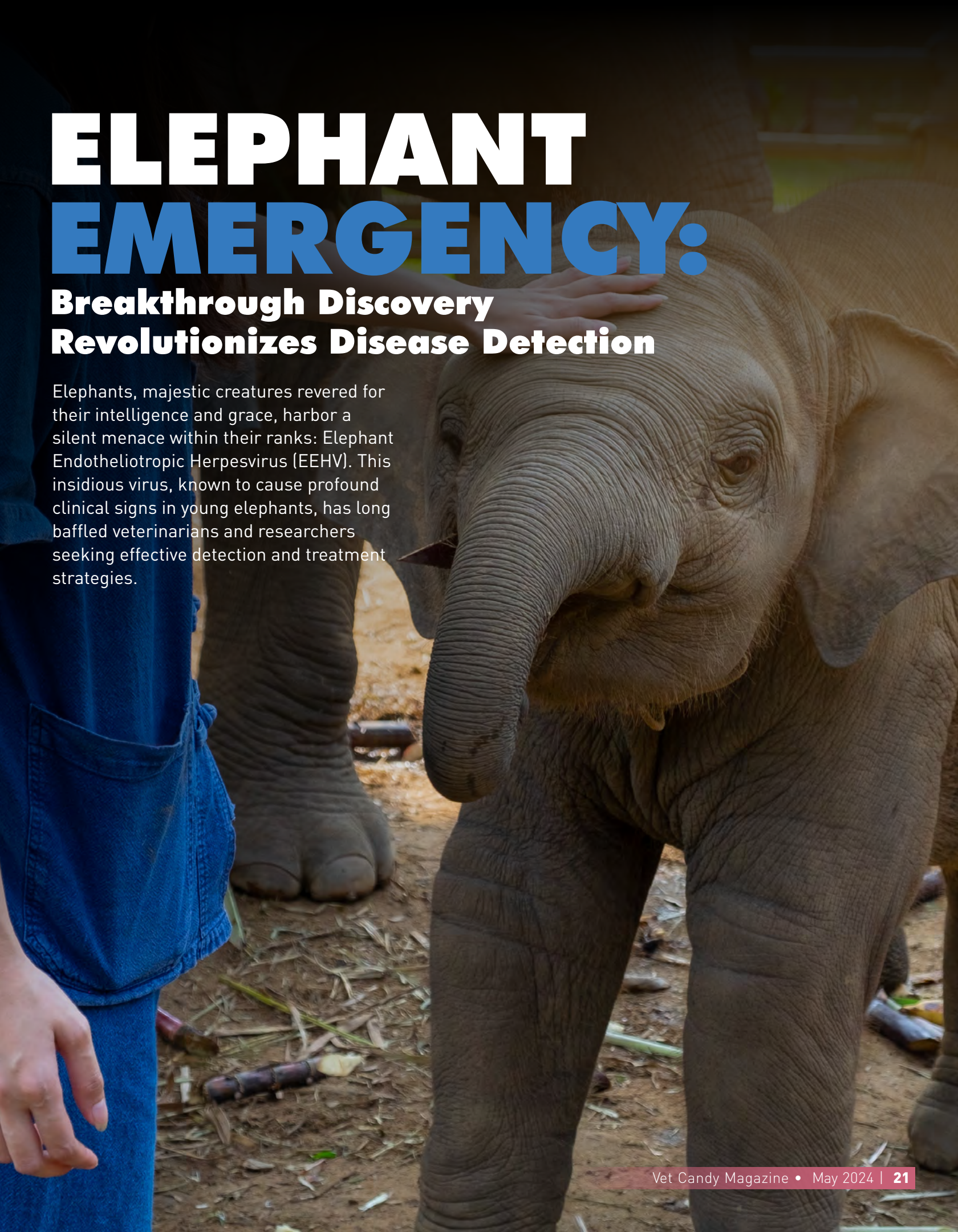
Conclusion:

As the specter of climate-driven diseases looms large, the time for action is now. By embracing a proactive stance and galvanizing collective efforts, we can stem the tide of infectious diseases fueled by climate change and safeguard the well-being of communities worldwide. Together, let us rise to meet this unprecedented challenge and forge a path toward a healthier, more resilient future.

ELEPHANT EMERGENCY:

Breakthrough Discovery Revolutionizes Disease Detection

Elephants, majestic creatures revered for their intelligence and grace, harbor a silent menace within their ranks: Elephant Endotheliotropic Herpesvirus (EEHV). This insidious virus, known to cause profound clinical signs in young elephants, has long baffled veterinarians and researchers seeking effective detection and treatment strategies.



A Race Against Time:

For nearly two decades, zoos and academic institutions have waged a tireless battle against EEHV, striving to unlock the secrets of this deadly virus. Now, a team of veterinarians and clinical pathology researchers from San Diego Zoo Wildlife Alliance (SDZWA) and the University of Copenhagen, Denmark, has achieved a breakthrough that could change the course of elephant care forever.

Individualized Baselines: A Game-Changing Approach:

Led by Dr. Rob Browning, clinical veterinarian at SDZWA, and senior veterinarian Dr. Kathryn Perrin, the research team uncovered a pivotal insight: population-based reference values for blood cell counts are insufficient for detecting critical deviations indicative of active EEHV infection. By establishing individual baseline values for each elephant and comparing test results against these personalized benchmarks, veterinarians can achieve more accurate interpretation of results, enabling earlier detection and intervention.

A Lifesaving Tool:

In the high-stakes realm of EEHV detection and treatment, every minute counts. With this groundbreaking approach, veterinarians gain a powerful tool to identify subtle signs of infection before it's too late. Dr. Perrin emphasizes the urgency of the discovery, noting that without individual baselines, vital early indicators of infection may go unnoticed, jeopardizing the lives of vulnerable elephants.

