



MORRIS
ANIMAL
FOUNDATION



Funded Studies

2023

**THANK YOU TO EVERYONE
WHO MAKES THIS WORK POSSIBLE!**



Animal Health Studies

AT MORRIS ANIMAL FOUNDATION, WE WORK EVERY DAY TO IMPROVE AND PROTECT THE HEALTH OF ANIMALS THROUGH SCIENTIFIC INNOVATION, EDUCATION AND INSPIRATION.

We are committed to fighting animal diseases worldwide in species ranging from cats and dogs to horses and donkeys; amphibians and penguins to African buffalo and bats.

Each year, our Scientific Advisory Boards review, rank and recommend for funding animal health grants submitted by scientists from around the world. At any given time, we are funding upwards of 150 studies in animal health, impacting more species in more places than any other nonprofit scientific organization. Without funding from Morris Animal Foundation, many studies simply could not be done, and critical animal health challenges would not be met.

This reference book provides details on animal health studies approved for funding in Fiscal Year 2023, including the study's title, duration, cost, funded organization and a study summary and description.

\$160
Million
Invested
Since 1948

3,000+
Grants Funded

350+
Species Directly Studied

25,000+
Species Benefit from Our Research

450+
Animal Health Problems Studied

Morris Animal Foundation is supported by generous donors who are passionate about improving the health and well-being of animals around the world. Every gift helps fund cutting-edge research that brings us closer to solving critical health challenges for the animals in our hearts and homes and in the wild.

Our History



1948

Dr. Mark L. Morris Sr. and wife, Louise, establish Buddy Foundation



1950

Foundation funds first dog and cat studies, at \$1,000 each



1956

First of three Scientific Advisory Boards established



1959

First horse study funded



1962

Organization renamed Morris Animal Foundation



1967

First wildlife study funded; blood survey in zoo animals



1990

First llama/alpaca study funded



2000

1,000th study funded



2012

First dogs enrolled in the Golden Retriever Lifetime Study

2023

Nearly \$160 million invested, 3,000+ animal health studies funded

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Morris Animal Foundation is an international organization that welcomes grant applications from researchers around the world. To learn more about our funded studies, or to apply for a grant, visit morrisanimalfoundation.org or contact us:

GENERAL INQUIRIES | 303.708.3429, mailbox@morrisanimalfoundation.org

RESEARCHER INQUIRIES | grantapplications@morrisanimalfoundation.org

PRESS INQUIRIES | 303.708.3418, press@morrisanimalfoundation.org

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Exploring Better Housing Options for Shelter Cats

EPIX ANALYTICS, EVERYCAT HEALTH FOUNDATION, MORRIS ANIMAL FOUNDATION, DENVER DUMB FRIENDS LEAGUE

Projected Duration: 1 Year **Study Cost:** \$25,000 **Commissioned Grant**

SUMMARY: Researchers will assess if providing shelter cats with a cat den, a commercially available cat housing product, as part of a larger holding kennel reduces stress, improves health and decreases time-to-adoption for these animals.

DESCRIPTION: The cat den is a type of feline housing used for transporting cats and providing quiet places for them within the context of larger holding kennels. Possible benefits of a cat den for shelter cats include increased comfort as well as reduced stress and stress-related health issues. However, little data exists on the effectiveness of these types of housing products within a shelter environment. Researchers will conduct a randomized trial, in partnership with a local pet adoption organization, to measure the real-world benefits of using cat dens within a shelter environment. Outcomes will include the length of stay in the shelter prior to adoption, occurrence and severity of upper respiratory tract infections, and the number of bites to humans. Outcomes for cats housed with dens will be compared with a control group of cats housed without dens. Findings will inform housing options for shelter cats to help improve their overall health, well-being and adoption readiness.

D23FE-018

Investigating the Origin and Progression of Feline Intestinal Lymphoma

COLORADO STATE UNIVERSITY

Projected Duration: 2 Years **Study Cost:** \$70,016 **Established Investigator Grant**

SUMMARY: Researchers will study how inflammatory bowel disease progresses into feline intestinal lymphoma, a much-needed step toward the development of better preventives, diagnostics and therapies.

DESCRIPTION: Inflammatory bowel disease and intestinal lymphoma are common diseases in older cats. Both diseases can be hard to diagnose and, for reasons that aren't clear, inflammatory bowel disease can progress to intestinal lymphoma in some cats. Little is known as to why so many cats get these diseases. To fill in this knowledge gap, researchers will look at genes in biopsy samples from diagnostic tests of cats at various disease stages. The team hopes findings will help identify what kind of cells become cancerous as the disease progresses from inflammatory bowel disease to intestinal lymphoma. In another arm of the study, the team will compare cat and human intestinal lymphoma cancers to see if there are lessons to be learned from the way human lymphoma patients are treated that may also help cat lymphoma patients. Together, these findings may pinpoint the cause of the disease in cats to help inform the development of better diagnostics, treatments and preventives for this devastating feline cancer.

D23FE-021

Studying the Genetics of Feline Tooth Resorption

UNIVERSITY OF WISCONSIN-MADISON

Projected Duration: 3 Years **Study Cost:** \$74,873 **Established Investigator Grant**

SUMMARY: Researchers will study the genetics behind the development of feline tooth resorption, a painful condition in which the body breaks down and reabsorbs teeth.

DESCRIPTION: Feline tooth resorption is a common and incurable condition in cats that can cause recurrent episodes of oral pain. Despite decades of study into environmental influences for the condition, little is known about the cause of tooth resorption. In human studies, tooth resorption runs in families, suggesting an underlying genetic influence. To find out if this also holds true for cats, researchers will analyze and compare DNA samples from cats affected with tooth resorption to cats that do not have evidence of current or past tooth resorptions. Findings will help paint a genetic picture of tooth resorption – for example if there are a few genes responsible or if many genetic variants influence the condition. This new knowledge will help inform new avenues of research to improve treatment and management of this painful dental condition in cats.

D23FE-022

Understanding Genetics of Oral Cancer

UNIVERSITY OF EDINBURGH, UNITED KINGDOM

Projected Duration: 3 Years **Study Cost:** \$74,892 **Established Investigator Grant**

SUMMARY: Researchers will use state-of-the-art gene editing techniques to identify genes that influence growth and progression of oral squamous cell carcinoma tumors in cats.

DESCRIPTION: Feline oral squamous cell carcinoma is a common, aggressive mouth cancer in cats that is highly challenging to treat. At present, few cats survive more than six months, even with intensive treatment, highlighting the urgent need for new treatments to better care for these patients. Understanding which genes the tumors rely on for growth and survival would help identify new targets for drug therapy. To fill this knowledge gap, researchers will use state-of-the-art gene editing techniques to screen for genes in cat cancer cell cultures to assess which genes are critical for growth of cancerous versus normal cells. The team then will identify the functions of these genes to see if existing drugs or experimental compounds can target the genes of interest. Findings will help pinpoint promising gene candidates for further study. This study is the first step in a drug development pipeline, with the longer-term aim of finding strategies that will increase lifespan and enhance the welfare of cats affected by devastating oral cancer.