A Paradigm Shift in Elephant Care:

The implications of this breakthrough extend far beyond the confines of the laboratory. By empowering elephant care facilities with the means to implement proactive monitoring and intervention strategies, this discovery has the potential to save countless lives and safeguard the well-being of elephant populations worldwide.

Conclusion:

As the scientific community celebrates this milestone achievement, the fight against EEHV enters a new chapter filled with hope and possibility. With individualized baseline values as their guide, veterinarians stand ready to confront this formidable foe head-on, armed with knowledge and determination to protect the majestic giants of the animal kingdom.

THE FIRST AND ONLY FELINE BROAD-SPECTRUM PARASITE PROTECTION THAT TREATS TAPEWORMS

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The One You Want for One-And-Done Monthly Parasite Protection

- First-of-its-kind formulation includes esafoxolaner specifically developed for use in cats
- Easy-to-apply monthly topical solution
- Safe for use in kittens as young as 8 weeks, weighing 1.8 lbs or more

Contact your Boehringer Ingelheim Representative to learn more

IMPORTANT SAFETY INFORMATION: *NexGard*® COMBO (esafoxolaner, eprinomectin, and praziquantel topical solution) is for topical use only in cats. Use with caution in cats with a history of seizures or neurologic disorders. The most frequently reported adverse reactions include vomiting, application site reactions, lethargy, and anorexia. If ingested, hypersalivation may occur. Avoid direct contact with application site until visibly dry. For more information, see full prescribing information or visit NexGardCOMBOClinic.com.

Boehringer Ingelheim

NexGard® COMBO
(esafoxolaner, eprinomectin, and praziquantel topical solution)

For topical use in cats only

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

Description:
NexGard® COMBO is a topical solution containing esafoxolaner, eprinomectin and praziquantel available in 0.3 mL and 0.9 mL unit applicators to treat cats from 1.8 lbs to 33 lbs. Each mL of NexGard® COMBO contains 12 mg of esafoxolaner, 4 mg of eprinomectin, and 83 mg of praziquantel. Inactive ingredients: dimethyl isosorbide, unstabilized glycerol formal, and butylated hydroxytoluene.

Esafoxolaner is a member of the aryl isoxazoline class of compounds. Its chemical name is 4-[(5S)-5-[3-chloro-5-(trifluoromethyl)phenyl]-5-(trifluoromethyl)-4, 5-dihydro-1,2-oxazol-3-yl]-N-{2-oxo-2-[(2,2,2-trifluoroethyl) amino]ethyl}-1-naphthamide.

Eprinomectin belongs to the avermectin class of anthelmintics and is a mixture of homologous components referred to as eprinomectin B1a and B1b. The chemical name for eprinomectin B1a is (4″R)-acetylamino-5-O-demethyl-4″-deoxyavermectin A_{1a}. The chemical name for eprinomectin B1b is (4″R)-acetylamino-5-O-demethyl-25-de(1-methylpropyl)- 4″-deoxy-25-(1-methylethyl) avermectin A_{1a}.

Praziquantel is a pyrazinoisoquinoline anthelmintic. Its chemical name is 2-(Cyclohexylcarbonyl)- 1,2,3,6,7,11b-hexahydro-4H-pyrazino[2, 1-a]-isoquinolin-4-one.

Indications:
NexGard® COMBO is indicated for the prevention of heartworm disease caused by *Dirofilaria immitis* and for the treatment and control of roundworm (fourth stage larval and adult *Toxocara cati*), hookworm (fourth stage larval and adult *Ancylostoma tubaeforme*; adult *Ancylostoma braziliense*), and tapeworm (*Dipylidium caninum*) infections. NexGard® COMBO kills adult fleas (*Ctenocephalides felis*) and is indicated for the treatment and prevention of flea infestations and the treatment and control of Ixodes scapularis (black-legged tick) and *Amblyomma americanum* (lone star tick) infestations for one month in cats and kittens 8 weeks of age and older, and weighing 1.8 lbs or greater.

Dosage and Administration:
NexGard® COMBO is dosed at a minimum of 0.055 mL/lb (0.12 mL/kg), which delivers a minimum dose of 0.65 mg/lb (1.44 mg/kg) esafoxolaner, 0.22 mg/lb (0.48 mg/kg) eprinomectin, and 4.53 mg/lb (9.98 mg/kg) praziquantel.

For heartworm disease prevention, apply once monthly for at least three months after last exposure to mosquitoes (see **Effectiveness).**

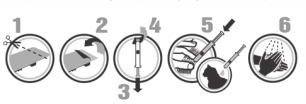
Administer the entire contents of a NexGard® COMBO unit applicator topically once a month as specified in the following table:

Dosing Schedule

Cat Weight (lb)	Volume (mL)	Esafoxolaner (mg)	Eprinomectin (mg)	Praziquantel (mg)
1.8-5.5	0.3	3.6	1.2	24.9
5.6-16.5	0.9	10.8	3.6	74.7
16.6-22	0.3 + 0.9	14.4	4.8	99.6
22.1-33	0.9 + 0.9	21.6	7.2	149.4

A veterinarian or veterinary technician should demonstrate or instruct the pet owner regarding the appropriate technique for applying NexGard® COMBO topically to cats and kittens prior to first use.

Keep product in original packaging until ready to use



1. Use scissors to cut the blister along the dotted line.
2. Then pull the lid away.
3. Remove the applicator from the package and hold it upright. Pull back the plunger slightly.
4. Twist and pull off the cap.
5. Part the hair on the midline of the neck, between the base of the skull and the shoulder blades until the skin is visible. Place the tip of the applicator on the skin and apply the entire contents directly onto the skin in one spot. The product should be applied to dry skin on an area where the cat cannot lick it off. If the weight of the cat requires a second application, apply the contents in the same manner as described above in the same location.
6. Wash hands after use with soap and water.

Heartworm Prevention:
For the prevention of heartworm disease, NexGard® COMBO should be administered once a month year-round. At a minimum, administration of NexGard® COMBO should start at least 1 month before the cat's first expected exposure to mosquitoes and monthly thereafter until at least 3 months after the cat's last seasonal exposure to mosquitoes (see **Effectiveness**). If a dose is missed and a 30-day interval between doses is exceeded, administer NexGard® COMBO immediately and resume the monthly dosing schedule. Treatment with fewer than 3 monthly doses may not provide complete heartworm prevention. When replacing another monthly heartworm preventive product in a heartworm prevention program, the first treatment with NexGard® COMBO should be given within one month of the last dose of the former medication. At the discretion of the veterinarian, cats older than 6 months of age may be tested to determine the presence of existing heartworm infection before treatment with NexGard® COMBO. Cats already infected with adult heartworms can be given NexGard® COMBO monthly to prevent further infections.

Flea Treatment and Prevention:
For the treatment and prevention of flea infestations, the use of NexGard® COMBO may begin at any time of year. NexGard® COMBO should be administered year-round at monthly intervals or begin at least one month before fleas become active. However, an environmental infestation may persist for a short time after beginning treatment with NexGard® COMBO because of the development of adult fleas from eggs that were laid prior to the initiation of treatment.

Tick Treatment and Control:
For the treatment and control of infestations with *Ixodes scapularis* and *Amblyomma americanum*, the use of NexGard® COMBO may begin at any time of year. NexGard® COMBO should be administered year-round at monthly intervals or begin at least one month before the ticks become active.

Treatment and Control of Roundworms, Hookworms, and Tapeworms:
NexGard® COMBO provides treatment and control of roundworms (adult and fourth stage larval *Toxocara cati*), hookworms (adult and fourth stage larval *Ancylostoma tubaeforme*; adult *Ancylostoma braziliense*), and tapeworms (*Dipylidium caninum*). For the treatment of hookworm, roundworms and tapeworm infections, NexGard® COMBO should be administered once as a single dose. Monthly use of NexGard® COMBO will control any subsequent infections. Cats may be exposed to and can become infected with roundworms, hookworms, and tapeworms throughout the year, regardless of season or climate.

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

Human Warnings:
Not for human use. Keep this and all drugs out of sight and reach of children.

Avoid direct contact with application site for 4 hours or until visibly dry.

This product may act as a mild to moderate eye irritant.

Keep product in the original packaging until use. Wash hands after product administration. If the product accidentally gets into the eyes, rinse thoroughly with water. If wearing contact lenses, flush the eyes first with water and then remove the lenses and continue to flush thoroughly with water. In case of accidental ingestion, or if skin or eye irritation occurs, contact a poison control center or physician for treatment advice.

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

Do not administer orally. Cats may salivate excessively if NexGard® COMBO is accidentally administered orally or is ingested through licking/grooming the application site (see **Target Animal Safety**).

The safety of NexGard® COMBO has not been fully evaluated in breeding, pregnant, or lactating cats.

The safety of NexGard® COMBO has not been tested in kittens less than 8 weeks of age or weighing less than 1.8 lbs (0.8 kg).

Adverse Reactions:
In a field safety and effectiveness study, which included a total of 201 households and 380 treated cats (244 cats treated with NexGard® COMBO, 136 cats treated with an active control), the safety of Nexgard® COMBO was evaluated over a 90-day period through in-clinic physical examinations or through reporting of abnormalities by the owner. The most frequently reported reactions in the NexGard® COMBO and active control groups are presented in the following table.

Adverse Reactions by Treatment Group

EVENT	Treatment Group			
	NexGard COMBO		Active Control	
	n[1]	% (n=244)	n[2]	% (n=136)
Vomiting	16	6.56	8	5.88
Application Site Hair Change	9	3.69	0	0.00
Anorexia	7	2.87	4	2.94
Lethargy	6	2.46	5	3.68
Bacterial skin infection	4	1.64	1	0.74
Itching	4	1.64	0	0.00
Sneezing	4	1.64	5	3.68
Skin Peeling	3	1.23	2	1.47
Diarrhea	3	1.23	3	2.21
Epiphora	3	1.23	1	0.74
Hypersalivation	3	1.23	0	0.00
Hyperthermia	3	1.23	0	0.00
Alopecia	2	0.82	0	0.00
Dermal thickening	2	0.82	0	0.00
Ear Pruritus	2	0.82	1	0.74
Application Site Redness	2	0.82	0	0.00
Conjunctivitis	1	0.41	1	0.74

[1]Number of cats treated with NexGard® COMBO with the identified abnormality.
[2]Number of cats treated with Active Control with the identified abnormality.

Contact Information:
To report suspected adverse events, for technical assistance or to obtain a copy of the SDS, contact Boehringer Ingelheim Animal Health USA Inc. at 1-888-637-4251 or www.nexgardforpets.com.

For additional information about reporting adverse drug experiences for animal drugs, contact FDA at 1-888-FDA-VETS or online at www.fda.gov/reportanimalae.

The Safety Data Sheet (SDS) provides additional occupational safety information. For customer service or to obtain product information, including the SDS, call 1-888-637-4251.