D23FE-025

Correlating Behaviors with Feline Cognitive Dysfunction Syndrome

UNIVERSITY OF WISCONSIN – MADISON

Projected Duration: 2 Years **Study Cost:** \$74,990 **Established Investigator Grant**

SUMMARY: Researchers will analyze owner-reported dementia behaviors in senior cats and look for correlating clinical signs of brain degeneration.

DESCRIPTION: Around half of senior cats over 12 years old show changes in behavior that resemble dementia in people. Signs of feline dementia, also known as cognitive dysfunction syndrome, can include disorientation, vocalization, changes in how cats interact with owners, and urination outside the litter box. In people with dementia, understanding brain abnormalities has enabled earlier diagnosis and promising new treatments for patients. However, little is known about the brain abnormalities that cause dementia in cats and currently no treatment exists for feline patients suffering from cognitive declines. To help fill this knowledge gap, researchers will ask owners to complete a survey about dementia behaviors they see in their senior cats. The team then will test how behavior changes relate to changes in blood test results. The team also will study the brains of senior cats that have passed away from natural causes to identify brain abnormalities. Researchers hope findings will help improve the diagnosis and treatment of feline dementia and enhance the quality of life of aging cats and the owners that care for them.

D23FE-302

Developing an mRNA Vaccine for Feline Infectious Peritonitis

UNIVERSITY OF CALIFORNIA, DAVIS

Projected Duration: 2 Years **Study Cost:** \$99,031 **First Award Grant**

SUMMARY: Researchers will explore first steps toward the development of an mRNA vaccine for feline infectious peritonitis, a deadly coronavirus in cats.

DESCRIPTION: Cats living together in high numbers, including shelters and catteries, are at high risk for common cat viruses, including feline coronavirus. This virus usually causes mild diarrhea which improves on its own. However, for a small number of cats, infection can lead to a deadly disease called feline infectious peritonitis. Recently, new drugs have been tested to cure infection but making an effective vaccine to prevent FIP has been challenging. Researchers will use lessons learned from developing mRNA vaccines for human coronaviruses as first steps toward a vaccine for FIP. These vaccines use one small part of the viral genetic code to teach the body how to fight infection. Researchers hope findings will lead to the development of an effective and safe vaccine for FIP in cats, potentially saving hundreds of thousands of cats' lives each year.

D23FE-303

Assessing a Novel Radiation Therapy for Oral Cancer

UNIVERSITY OF MISSOURI

Projected Duration: 2 Years **Study Cost:** \$100,000 **First Award Grant**

SUMMARY: Researcher will assess the potential of a novel radiation therapy to treat oral squamous cell carcinoma, a painful mouth cancer in cats.

DESCRIPTION: Oral squamous cell carcinoma is an aggressive cancer in the mouth of cats. OSCC often is difficult to identify until late disease stages, when the cancer is too large and invasive for surgery. The most effective treatment option for late-stage OSCC is radiation therapy. However, radiation is unlikely to provide a cure and has many side effects that affect quality of life and often only provides a few months of palliative benefit. Researchers will evaluate a cutting-edge type of radiation therapy called lattice radiotherapy as potential treatment. With lattice radiotherapy, small parts inside the cancer are treated with very large doses but neighboring normal structures such as the skin, eye and mouth receive lower doses. In human studies, lattice radiotherapy has resulted in milder side effects and partial or complete resolution of some cancers. Researchers hope for similar findings in cat patients that ultimately will help improve outcomes for cats with this painful and life-limiting cancer

D23FE-504

Assessing a Nonsurgical Sterilization Method for Male Cats

UNIVERSITY OF GEORGIA

Projected Duration: 2 Years **Study Cost:** \$74,940 **Donor-Inspired Grant**

SUMMARY: Researchers will develop and assess the efficacy of a novel vaccine to help combat overpopulation of free-roaming, community cats.

DESCRIPTION: Every year, an estimated 60 to 100 million feral cats are born and live outdoors in colonies. Surgical sterilization is a routine part of trap-neuter-return programs that help decrease regional populations of free-roaming, community cats. However, this method is too expensive for large-scale sterilization, especially in resource-poor areas. TNR also requires the difficult task of capturing cats safely. To address this problem, researchers will design and assess a novel vaccine, a nonsurgical and noninvasive method of sterilization that does not require capture and handling of cats. The team will assess whether male cats receiving the vaccine have reproductive hormones that drop to levels similar to those seen in castrated male cats. If successful, findings will inform further studies into the technique and may provide an easier and more cost-effective way to manage and reduce numbers of free-roaming, unowned cats.

D23FE-505

Assessing a Novel Nonsurgical Sterilization Method in Female Cats

TUFTS UNIVERSITY

Projected Duration: 1 Year **Study Cost:** \$75,000 **Donor-Inspired Grant**

SUMMARY: Researchers will assess the effectiveness of a novel single-injection, nonsurgical sterilization technique in female cats.

DESCRIPTION: Cat overpopulation is a worldwide problem. The current solution is to spay/neuter cats using surgery. But surgeries are expensive, require trained personnel and special equipment to perform, and can be painful for the cats. A more humane approach would be a nonsurgical procedure, preferably a single injection that would result in permanent sterilization. To address this problem, researchers are working on a single-injection, nonsurgical method they hope can reduce or eliminate the cells that support production of eggs and sperm in cats. The team has successfully used this new technique in several species, reducing egg production in chickens and eliminating breeding cycles in rats. Their next step is to assess its effectiveness in a small group of female cats. The team hopes their novel approach will successfully reduce or eliminate fertility in female cats and one day inform methods to help control cat overpopulation worldwide.

D23FE-510

Assessing a Novel Treatment for Oral Cancer

UNIVERSITY OF GUELPH, CANADA

Projected Duration: 2 Years **Study Cost:** \$16,903 **Donor-Inspired Grant**

SUMMARY: Researchers will assess a novel nanoparticle strategy to better stage and target cancerous oral tumors in cats.

DESCRIPTION: Oral squamous cell carcinoma (OSCC) is a common and aggressive cancer in cats with few effective treatment options. Researchers are studying a novel nanoparticle called porphysomes. Porphysomes are given intravenously and the particles travel to areas with tumor cells (either primary or metastatic). The particles remain in the affected areas, allowing for localized diagnosis and treatment. Researchers will evaluate the safety and effectiveness of porphysomes, in combination with photodynamic therapy, in client-owned cats diagnosed with nonsurgical OSCC. The team hopes this combined therapy will improve treatment for OSCC in cats, especially those patients that are poor surgical candidates, and also inform research into similar oral cancers in other species including humans.

D20CA-307

Determining Pain Management Effectiveness of Cannabidiol

UNIVERSITY OF SASKATCHEWAN, CANADA

Projected Duration: 2 Years **Study Cost:** \$80,780 **First Award Grant**

SUMMARY: Researchers will assess whether oral CBD extract improves pain management and function in dogs following orthopedic surgery.