Clinical Pharmacology:
Mode of Action:
Esafoxolaner is a member of the isoxazoline family, shown to bind at a site to inhibit insect and acarine ligand-gated chloride channels, in particular those gated by the neurotransmitter gamma-aminobutyric acid (GABA), thereby blocking pre- and post-synaptic transfer of chloride ions across cell membranes. Prolonged esafoxolaner-induced hyperexcitation results in uncontrolled activity of the central nervous system and death of insects and acarines. The selective toxicity of esafoxolaner between insects/acarines and mammals may be inferred by the differential sensitivity of the insects/acarines' GABA receptors versus mammalian GABA receptors.

Eprinomectin is an endectocide in the macrocyclic lactone class that binds to glutamate gated chloride channels that are present in invertebrate nerve and muscle cells and increases the permeability of the cell membrane to chloride ions that triggers hyperpolarization of the nerve or muscle cell in susceptible parasites, resulting in paralysis and death of the parasite.

Praziquantel's mode of action is not precisely known, but treated tapeworms undergo muscular paralysis accompanied by a rapid influx of calcium ions and the disruption of the tegument.

Pharmacokinetics:
After a single topical administration to healthy male and female cats of a combined topical formulation containing esafoxolaner (12 mg/mL), eprinomectin (4 mg/mL), and praziquantel (83 mg/mL), at dose volumes of 0.06, 0.12, or 0.24 mL/kg, there was a dose proportional increase in the exposure of each ingredient based on maximum plasma concentration (Cmax) and area under the plasma concentration time curve (AUC). After repeated monthly doses of the combined topical formulation at the target dose of 1.44 mg/kg esafoxolaner, 0.48 mg/kg eprinomectin, and 9.98 mg/kg praziquantel, steady state was reached by the fourth dose for esafoxolaner and after the second dose for eprinomectin and praziquantel. Additionally, modest accumulation was observed for esafoxolaner (approximately 3-fold) and praziquantel (approximately 1.5- to 2-fold) between the first and fifth dose, whereas no accumulation was observed for eprinomectin.

Effectiveness:
Heartworm Prevention:
In well-controlled laboratory studies, NexGard® COMBO (esafoxolaner, eprinomectin, and praziquantel topical solution) was 100% effective in preventing the development of heartworms in cats inoculated with infective larvae of *Dirofilaria immitis* 30 days prior to the first of three consecutive monthly treatments.

Flea Treatment and Prevention:
In a well-controlled laboratory study, NexGard® COMBO killed >92% of fleas within 24 hours. During subsequent weekly infestations, NexGard® COMBO killed ≥95.5% of fleas within 24 hours through Day 31 and killed fleas before they could lay eggs. The effectiveness against adult fleas at 24 hours post-infestation in the treated cats virtually eliminated flea egg production (99.8 – 100% control of flea egg production by 24 hours) throughout the remainder of the month. In a field safety and effectiveness study in the United States, conducted in households with existing flea infestations, the effectiveness of NexGard® COMBO against fleas was 97.8%, 99.6%, and 99.9% when assessed on Days 30, 60, and 90, respectively. Cats with signs of flea allergy dermatitis showed improvement in alopecia, dermatitis/ pyodermatitis, pruritus, erythema, papules, and scaling, as a direct result of eliminating fleas.

Tick Treatment and Control:
In well-controlled laboratory studies, NexGard® COMBO demonstrated ≥95.1% effectiveness against *Ixodes scapularis* 48 hours post-infestation for a month and ≥95.6% effectiveness against *Amblyomma americanum* 72 hours post-infestation for a month.

Treatment and Control of Roundworms, Hookworms, and Tapeworms:
In 2 well-controlled laboratory studies, NexGard® COMBO provided 98.9% and 100% effectiveness against natural and/or induced roundworm infections with the dose-limiting gastrointestinal nematode species (adult *Toxocara cati*), respectively. Effectiveness studies against fourth stage larval *Toxocara cati* and hookworms (adult and fourth stage larval *Ancylostoma tubaeforme*; adult *Ancylostoma braziliense*) were conducted with an early formulation. The doses of eprinomectin in this early formulation are equivalent to that of the final formulation of NexGard® COMBO. In well-controlled laboratory studies, NexGard® COMBO provided on average 92.8% effectiveness against natural and/or induced infections with *Dipylidium caninum*.

Target Animal Safety:
Margin of Safety Study:
NexGard® COMBO was applied topically to healthy kittens (8 to 9 weeks of age) at 1X, 3X, or 5X the maximum exposure dose six times at 28-day intervals; kittens in the control group were dosed with mineral oil. One kitten in the 5X group exhibited recumbency, tremors, hypothermia, ataxia, disorientation, and pupil dilation (responsive to light) 9 hours after the third dose. This kitten received supportive care, including washing the application site, and recovered within 48 hours post-dose. During necropsy, a dark red subcutaneous area (≤5 mm diameter) was observed in the treatment site area of three cats in the 5X group, but microscopic examination revealed no histologic abnormalities. No significant changes related to NexGard® COMBO were observed for physical examination, body weight, clinical pathology (hematology, coagulation, and serum chemistry), histopathology, or organ weights.

Study in Heartworm Positive Cats:
Adult cats, 4.7 to 6.6 months of age, were experimentally infected with adult heartworms (*D. immitis*) by venous transplantation. All cats were negative for heartworm antibody, antigen and microfilariae prior to transplantation. Two weeks after transplantation, immunoserology verified positive antigen and the presence of microfilariae in all enrolled cats. A combination of fipronil, eprinomectin, praziquantel, and (S)-methoprene was applied topically to cats at 1X or 3X the maximum exposure dose once every 28 days for three consecutive treatments; cats in the control group were dosed with mineral oil. One cat in the 1X group exhibited cyanotic mucous membranes and tachypnea for 24 hours following the first treatment. The cat recovered and exhibited no abnormal signs following two subsequent treatments. There was no difference between the treatment groups in the number of adult *D. immitis* recovered at the end of the study.

Oral Administration Study:
Oral tolerance was evaluated to assess the effects of accidental oral ingestion. Kittens (male and female) ranging in age from 7.4 to 8.9 weeks were orally administered NexGard® COMBO at 1X the maximum exposure dose; kittens in the control group were dosed with saline. Cats were observed for adverse reactions at 1, 2, 3, 4, and 8 hours following administration, then twice a day until Day 14. All 8 cats administered NexGard® COMBO immediately exhibited excessive hypersalivation after oral administration. However, all cats stopped salivating within 1 hour after exposure. No additional health-related observations were seen for the remainder of the study.

How Supplied:
NexGard® COMBO is packaged as a single dose in 0.3 mL (for cats 1.8 – 5.5 lb) and 0.9 mL (for cats 5.6-16.5 lb) applicators.
Each size applicator is available in cartons containing 1, 3 or 6 applications.

Storage Information:
Store at 59° – 86°F (15° – 30° C). Brief periods up to 104° F (40° C) are permitted. Protect from light.

Approved by FDA under NADA # 141-570

Marketed by: Boehringer Ingelheim Animal Health USA Inc., Duluth, GA 30096

NEXGARD® is a registered trademark and NEXGARD COMBO is a trademark of Boehringer Ingelheim Animal Health France, used under license.

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Boehringer Ingelheim

New roadmap to prevent pandemics centers on protecting biodiversity

An international team of 25 scientists, including researchers from the Cornell University College of Veterinary Medicine (CVM), has proposed a roadmap for how to prevent the next pandemic by conserving natural areas and promoting biodiversity, thereby providing animals with enough food, safe havens and distance to limit contact and the transfer of pathogens to humans.

Pandemics begin when disease-harboring animals, such as bats, come in close proximity with people, livestock or other animals and pass on new pathogens. Viruses such as SARS-CoV-2, SARS-CoV-1, Nipah, Hendra and possibly Ebola have all fatally spilled over from bats to humans, sometimes through an intermediate host.

"The world is focused on how can we detect and then contain a novel pathogen once it is circulating in humans, rather than how can we prevent that pathogen from entering the human population in the first place," said Raina Plowright, the Rudolf J. and Katharine L. Steffen Professor of Veterinary Medicine in the Department of Public and Ecosystem Health at CVM, who is first author of the paper, "**Ecological Countermeasures to Prevent Pathogen Spillover and Subsequent Pandemics**," published in Nature Communications.

"Pandemic prevention promotes health equity by reducing the risk that a pandemic will happen, reducing disease risk for everyone," said Charley Willison, assistant professor of public and ecosystem health at CVM and a co-author on the paper.

The pandemic-prevention strategy is based on insights from **a pair of 2022 papers** that serve as a case study applicable to all animals that potentially carry zoonotic diseases. Those papers – about how bats can spread fatal Hendra virus to horses and people – explained that when bats lose their natural habitats and winter food sources, their large populations splinter and they migrate in small groups to agricultural and urban areas. They also become stressed, partly due to inadequate food sources, and they shed more virus in their urine. But when natural habitats can provide adequate food, especially in fallow winter months, the bats return to these habitats, aggregate in large numbers, and stop shedding virus.

The roadmap uses this and other case studies to explain the mechanisms linking environmental change and spillover of pathogens from animals to humans, and identifies ecological interventions to disrupt these links and policy frameworks to implement them.

Land-use changes are a prominent driver for pathogen spillover into people from wildlife, through human behaviors that put people in closer contact with animals. For example, when humans build roads into previously intact natural areas it increases opportunities for human exposure with wildlife species.

Ecological interventions begin by protecting the places where animals eat. "We need to make sure there's always an abundant supply of food available at all times of year, especially when animals are in stressful life history stages like reproduction and migration," Plowright said.

Next, it's important to protect where animals may roost or aggregate, as tens of thousands of bats can roost in canopies and caves, so when these areas are disturbed, these populations can splinter, move and shed more virus. Also, cave dwelling bats may not have other caves to move to, in which case they stay put, become more stressed and likely shed more virus. Protecting lands that act as buffers between people and wildlife is also key.

"There are trillions of microbes in nature, but we rarely actually get sick, because there are many, many barriers between us and new pathogens," Plowright said.

Lastly, for communities who come in contact with animals, it's important to ensure people have the protection that they need to avoid pathogen exposure, Plowright said.

The study's authors emphasize the need for an international agency or panel that can assess and synthesize data on pandemic prevention, preparedness and response and collect metrics on intactness of landscapes, ecological integrity and biodiversity.

"Limited policy capacity paired with the increased risk of pandemics due to climate change necessitates action," Willison said. "Greater investment in pandemic policies overall, with an emphasis on pandemic prevention, will promote more effective and equitable pandemic mitigation strategies."

The paper was funded by the Cornell Center for Pandemic Prevention, Preparedness and Response, the National Science Foundation, the Defense Advanced Research Projects Agency, the National Institutes of Health, the Montpellier Advanced Knowledge Institute on Transitions and the National Environment Research Council.

Written by Krishna Ramanujan; for additional information, see this **Cornell Chronicle story**.

Shocking Revelation:

Is CBD Safe for Your Dog?