DESCRIPTION: The use of CBD and other cannabis-derived substances to control pain in pets is a booming industry. However, little scientific data exists on the efficacy and safety of cannabis-derived products, and there are no CBD formulations with regulatory approval for therapeutic use in animals in North America. To help fill this knowledge gap, researchers will evaluate whether adding oral CBD extract to a standard pain management plan is beneficial in dogs following orthopedic surgery. Dogs undergoing tibial plateau leveling osteotomy, a common orthopedic procedure, will receive a standard analgesic regimen with or without a CBD herbal extract for 14 days. Findings will help determine if adding a CBD extract to a standard analgesic protocol is beneficial; and if so, provide data on an effective range of CBD plasma concentrations for dogs following surgery.

D23CA-012

Looking for New Treatments for Recurring Ear Infections

UNIVERSITY OF FLORIDA

Projected Duration: 3 Years **Study Cost:** \$75,000 **Established Investigator Grant**

SUMMARY: Researchers will evaluate proactive treatments for recurrent ear infections as well as a novel treatment for active ear infections.

DESCRIPTION: Recurrent ear infections are common in dogs and can be costly for owners. Strategies to prevent recurrences and alternative treatments to address resistant infections are urgently needed. Researchers will evaluate the use of two preventive treatments in client-owned dogs prone to recurrent bacterial ear infections. The team also will conduct a small clinical trial in client-owned dogs diagnosed with an ear infection. For comparison data, one group will receive a novel non-antibiotic treatment and one group will receive standard-of-care antibiotics. The researchers will then compare the two treatments to see if the novel treatment is equal to, or superior to, current treatment protocols. Together, these studies may provide safe and alternative options for veterinarians who regularly treat recurrent ear infection cases in their clinics.

D23CA-015

Reducing Obesity in Working Dogs

THE HEBREW UNIVERSITY OF JERUSALEM, ISRAEL

Projected Duration: 3 Years **Study Cost:** \$75,000 **Established Investigator Grant**

SUMMARY: Researchers will develop new training strategies for working dogs using non-food items to reward performance to help reduce overweight/obesity issues and resulting health problems in these animals.

DESCRIPTION: Labrador retrievers are one of the most common working dog breeds in the world and more likely to become overweight than other dogs. Studies show nearly 20% of Labrador retrievers trained to be guide dogs carry a mutation associated with obesity. The extra pounds can contribute to health problems over time for working dogs such as arthritis, cancer and heart failure. These health conditions affect quality of life and can contribute to shortened lifespans. These dogs often are raised and trained using food as an incentive for performance, which can complicate weight management efforts. Researchers will explore alternative training practices using non-food reward strategies for dogs working as guide dogs for the blind. All puppies will be screened for the overweight/obesity gene. The team then will compare results of puppies with and without the obesity-associated gene with those trained with and without food incentives. Findings will inform new training practices to help improve the health and well-being of working dogs as well as benefiting working dog owners who rely on these animals to improve their own quality of life.

D23CA-303

Evaluating a Novel Treatment for Ear Infections and Biofilms

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY

Projected Duration: 2 Years **Study Cost:** \$74,134 **First Award Grant**

SUMMARY: Researchers will conduct a clinical trial evaluating the effectiveness of a novel treatment to clear ear infections in dogs.

DESCRIPTION: Dogs with chronic ear infections often are infected by bacteria that can produce biofilms, a community of bacteria surrounded by a slimy protective coating that makes it difficult for drugs to reach their target. Bacteria-shielding biofilms are challenging to treat with antibiotics, highlighting the need for more effective therapies. Researchers will conduct a clinical trial in dogs with bacterial ear infections to evaluate a novel adjunct treatment. This treatment shows promise in breaking through the biofilms' protective surface and killing bacteria in both a laboratory setting and in a variety of mammal species. One group of study dogs will be treated with standard-of-care antibiotics and a placebo. The other group will receive standard-of-care antibiotics with the addition of the novel adjunct treatment. Findings on the two groups will provide valuable data on the efficacy of the new treatment to clear dogs with ear infections complicated by biofilms.

D23CA-404

Repurposing Drugs to Treat Deadly Algae Infections

JAGIELLONIAN UNIVERSITY, POLAND

Projected Duration: 1 Year **Study Cost:** \$45,371 **Fellowship Training Grant**

SUMMARY: Researchers will evaluate nine currently available drugs for the treatment of deadly algae infections in dogs.

DESCRIPTION: Single-cell algae known as *Prototheca* are the only plants able to infect other organisms, and lethal infections in dogs are becoming more prevalent. *Prototheca* infections are very hard to treat and are nearly 100% fatal despite therapy. After screening 1,200 commercially available drugs, researchers identified nine promising drugs with unexpected anti-*Prototheca* activity. In this study, the team will focus on identifying which of these candidates are best suited for treating dogs sickened by *Prototheca*. Findings will inform future studies in dog patients suffering from these rare, but frequently fatal, infections.

D23CA-469

Studying E. Coli Urinary Tract Infections

THE OHIO STATE UNIVERSITY

Projected Duration: 2 Years **Study Cost:** \$124,983 **Fellowship Training Grant**

SUMMARY: Researchers will study antibiotic resistance in dogs with recurrent urinary tract infections caused by *E. coli* as well as gut microbiota responses to antibiotics in dogs with and without multidrug-resistant *E. coli* strains to help inform antibiotic use.

DESCRIPTION: Recurrent UTIs are a primary reason for repeated antibiotic use, contributing to multidrug resistance in both dogs and people. Fecal *E. coli* are the main culprits responsible for UTIs. However, the links between urine and fecal *E. coli* and how antibiotics impact the development of multidrug resistance over time is not well understood. To fill this knowledge gap, researchers will compare multidrug-resistant *E. coli* strains in urine and fecal samples of dogs diagnosed with recurrent UTIs. The team also will compare gut microbiota, including the gut residing *E. coli*, response to antibiotic use in dogs with and without multidrug-resistant *E. coli* UTIs. The team will particularly focus on multidrug-resistant genes during and after antibiotic use. Findings will help inform antibiotic use and further studies on the microbiome in dogs and people with recurrent and hard-to-treat UTIs.

D23CA-478

Investigating Role of an Immune Protein in Aggressive Osteosarcoma

UNIVERSITY OF ILLINOIS

Projected Duration: 2 Years **Study Cost:** \$104,078 **Fellowship Training Grant**

SUMMARY: Researchers will study how to block an immune protein associated with the accelerated spread of osteosarcoma in dogs.

DESCRIPTION: Osteosarcoma is the most common bone cancer affecting dogs. Because OSA usually affects the leg bones, the first signs of disease often are limping and pain. While removing the tumor with surgery can relieve pain and improve quality of life, OSA can rapidly grow and metastasize. Most dogs diagnosed with OSA will eventually die from metastases. Currently, treatments for slowing metastases rely solely on chemotherapy, yet the cancer-fighting activity of chemotherapy isn't very effective. Given these limitations, new ways to effectively manage metastatic disease in dogs with OSA are desperately needed. Studies show some immune-system proteins can stimulate destruction of the cancer, while other proteins can be harmful, promoting cancer growth and spread. One immune protein that causes inflammation is called interleukin-1-beta and is thought to promote and accelerate the spread of OSA. Given the importance of IL-1-beta in OSA, neutralizing or blocking this protein with new drugs could be an effective strategy in slowing cancer spread and improving patient survival times. Researchers will explore the role of IL-1-beta in canine OSA, with the goal of finding new drugs that can block its cancer-promoting effects in dogs with this deadly bone cancer.