Landmark Study Finally Unveils the Truth

In an unprecedented move, the National Animal Supplement Council (NASC) has unleashed a game-changing revelation about the safety of cannabidiol (CBD) products for dogs. With the publication of results from a groundbreaking study in Frontiers in Veterinary Science, pet owners worldwide are on the edge of their seats, eager to discover the truth behind CBD's potential impact on their beloved companions.

A Paradigm-Shifting Discovery:

After years of speculation and uncertainty, the NASC has finally shed light on the safety of CBD products for dogs through a meticulously conducted peer-reviewed safety study. The findings, published in one of the most respected scientific journals, present a paradigm-shifting perspective on the use of CBD in pet care.

Unveiling the Study:

The pivotal study, a first-of-its-kind endeavor, involved 32 healthy beagle dogs subjected to rigorous testing over a span of 90 consecutive days. Divided into four treatment groups, the dogs were administered varying formulations of CBD, meticulously monitored to assess safety and tolerance levels.

Jaw-Dropping Results:

Contrary to lingering doubts and speculation, the study yielded astonishing results, demonstrating that CBD products, when administered at a dose of 5 milligrams per kilogram of body weight per day, were well tolerated by healthy male and female beagles. With no adverse effects reported, the study marks a monumental breakthrough in our understanding of CBD's impact on canine health.

A Testament to Safety:

Bill Bookout, President of NASC, emphasized the comprehensive nature of the study, which not only incorporated a meticulously controlled protocol but also drew upon a decade of post-market surveillance data. This holistic approach ensures a thorough assessment of CBD's safety profile, reassuring pet owners of its efficacy and reliability.

Gratitude and Acknowledgment:

Acknowledging the monumental effort behind the study, Bookout extended gratitude to the NASC Board of Directors, members, retailers, and veterinarians whose unwavering support propelled this landmark research forward. Special recognition was also extended to the study co-authors and collaborators whose dedication made this breakthrough possible.

A Beacon of Hope for Pet Owners:

As pet owners navigate the complexities of companion animal health, the NASC's groundbreaking study offers a beacon of hope and reassurance. With the yellow NASC Quality Seal serving as a symbol of trust and reliability, pet owners can confidently embrace CBD products backed by rigorous scientific scrutiny.

In a world filled with uncertainties, the NASC's landmark study provides much-needed clarity and reassurance to pet owners worldwide. With CBD products emerging as a promising avenue for enhancing canine well-being, the future of pet care looks brighter than ever before. Stay tuned as the NASC continues to lead the charge in championing the health and well-being of our cherished four-legged companions.

Read the full study here

Mind-Blowing evelation:

DOGS UNDERSTANDS MORE THAN YOU THINK! NEW STUDY UNCOVERS CANINE LANGUAGE SECRETS

In a stunning revelation that challenges conventional wisdom, a groundbreaking study conducted by researchers at Eötvös Loránd University has unveiled the hidden language abilities of man's best friend. Contrary to popular belief, dogs may possess a profound understanding of human words, extending beyond mere learned behaviors to encompass a deeper cognitive understanding of language.

Unveiling Canine Language Proficiency:

Published in Current Biology on March 22, 2024, the study provides compelling evidence that dogs exhibit an implicit understanding of object words, activating corresponding mental representations when exposed to familiar vocabulary. Led by Marianna Boros and Lilla Magyari of the Department of Ethology, the research sheds new light on the intricate dynamics of canine communication.

Deciphering Canine Cognition:

Traditionally, tests of word understanding in non-verbal individuals, such as infants and animals, have relied on active choice tasks, often yielding inconclusive results. However, the researchers adopted a novel approach, leveraging non-invasive EEG technology to measure brain activity in dogs exposed to familiar object words.

Revealing Insights from Brain Activity:

Through meticulous experimentation involving 18 dog-owner pairs, the researchers observed distinct patterns of brain activity in response to matching versus mismatched objects. This groundbreaking discovery suggests that dogs possess a fundamental understanding of object words, akin to human comprehension, challenging existing paradigms of canine cognition.

Beyond Learned Behaviors:

Contrary to prevailing assumptions, the study suggests that dogs' capacity for understanding language extends beyond learned behaviors, encompassing a nuanced grasp of word-object associations. This profound revelation has profound implications for our understanding of interspecies communication and the evolution of language.

Reshaping Our Understanding of Canine Communication:

The implications of this groundbreaking study extend far beyond the realm of pet ownership, offering profound insights into the complexity of canine cognition. As we unravel the mysteries of language evolution, researchers are left pondering the unique bond between humans and dogs and its role in shaping cognitive abilities.

A New Dawn for Dog Owners:

For dog owners, this revelation offers a newfound appreciation for the depth of their furry companions' understanding. Beyond simple commands, dogs may possess a nuanced comprehension of human language, enriching the bond between pets and their owners.

Future Frontiers:

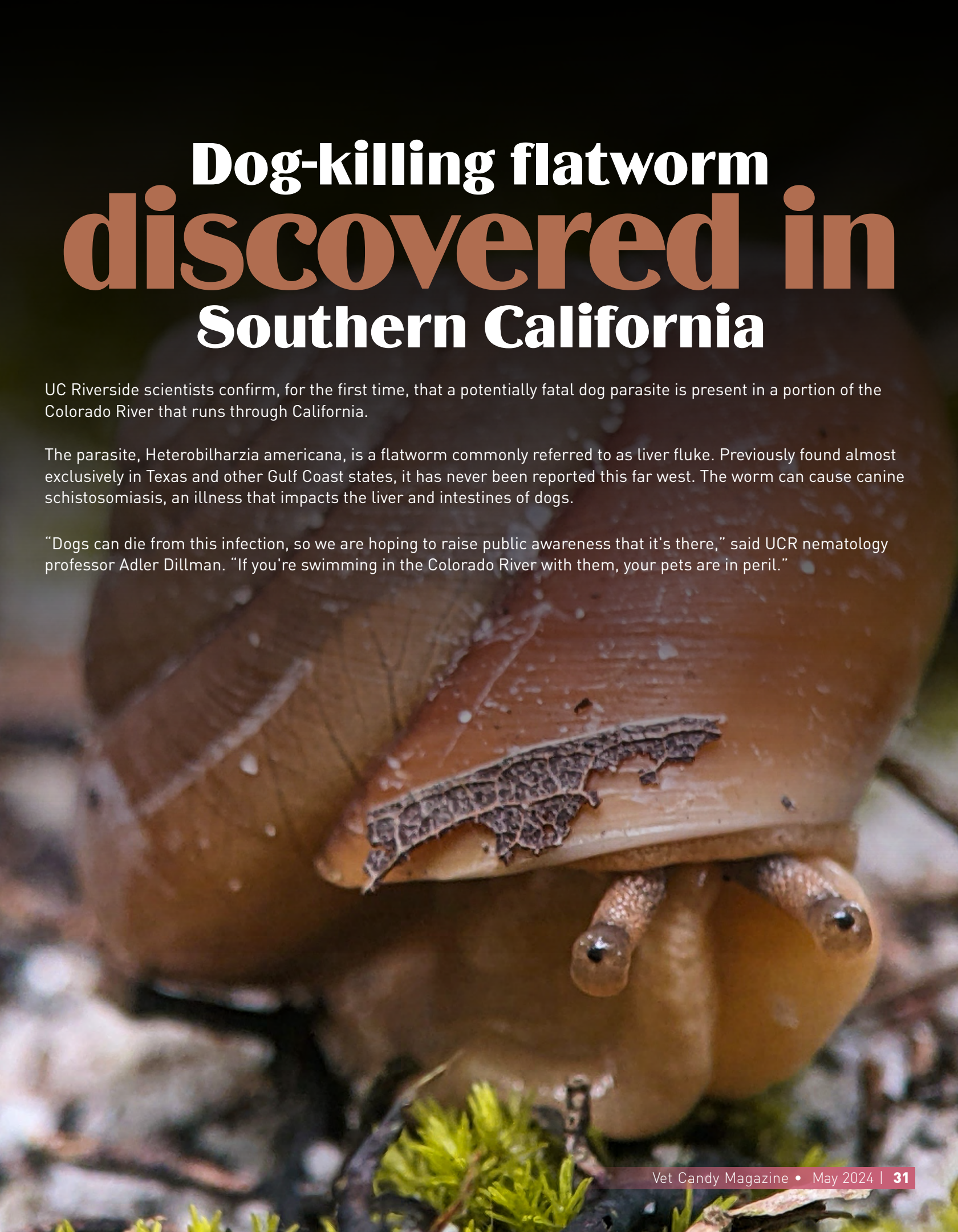
As researchers delve deeper into the mysteries of canine cognition, questions abound regarding the universality of language understanding across species and the role of human-dog interaction in shaping cognitive abilities. With further exploration, we may unlock even more secrets of the canine mind, reshaping our perception of man's oldest and most loyal companion.

Dog-killing flatworm discovered in Southern California

UC Riverside scientists confirm, for the first time, that a potentially fatal dog parasite is present in a portion of the Colorado River that runs through California.

The parasite, Heterobilharzia americana, is a flatworm commonly referred to as liver fluke. Previously found almost exclusively in Texas and other Gulf Coast states, it has never been reported this far west. The worm can cause canine schistosomiasis, an illness that impacts the liver and intestines of dogs.

“Dogs can die from this infection, so we are hoping to raise public awareness that it's there,” said UCR nematology professor Adler Dillman. “If you're swimming in the Colorado River with them, your pets are in peril.”



After learning about cases of the infection in local dogs, Dillman assembled a research team and headed to Blythe, a border town east of Joshua Tree National Park in Riverside County, where the sick dogs had all spent time swimming in the river.

The infection is driven by the presence of a snail that transmits the worm. The research team collected more than 2,000 snails from the banks of the river. A **paper** published this week in the journal Pathogens describes how the team used DNA to confirm the identity of both the snails and the flatworm.

"We actually found two species of snails that can support H. americana in the river in Blythe, and we found both snails actively shedding this worm," Dillman said. "Not only was it a surprise to find H. americana, we also did not know that the snails were present here."

After transforming itself inside one of the snails, the worm ventures out with the goal of finding a mammal to infect. In this stage it can only survive on its own for about 24 hours. If a dog or a raccoon is in the water, or drinking, then it gets infected.

"It gets into the veins of the intestinal lining, and that's where it develops into an adult and mates," Dillman said. "The presence of the adults in the veins isn't the problem. It's the eggs that get into the lungs, spleen, liver, and heart. The immune system tries to deal with it, and hard clusters of immune cells called granulomas form. Eventually the organ tissues stop functioning."

Once infected, it can be several months before the worst symptoms of the illness appear. Since 2019 in California, 11 dogs in three counties have been confirmed with this disease, and one has died. Health officials hope that with awareness they can prevent further infections and deaths.

"Symptoms start gradually with a loss of appetite, and eventually include vomiting, diarrhea, profound weight loss, and signs of liver disease. If your dog has these symptoms after swimming in the Colorado River, it's a good precaution to ask your veterinarian for a simple fecal test," said Emily Beeler, a veterinarian with the Los Angeles County Department of Public Health.

"Treatment typically involves use of multiple medications and close monitoring of the dog by a veterinarian," Beeler said.