D23CA-504

Evaluating a New Treatment for Canine Osteosarcoma

ELIAS ANIMAL HEALTH

Projected Duration: 2 Years **Study Cost:** \$158,152 **Commissioned Grant**

SUMMARY: Researchers will evaluate the safety and efficacy of a novel combination of checkpoint inhibitor and adoptive T-cell therapy in giant-breed dogs diagnosed with appendicular osteosarcoma, a type of primary bone cancer in the limbs.

DESCRIPTION: Osteosarcoma affects more than 10,000 dogs annually. While some dogs respond well to surgical amputation of the affected limb followed by chemotherapy, other dogs may not be good candidates for this treatment approach. To fill this treatment gap and expand therapeutic options, researchers are working on developing a novel combination of two immunotherapies that will help stimulate a dog's own immune system to kill cancerous OSA cells. The team will evaluate the safety and effectiveness of this treatment in giant-breed dogs diagnosed with appendicular OSA that are not good candidates for standard-of-care amputation. By establishing safety and determining the efficacy of this combination, the team will generate a new treatment option for canine OSA which may not require the amputation of a limb. The team also will generate preliminary data necessary for a subsequent submission of an Investigational New Animal Drug Application to the FDA's Center for Veterinary Medicine. Successful completion of this study will achieve key developmental steps to set the stage for further advancement of a combination vaccine and cellular therapy treatment to improve outcomes in giant-breed dogs diagnosed with appendicular OSA.

D23CA-506

Assessing an Immunotherapy for Osteosarcoma

UNIVERSITY OF MINNESOTA

Projected Duration: 1.5 Years **Study Cost:** \$130,000 **Donor-Inspired Grant**

SUMMARY: Researchers are studying the feasibility of an adjunct immunotherapy for large- and giant-breed dogs with osteosarcoma that are not good candidates for cancer surgery or limb amputation.

DESCRIPTION: Treatment for canine osteosarcoma, the most common bone cancer in dogs, has not significantly changed in the past decade. This is particularly true for large- and giant-breed dogs that are poor candidates for amputation and also are at greater risk for developing osteoarthritis in their limbs. In human cancer, rapid advances that combine standard therapy with immunotherapy drugs are changing treatment paradigms, helping to slow tumor growth and cancer spread. Immunotherapies are treatments that trigger the body's immune system to fight cancer. Unfortunately, no commercially available immunotherapy drugs exist for use in canine osteosarcoma, despite the high prevalence in dogs and the expectation that the cancer will spread within 6-to-12 months of diagnosis, even with advanced treatment. To expand treatment opportunities, especially for large and giant breeds, researchers developed a drug that stops a protein found in osteosarcoma that blocks the body's ability to attack the tumor. In this arm of the study, the team will assess how this new drug stimulates the immune system to fight osteosarcoma and how to combine it with standard-of-care treatment like radiation in client-owned dogs. The team hopes this new immunotherapy approach will help improve long-term outcomes and quality of life for dog patients. Findings will provide essential preliminary data to inform and design a larger clinical trial in dogs with the deadly bone cancer.

D23CA-507

Understanding Heart Disease in Newfoundland Dogs

MICHIGAN STATE UNIVERSITY

Projected Duration: 2 Years **Study Cost:** \$50,000 **Donor-Inspired Grant**

SUMMARY: Researchers will study the genetic basis of subvalvular aortic stenosis in Newfoundland dogs, a high-risk breed for developing this devastating heart condition.

DESCRIPTION: Subvalvular aortic stenosis, a constriction of the aorta, the major vessel carrying blood from the heart, is a significant concern in several dog breeds, causing shortened lifespan and, in some cases, sudden death. Large and giant breeds, including Newfoundland dogs, rottweilers and bullmastiffs, have a higher risk of developing SAS. The breed-specific prevalence, the early age of onset, the clustering of affected dogs in sibships, and results from some breeding studies have pointed to a genetic basis for SAS in these high-risk breeds. However, the causative genetic variation(s) and identification of the broader genetic basis for SAS in Newfoundland dogs and other breeds has remained elusive. Partnering with breed clubs, researchers will use state-of-the-art genomic tools to take a deeper dive into the genetics associated with SAS in Newfoundland dogs. Findings will help advance our understanding of the genetic basis of SAS in the breed and provide valuable clues to help other breeds affected by this life-limiting heart condition.

D23CA-510

Understanding Toxic Heavy Metal Burden in Aging Dogs

UNIVERSITY OF WISCONSIN – MADISON

Projected Duration: 2 Years **Study Cost:** \$165,525 **Mark L. Morris Jr. Investigator Award**

SUMMARY: Researchers will study if toxic heavy metals are associated with increased risk of health challenges in aging dogs, including cognitive decline, hearing loss and visual decline.

DESCRIPTION: Dogs, just like their human owners, may be exposed to toxic chemicals commonly found in and around the home. These chemicals can include heavy metals such as arsenic, cadmium, chromium, lead and mercury. Heavy metals can build up in the body and cause damage to internal organs, including the aging brain and nervous system. Human studies show toxic heavy metals can cause nervous system damage and can increase the risk for diseases such as Alzheimer's disease, other dementias, hearing loss and vision loss. Researchers will evaluate if this also holds true for aging dogs. In one arm of the study, the team will study heavy metal exposure in dogs living in Wisconsin and follow thinking and memory function, hearing and vision over 18 months. In another arm of the study, the team will use owner questionnaires to assess similar function for dogs living in Flint and Detroit, Michigan, which are noted for lead toxicity. Findings will further our understanding of the relationship between toxic metal sources in the home and dog health. Data also will provide a foundation for future studies into potential treatments or preventions to protect the brain and sensory organ health of older dogs.

D23CA-511

Investigating Inflammation and Disease in Aging Dogs

COLORADO STATE UNIVERSITY

Projected Duration: 3 Years **Study Cost:** \$139,975 **Mark L. Morris Jr. Investigator Award**

SUMMARY: Researchers will study age-associated inflammation associated with diseases in older dogs.

DESCRIPTION: Aging is marked by chronic inflammation. In people, one cause of inflammation is the presence of clonal hematopoiesis of indeterminate potential. CHIP is seen when white blood cells acquire mutations that cause the cells to live longer and produce harmful, inflammatory proteins. People with CHIP are more likely to have diseases such as type 2 diabetes, heart disease and stroke, all of which are caused by inflammation. The same may be true for dogs and age-related canine health concerns. Researchers will fill in the knowledge gap of what kind of CHIP mutations are seen in dogs, measure CHIP mutation frequency in older dogs and the effect of mutations on the dog immune system. The team will use this new data to measure CHIP in dogs enrolled in large cohort studies such as the Golden Retriever Lifetime Study and the Dog Aging Project with the aim of looking for links associated with inflammatory diseases. The team also will assess potential treatments to fight the effects of CHIP and associated diseases in aging dogs.

D23CA-513

Studying Biological Aging in Dogs

VAIKA, INC.

Projected Duration: 3 Years **Study Cost:** \$250,000 **Mark L. Morris Jr. Investigator Award**

SUMMARY: Researchers will study the aging process, including genetically programmed aging “clocks” and anti-aging strategies in a well-studied population of retired sled dogs.

DESCRIPTION: Every mammal species has a lifespan determined and controlled by their genetic make-up. Researchers will look at aging mechanisms in a cohort of retired sled dogs, to detect and measure DNA modifications associated with aging. The team will specifically use a tool called a DNA methylation clock, a biological test that assesses chemical cell changes as predictors of life expectancy, disease risk and mortality. They will determine the DMC scores in DNA samples collected over time on the sled dogs to learn if DMC can predict remaining lifetime and development of age-related diseases. The team also will evaluate whether DMC could show any difference between dog groups that did and did not receive anti-aging treatments. Findings may highlight the potential of DMC to measure the aging of cells and biological age as opposed to chronological age and associated disease risk. In addition, the team will assess if their anti-aging treatments had any effect on DMC.

D23CA-518

Treating Frailty with Exercise to Improve Health Span

NORTH CAROLINA STATE UNIVERSITY

Projected Duration: 2 Years **Study Cost:** \$249,062 **Mark L. Morris Jr. Investigator Award**

SUMMARY: Researchers will conduct a clinical trial to assess if exercise can reduce frailty and improve health span of frail, elderly dogs.

DESCRIPTION: Frailty is a physical state in which health reserves are limited, decreasing response to stress and increasing death rate. In people, frailty is defined by weight loss, weakness, exhaustion, slow walking and low activity. While frailty is important in the assessment of elderly people and is treated to improve health, the idea of frailty is rarely used in veterinary medicine. Researchers developed a frailty tool for veterinarians that uses owner questions to assess frailty areas, and assessment of body and muscle condition. The tool accurately predicts six-month death rate; data shows dogs who are frail in greater than or equal in two areas are three times more likely than non-frail dogs to die within six months. The team will conduct a clinical trial to assess how frail dogs, as defined by their frailty tool, respond to exercise. Dogs will be allocated to either a standard care group or a rehabilitation group that includes added daily in-home exercise and three months of weekly in-clinic exercise targeting endurance, strength and balance. Findings will fill knowledge gaps of frailty in dogs, how frailty changes over time and how dogs respond to exercise to improve canine patient health and quality of life.

D23CA-526

Understanding Health and Well-being Impacts on Post-Traumatic Stress Support Service Dogs

UNIVERSITY OF DENVER

Projected Duration: 3 Years **Study Cost:** \$264,000 **Commissioned Grant**

SUMMARY: Researchers will study the health and well-being of service dogs paired with military veterans with post-traumatic stress disorders. They will use their findings to inform new tools to assess and track the well-being of these specially trained dogs.

DESCRIPTION: Post-traumatic stress disorder impacts nearly one third of military veterans who have experienced combat. Current medicines and mental health therapies have limited effectiveness, and many people are not cured by existing treatments. Service dogs for PTSD have become more common, and current research on their effectiveness is promising. However, no one has studied how service dogs are impacted by their work. To determine if and how pairing the dogs with veterans diagnosed with PTSD affects the dog's health and well-being, researchers will examine service dogs' genes, physiology and behaviors over time. They also aim to pinpoint biomarkers for tracking service dog health and help identify the genetic makeup associated with dogs that are most suited to support veterans with PTSD. The findings will guide the ethical use of psychiatric service dogs and provide more tools to track their health and welfare. This research is part of a larger study that will follow veterans with PTSD before and after receiving a service dog.

D23CA-527

Looking for Genetic Mutations Associated with Hemangiosarcoma in American Golden Retrievers

UTRECHT UNIVERSITY, THE NETHERLANDS

Projected Duration: 1 Year **Study Cost:** \$50,000 **Commissioned Grant**

SUMMARY: Using genotyping data from the Golden Retriever Lifetime Study, researchers will conduct a study to help identify genomic regions involved with increased susceptibility for hemangiosarcoma in American golden retrievers.

DESCRIPTION: Hemangiosarcoma was recently identified as the most important cancer diagnosis noted in the American golden retriever population. Hemangiosarcoma also is the most common cancer diagnosed in the Golden Retriever Lifetime Study cohort. Interestingly, the disease is less common in European golden retrievers, suggesting a hereditary component to the disease. Researchers will study the genomes of golden retrievers to identify mutations associated with development of hemangiosarcoma in the breed. Findings could lead to better treatments and diagnostic testing for this serious cancer.

D23CA-528

Unraveling Doberman Hepatitis

UTRECHT UNIVERSITY, THE NETHERLANDS

Projected Duration: 3 Years **Study Cost:** \$199,461 **Donor-Inspired Grant**

SUMMARY: Researchers will identify DNA mutations associated with the predisposition for hepatitis in Doberman pinschers, as well as search for biomarkers in the blood predictive of early-stage disease to help improve earlier intervention, disease monitoring and treatment success.

DESCRIPTION: Doberman hepatitis, is a hereditary disease which causes severe illness in affected dogs. The diagnosis is made based on examination of a liver biopsy, often in late stages of the disease. Immune deregulation as well as copper accumulation in the liver plays a role in the development and progression of disease. However, the exact mechanism and cause of the disease are not completely understood. This makes Doberman hepatitis difficult to treat with often poor patient outcomes. To help address this issue, researchers will try to identify DNA mutations responsible for Doberman hepatitis. With this information, the team hopes to develop DNA tests to help reduce disease incidence in the breed. The team also will try to develop noninvasive blood biomarker tests to improve early diagnosis and disease monitoring. Together, these findings may lead to more effective ways to diagnose and treat this devastating disease in Dobermans.

D23CA-536

Searching for the Cause of Diet-Associated Heart Disease

TUFTS UNIVERSITY

Projected Duration: 1 Year **Study Cost:** \$149,913 **Donor-Inspired Grant**

SUMMARY: Researchers will study the structure and function of mitochondria, also known as the cells' energy source, and the role they play in an emerging form of dilated cardiomyopathy, a common heart disease that affects large and giant breed dogs.

DESCRIPTION: Dilated cardiomyopathy is a common disease of the heart muscle that affects certain large or giant dog breeds. However, in recent years, veterinarians began seeing dogs in their clinics with a unique form of the disease – one that appears to be associated with diets that are grain-free or contain pulses, including peas and lentils. Diet-associated DCM, or daDCM, is unique in that it dogs of any breed and size. Unlike other forms of DCM, heart function in affected dogs can improve if the diet is changed. Researchers recently found higher numbers of abnormal mitochondria in dogs with daDCM than in those with primary DCM. Mitochondria supply energy to cells throughout the body but are especially important in heart cells where a continuous energy supply is needed for the heart to beat. Genetic mutations or toxins that damage mitochondria can lead to DCM. The team hopes to pinpoint the cause of daDCM by studying the mitochondrial structure and function in dog hearts and hopefully identifying changes that are unique to dogs with daDCM compared to dogs with primary DCM as well as to a control group of dogs without heart disease. If successful, this new information may help pinpoint the cause of daDCM for early intervention and prevention.