It is important to note that H. americana is not known to be capable of causing disease in humans. "It can cause swimmer's itch, a red rash where it penetrates human skin. But it's not able to cause infection," Dillman said.

Additionally, Dillman hopes to allay concerns that the parasite could be contaminating urban drinking water. "Compared to other pathogens these worms are fairly large. They can easily be filtered out with common water purification strategies," he said. Though there is no cause for concern about contamination of water sources, drinking the water directly is still inadvisable.

"You have viruses, bacteria, and other parasites such as Giardia in rivers," Dillman said. "Nobody should be drinking straight out of the river, and that has nothing to do with this particular parasite."

Rabbit owners can recognize pain in their pets, study finds

Rabbits are popular family pets, with around 1.5 million* in the UK and it is important that owners can recognise when their animal is in pain, and know when to seek help to protect their rabbit's welfare. New research by the University of Bristol Veterinary School has found the majority of rabbit owners could list signs of pain and could mostly identify pain-free rabbits and those in severe pain, but many lacked knowledge of the subtler sign of pain.

The study, published in BMC Veterinary Research today [27 March], provides the first insight into how rabbit owners identify pain and their general ability to apply this knowledge to detect pain accurately.

Rabbits are prey species and have evolved to hide signs of illness and pain. Recent research has developed pain scales for use by veterinary professionals - including the Bristol Rabbit Pain Scale (BRPS) - but to date research hasn't investigated rabbit owners' ability to recognise pain in their animals.

The study explored how owners identify pain in their pet rabbits and their ability to correctly spot different levels of pain, and to find out areas in which owners would benefit from education.

Owners were recruited via a variety of routes including Facebook and completed a two-part online survey. Part one collected data on demographics, owners' knowledge of pain signs and beliefs about pain in rabbits. Part two asked respondents to pain score eight videos, recorded during routine veterinary treatment, of rabbits in different levels of pain for comparison to pain scores made by three experts.

The researchers used a simplified version of the BRPS which involved a single 0 to 3 scale. The research team explored the number of pain signs each respondent could list, the total score given to the videos, and their difference from the experts' scores.

A total of 500 people completed part one of the survey and 345 completed part two. Respondents were mostly able to identify five signs of pain (such as anorexia, and changes in posture and movement), but many were less aware that decreases in grooming behaviour and changes to eye and ear position can also be signs of pain. Women, people who worked with rabbits, and those with experience of their rabbit having an operation recognised pain more accurately.

Overall, 98.6 per cent of respondents thought correctly that rabbits felt pain as much or more than dogs and cats. In part two, respondents more frequently agreed with the experts when identifying rabbits in no pain (88.8 per cent) and severe pain (65.2 per cent), but there was lower agreement when recognising mild (28.4 per cent) and moderate pain (43.2 per cent). Respondents overall rated pain lower than experts with an average total pain score of 11.9 compared to 18 given by the expert.

Dr. Nicola Rooney Senior Lecturer in Wildlife and Conservation at Bristol Veterinary and corresponding author, said: "Most rabbit owners were able to list numerous pain signs and were generally able to recognise pain-free rabbits and those in severe pain. Owners' ability to differentiate between mild and moderate pain is more limited and they could benefit from training in the subtler signs of pain. Veterinary professionals should also be aware of areas where owners' knowledge can be improved."

Charlotte Forder, lead author, who conducted the study for her final BSc Veterinary Nursing and Bioveterinary Science research dissertation, added: "Our study highlighted a gap in the communication between owners and veterinary professionals. Speaking to, and advising, owners when animals are having procedures is important, so the animal has the best outcome. It is also a great opportunity for the veterinary community to educate owners about signs of pain in rabbits."

Advancing Ocular Care:

Purdue Engineers Develop Smart Soft Contact Lenses for Chronic Disease Management

Purdue University's College of Engineering has embarked on a groundbreaking endeavor to enhance ocular health with the development of specialized smart soft contact lenses. These lenses aim to revolutionize the management of chronic ocular diseases such as glaucoma, corneal neovascularization, and dry eye syndromes. Spearheaded by Dr. Chi Hwan Lee, an expert in StickTronics and wearable biomedical devices, the research teams have secured two grants totaling $6.7 million from the National Eye Institute (NEI).

The innovative lenses, which leverage patent-pending technology, hold promise in continuously monitoring intraocular pressure (IOP)—a crucial factor in glaucoma management. Unlike traditional tonometers, which often compromise comfort due to increased lens thickness and stiffness, Purdue's smart soft contact lenses prioritize wearer comfort and usability. By retaining key features of commercial soft contact lenses, such as transparency and overnight wearability, while integrating cutting-edge smart technology, these lenses offer a seamless and effective solution for patients.

Dr. Lee emphasizes that the research will not only focus on enhancing the lenses' functionality but also on conducting rigorous clinical trials to evaluate their biosafety, usability, and therapeutic effectiveness. Collaborating with esteemed institutions like Indiana University's School of Optometry and Michigan Medicine, Purdue aims to pave the way for a paradigm shift in ocular care.

Supported by the NEI's steadfast commitment, Purdue's research teams are dedicated to advancing the field of ocular medicine. Through their collective efforts, they aspire to introduce an innovative, closed-loop system that enables simultaneous monitoring and drug delivery—a transformative development for veterinarians and their patients.

As Purdue's journey unfolds, veterinarians stand poised to benefit from this cutting-edge technology, offering new avenues for enhanced patient care and improved treatment outcomes. With the convergence of engineering prowess and medical innovation, Purdue's smart soft contact lenses herald a new era in ocular health management.

Level up your teams skills with the world's best instructors

Start your learning journey with our learning, development and mentorship platform!

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