D23CA-537

Evaluating New Strategies for Canine Glaucoma

INTERNATIONAL INSTITUTE OF TRANSLATIONAL MEDICINE, POLAND

Projected Duration: 3 Years **Study Cost:** \$165,000 **Donor-Inspired Grant**

SUMMARY: Researchers are working toward improving early detection and treatment of canine glaucoma, a blinding disease in dogs.

DESCRIPTION: Glaucoma is a leading and painful cause of blindness in dogs. Currently available interventions only delay blindness, highlighting the need for new and efficient therapies that preserve sight in affected animals. Loss of vision in glaucoma is due to death of retinal ganglion cells, which is the result of destructive processes linked to a gradual loss of mitochondrial functions – a powerhouse of cells. This leads to a decrease in the RGCs' energy supply, and also increases the production of damaging and harmful substances that provoke cell death. To help solve this issue, researchers will study novel molecules associated with mitochondrial stress in the canine patients' eyes to learn more about mitochondrial-associated RGC death. The team also will evaluate the potential of a novel therapy, replacing defective mitochondria with their healthy counterparts to improve retinal function in affected dogs to help slow or stop RGC damage. Together, these studies will pave the way for the development of early detection methods and improved treatments for this serious, degenerative eye disorder in dogs.

D23CA-541

Studying a Novel Anti-Cancer Drug for Histiocytic Sarcoma

MICHIGAN STATE UNIVERSITY, UNIVERSITY OF WISCONSIN, VIRGINIA TECH AND UNIVERSITY OF FLORIDA

Projected Duration: 2 Years **Study Cost:** \$148,835 **Commissioned Grant**

SUMMARY: Researchers are conducting a clinical trial to evaluate the ability of the drug trametinib to control tumor growth and improve outcomes for dogs with histiocytic sarcoma, an aggressive and usually fatal canine cancer.

DESCRIPTION: Histiocytic sarcoma is a highly aggressive cancer in dogs with a poor prognosis. The cancer tends to develop in the spleen, lungs, bone marrow, liver and lymph nodes. HS can occur in any dog but certain breeds, including Bernese mountain dogs, flat-coated retrievers, golden retrievers, rottweilers and miniature schnauzers, are at higher risk of developing this cancer. Chemotherapy is the mainstay of treatment but with limited success. Finding new treatment options is imperative. Building on their earlier studies on the mechanism of this cancer and on drug response to cancer cells, researchers are conducting a clinical trial in dogs with HS to find out if the drug trametinib can improve outcomes for these patients. Response to treatment will be evaluated based on changes in tumor size over time. The team also will look for genetic mutations that could be used as predictors of drug response that may guide individualized treatment choices for dogs. If successful, findings will determine if trametinib might work as a novel targeted therapy for HS, adding a much-needed treatment option to improve outcomes for dogs with this challenging cancer.

D23CA-702

Studying Genetic Drivers of Histiocytic Sarcoma Tumors

COLORADO STATE UNIVERSITY

Projected Duration: 1 Year

Grant Amount: \$10,000

Commissioned Grant

SUMMARY: Researchers will study genetic variants – errors in the genetic code – in histiocytic sarcoma tumors and cell lines to identify genetic signatures associated with this aggressive canine cancer. The team will use these findings to study a treatment response.

DESCRIPTION: Cancer researchers have been improving treatments for different cancers by identifying genetic variants in the tumors and by identifying or developing new drugs that can turn off the instructions of these variants to make more cancer cells. However, since many cancers have more than one alteration in their genetic code, drugs studied in the laboratory don't always work as expected in the patient. Cancers that start in certain types of cells either have exactly the same genetic code errors or may have genetic code errors at different points along the same set of instructions. Researchers have found that for a type of canine cancer called histiocytic sarcoma, about half of dogs have the same type of genetic code error. Researchers want to find out what genetic code errors are occurring in the other half of the dogs with this aggressive cancer. To fill this knowledge gap, the team will conduct a genome-wide screening of histiocytic sarcoma tumors and cells. The team will look for changes in the cell codes and biological mechanisms in histiocytic sarcoma tumors and cells. The team also will test cell lines for drug sensitivity. The team hopes their findings will help identify the best markers for predicting how this cancer progresses in different dogs and response to different treatments.

D23CA-801

Assessing a New Antibiotic for Ear Infections

UNIVERSITY OF PENNSYLVANIA

Projected Duration: 1 Year

Study Cost: \$10,000

Pilot Study Grant

SUMMARY: Researchers will conduct a clinical trial to assess the efficacy of an antibiotic to treat staphylococcal ear infections in dogs.

DESCRIPTION: Studies show that the most commonly isolated bacterial pathogens in canine ear infections are two species of *Staphylococcus*. Researchers have previously shown that fosmidomycin, an antibiotic and antimalarial agent, is effective against bacteria of these species under laboratory conditions, and well tolerated in a small subset of dogs. Using this information, the team will conduct a clinical trial to assess the effectiveness and safety of fosmidomycin in client-owned dogs diagnosed with bacterial ear infections. Fosmidomycin will be evaluated against an established antibiotic for ear infections in dogs. Half of the ears will be randomly assigned to treatment with a solution of the established antibiotic, and the other half will be randomly assigned to treatment with a solution of fosmidomycin. Researchers hope findings will lay the groundwork for further studies of fosmidomycin as a therapy for staphylococcal infections in companion animals including ear infections in dogs.

D23CLP-103

Improving Early Detection of Canine Lymphoma

UNIVERSITY OF GUELPH, CANADA

Projected Duration: 2 Years **Study Data & Samples Only**

SUMMARY: Researchers will assess if levels of a specific serum biomarker can be used for early detection of lymphoma in dogs, using samples and data from the Golden Retriever Lifetime Study.

DESCRIPTION: Studies indicate that microRNAs are valuable molecular tools for diagnosing many cancers, and measuring their levels in blood samples may be a promising, noninvasive way to predict disease before the onset of clinical signs. In this study, researchers will evaluate microRNA levels in blood samples collected from golden retrievers enrolled in Morris Animal Foundation's Golden Retriever Lifetime Study that developed lymphoma. Since lymphoma is the second most common cancer diagnosed in this cohort, and blood is collected before and after the onset of the disease, these data and sample sets provide a unique opportunity to learn if changes in levels of serum microRNA biomarkers are predictive of lymphoma. If successful, the findings will inform the development of a cancer screening test.

D23CLP-203

Investigating Risk Factors and Prescribing Practices for Ear Infections

NORTH CAROLINA STATE UNIVERSITY

Project Duration: 1 Year **Study Data Only**

SUMMARY: Researchers will study factors associated with otitis externa, a common ear infection in dogs, as well as treatments prescribed for this condition using data from the Golden Retriever Lifetime Study.

DESCRIPTION: Otitis externa is one of the most common medical conditions reported during veterinary visits, and it is a top condition among dogs enrolled in the Golden Retriever Lifetime Study. The underlying cause for otitis externa in many dogs is allergic dermatitis, but other possible causes include foreign bodies, tumors, ear conformation and parasites. Generally, topical antimicrobials effectively treat acute infections, and anti-inflammatory medications are helpful adjunct therapies. If the infection is chronic or extends from the outer ear into the middle ear, oral antimicrobials can be used. Within the context of the growing problem of antimicrobial-resistant infections, more information is needed on antimicrobial prescribing practices for otitis externa in dogs. Using data from the Golden Retriever Lifetime Study, researchers will study environmental, dietary and treatment-related factors in dogs with acute or chronic otitis externa, as well as the presence of concurrent allergic dermatitis. The team also will look at veterinary antimicrobial prescribing patterns for otitis externa using veterinary visit data, with particular attention to prescription of oral antimicrobials. This new information could inform interventions to improve treatment for otitis externa in dogs including antimicrobial stewardship efforts.

D23CLP-204

Understanding How Social Factors Impact Lifestyle Choices and Canine Cancer Risk

ROSS UNIVERSITY COLLEGE OF VETERINARY MEDICINE, WEST INDIES

Projected Duration: 2 Years **Study Data Only**

SUMMARY: Researchers will explore how social factors affect lifestyle choices such as diet selection and physical activity. The team will see if these choices impact cancer risk in golden retrievers enrolled in Morris Animal Foundation's Golden Retriever Lifetime Study.

DESCRIPTION: Cancer is one of the leading causes of death in dogs. However, little is known about specific nutritional, environmental, lifestyle and genetic risk factors leading to the development of cancer in dogs. To help fill this knowledge gap, researchers will analyze data from Morris Animal Foundation's Golden Retriever Lifetime Study on diet types, feeding habits, food supplements, environmental conditions and cancer diagnoses. The team also will analyze social determinant data, including geographic location, income level, exercise time and activity levels both on an individual and regional level. Together, these cumulative data, collected annually throughout the lifetime of the Study dogs, may help identify influencing, and possibly modifiable, factors that contribute to cancer risk in dogs.

D23CLP-205

Investigating Urinary Incontinence in Dogs

UNIVERSITY OF WISCONSIN-MADISON

Projected Duration: 2 Years **Study Data Only**

SUMMARY: Researchers will study whether genetic exposures influence onset and age-of-onset for the most commonly acquired urinary incontinence in dogs, urethral sphincter mechanism incompetence (USMI).

DESCRIPTION: Urethral sphincter mechanism incompetence (USMI) is the most common cause of urinary incontinence in dogs. Studies show USMI is associated with the effects and timing of sterilization in dogs, typically occurring in adult, spayed female dogs. However, little is known about the genetic and environmental risk factors that also may influence onset of USMI in female dogs. To learn more about these potential risk factors, researchers will analyze genetic and survey data (presence of comorbidities and environmental exposures including loss of hormones through spay surgery) collected from dogs enrolled in the Golden Retriever Lifetime Study. The researchers will determine the influence, if any, these factors have on the development of USMI at an early stage (within 3 years of spay surgery), later in life, or not at all. Findings will help inform a larger scale investigation in dogs with USMI that may lead to identification of early risk factors and potential preventive strategies.

D23CLP-550

Studying Cancer Prevalence and Risk Factors in Golden Retrievers

THE ROYAL VETERINARY COLLEGE, UNITED KINGDOM

Projected Duration: 3 Years **Study Cost:** \$425,115 **Study Data Only**

SUMMARY: Researchers will study the frequency of, and risk factors for, cancer in golden retrievers using data from the Golden Retriever Lifetime Study and VetCompass health databases.

DESCRIPTION: Morris Animal Foundation is collaborating with Veterinary Companion Animal Surveillance System, a nonprofit initiative based at the Royal Veterinary College that collects and analyzes data from over 1,800 veterinary practices in the United Kingdom. Together, the two organizations will establish a cancer epidemiology team based at the Royal Veterinary College in the United Kingdom who will analyze cancer data from dogs enrolled in the Golden Retriever Lifetime Study as well as health data collected on 27,000 golden retrievers under veterinary care at VetCompass practices in the United Kingdom. Studying the large VetCompass dataset would highlight broad trends in the breed's overhealth and cancer risk in the UK. These data will be compared to information collected from the Golden Retriever Lifetime Study. The cancer epidemiology team also will explore the survival of golden retrievers after diagnosis. Findings will help estimate the frequency of and identify risk factors for cancers in golden retrievers as well as provide a valuable resource for additional canine cancer studies.

D23EQ-012

Evaluating an Adjunct Therapy for Cushing's Disease

MISSISSIPPI STATE UNIVERSITY

Projected Duration: 1 Year **Study Cost:** \$99,954 **Established Investigator Grant**

SUMMARY: Researchers will study if the addition of the drug cyproheptadine improves clinical signs and blood parameters in horses receiving the standard-of-care treatment for pituitary pars intermedia dysfunction, or Cushing's Disease.

DESCRIPTION: More than 20% of older horses suffer from pituitary pars intermedia dysfunction. PPID is caused by inappropriately high circulating hormone levels. Affected horses are more likely to develop foot disease and bacterial infections and show dullness and poor performance. Many equine patients that develop complications are euthanized. The treatment of choice for these patients is a drug called pergolide. However, this drug is relatively expensive and as a horse ages, the disease gets worse, prompting the need for higher doses to manage symptoms and for some this creates more complications. In this project, researchers will investigate if adding a more cost-effective drug called cyproheptadine improves clinical response. Cyproheptadine has been given to horses for decades but scientific data about its effectiveness is lacking. If results show that combination treatment helps horses with PPID, the team will have paved the way for a less expensive way of helping older horses with PPID and provided a science-based recommendation for horses that do not tolerate pergolide well and are in desperate need for another treatment path to remain healthy.

D23EQ-014

Working Toward a Vaccine for Strangles

TEXAS A&M UNIVERSITY

Projected Duration: 1 Year **Study Cost:** \$65,754 **Established Investigator Grant**

SUMMARY: Researchers will test a new protein's ability to stimulate the immune system as a next step in developing an effective vaccine against *Streptococcus equi*, the bacteria that causes strangles.

DESCRIPTION: Strangles is a highly contagious disease of the upper respiratory tract of horses, caused by the bacterium *Streptococcus equi* subspecies *equi*, and it is one of the most frequently diagnosed infectious diseases in horses worldwide. Currently, no vaccine in the United States has strong evidence of being safe and effective and none is able to differentiate vaccinated horses from horses with natural infection. Earlier studies showed that horses can be safely immunized and can develop an immune response to a newly identified protein candidate for a strangles vaccine. In this study, the team will further characterize the safety and immune responses of vaccinating horses with this protein vaccine candidate and determine if antibodies from immunized horses have action against SEE, the causative agent for strangles. Findings will help inform the development of a safe and effective vaccine for horses against strangles.

D23EQ-018

Developing an Early Diagnostic Detection Method for Cushing's Disease

UNIVERSITY OF FLORIDA

Projected Duration: 3 Years **Study Cost:** \$99,839 **Established Investigator Grant**

SUMMARY: Researchers will see if machine learning can improve early detection of pituitary pars intermedia dysfunction, or Cushing's disease in horses.

DESCRIPTION: Equine pituitary pars intermedia dysfunction is a common disease of aged horses, ponies and donkeys. This endocrine disorder is associated with the development of many clinical signs, including incomplete or late shedding of hair, loss of muscle mass, change in behavior, exercise intolerance and laminitis, a painful inflammation within the hoof. Treatment can be very effective, particularly if started before advanced disease, highlighting the need for early diagnosis. Unfortunately, currently available PPID diagnostic tests fail to consistently identify early disease. To address this issue, researchers will use a computer modeling approach known as machine learning to create a new way to diagnose early stages of PPID in affected horses. Specifically, they will teach the computer model to identify a specific peptide signature in the plasma of PPID-affected horses. Peptides are small fragments of proteins and changes in the amount and type of peptides traveling in the bloodstream when disease is present. Studies have successfully generated peptide signatures indicative of disease in human plasma. The team hopes this same approach will be successful in horses and enable improved and earlier diagnosis of PPID in aged horses.

D23EQ-023

Working Toward Better Diagnostics and Treatment of Septic Foals

NORTH CAROLINA STATE UNIVERSITY

Projected Duration: 2 Years **Study Cost:** \$65,302 **Established Investigator Grant**

SUMMARY: Researchers will compare blood hormone levels in sick and healthy foals and use this information to help inform the development of better diagnostic methodology and treatment alternatives for foals with sepsis.

DESCRIPTION: Sepsis, the body's overactive response to infection, is a common cause of foal illness and death. Septic foals show signs of body system collapse, leading to severe pain, prolonged treatment and in some cases euthanasia. A major consequence of sepsis is the loss of the proper hormonal production necessary for normal body function. One of the most important hormones involved in fighting sepsis is cortisol – essential for controlling inflammation and regulating blood sugar and blood pressure in sick patients. Sick foals often have low blood levels of cortisol that can lead to worsening symptoms and death. In this study, researchers will work toward creating a new diagnostic test for hormonal diseases in septic foals. Findings will provide a better understanding of foal sepsis and inform possible new treatment options, improving the survival rate and well-being of foals affected by this devastating and challenging health condition.

D23EQ-025

Developing a New Diagnostic Test for Equine Gastric Disease

THE UNIVERSITY OF GEORGIA

Projected Duration: 2 Years **Study Cost:** \$92,078 **Established Investigator Grant**

SUMMARY: Researchers will test if the relative amount of the bacteria *Sarcina* in stool samples is a good biomarker for equine glandular gastric disease, a serious cause of illness in horses.

DESCRIPTION: Despite tremendous research efforts, gastrointestinal diseases remain a common and top cause of death in horses, second only to advanced age. In many cases, GI diseases are not diagnosed until severe disease is present, making treatment challenging. To help address this issue, researchers will assess if a fecal-based assay can be used as an easy-to-use and effective diagnostic test for equine glandular gastric disease, a painful condition associated with gastric ulcers. Currently available methods to diagnose this condition are limited to expensive gastroscopy, so many horses are treated presumptively without definitive diagnosis. The problem with this approach is that the treatment of choice is expensive and drug efficacy questionable. The team is specifically looking at the abundance of a bacteria called *Sarcina* in fecal samples of affected horses that they believe could serve as a biomarker for gastric disease. If successful, this new tool could help inform diagnosis and treatment options for this serious condition in horses.

D23EQ-413

Searching for New Treatments for Systemic Inflammatory Response Syndrome

THE UNIVERSITY OF GEORGIA

Projected Duration: 2 Years **Study Cost:** \$124,200 **Fellowship Training Grant**

SUMMARY: Researchers will investigate the feasibility of using a currently available veterinary drug as a treatment for systemic inflammatory response syndrome, a serious immune response disorder in horses.

DESCRIPTION: Systemic inflammatory response syndrome occurs when the immune system overreacts, or “goes haywire.” SIRS is associated with many conditions including severe infections and major trauma and can lead to higher treatment costs, organ failure, laminitis and even death in equine patients. Horses with both colic, or gastrointestinal disease, and SIRS are eight times more likely to die than horses with colic and without SIRS. Unfortunately, effective treatments for SIRS in horses are lacking. One of the dysregulation pathways noted in horses with SIRS concerns insulin and blood sugar levels. In humans and other animals, the drug metformin has shown promise in improving SIRS. It can work to both control the balance of insulin and blood sugar levels as well as regulate the immune response. Metformin is safe, affordable, and has long been used in horses to treat insulin dysregulation in another common disorder, equine metabolic syndrome. However, its effects on equine immune cells and in SIRS are not known. In this project, researchers will explore the use of metformin as a new SIRS treatment in horses. The team will study how metabolic and immune markers correlate with SIRS and disease severity in horses admitted to referral hospitals for colic treatment. They also will investigate metformin’s effects in a safe, simulated SIRS model under laboratory conditions. Findings will provide key information about how the metabolic and immune systems interact in horses with SIRS. If successful, this new information will help inform the development of a new treatment for this potentially fatal condition in horses.

D23EQ-452

Working Toward a Predictive Test for Colic Surgery Complications

UNIVERSITY OF ILLINOIS, URBANA

Projected Duration: 2 Years **Study Cost:** \$124,956 **Fellowship Training Grant**

SUMMARY: Researchers will study proteins and the genetic makeup of the peritoneal fluid, a liquid that acts as a lubricant in the abdominal cavity, as a first step toward a diagnostic test to help predict which horses are at higher risk for colic surgery complications.

DESCRIPTION: Horses that require surgical treatment for colic are at higher risk for complications and death. Unfortunately, no test exists that can reliably predict which horses will experience complications, making recovery predictions challenging. Peritoneal fluid bathes the abdominal organs, and contains cells, proteins and other substances that reflect abdominal disease or health. However, current tests based on measurement of a single protein or enzyme in the PF do not reliably predict outcomes for horses with colic. For a more complete picture of the PF, researchers will measure its entire gene transcript and protein content in healthy horses as well as in those requiring surgery for colic. Researchers hope analysis of these data will reveal changes in PF proteins and gene transcripts related to postoperative complications and death. This work is a first step toward the development of a diagnostic test based on PF proteins or gene transcripts to help equine veterinarians better diagnose and treat horses with colic.

D23EQ-454

Learning How Air Pollution Impacts Horses While Training

COLORADO STATE UNIVERSITY

Projected Duration: 2 Years **Study Cost:** \$122,038 **Fellowship Training Grant**

SUMMARY: Researchers will study how air pollution affects horses training outside and use this information to help inform management and training recommendations.

DESCRIPTION: Studies show horses frequently exposed to elevated air pollution at racetracks throughout the United States, and when air pollution is elevated on the day of racing, all horses run slower. However, air pollution doesn't just affect horses on racing days. Little is known about the health and performance of horses that repeatedly train outside during high pollution days. Researchers will analyze 10 years of air pollution and racehorse training/competition data to address this knowledge gap. The team also will share findings with horse health experts to help guide management recommendations for equine athletes during periods of elevated air pollution.

D23EQ-509

Exploring Inhibitory Control and Coping Behaviors in Horses

HUMBOLDT UNIVERSITY OF BERLIN, GERMANY

Projected Duration: 1 Year **Study Cost:** \$9,746 **Donor-Inspired Study**

SUMMARY: Researchers will use behavioral tests and stress hormone analysis to assess a horse's impulsivity and coping abilities in stressful situations that may lead to mental and physical health issues, poor welfare and/or problematic behaviors.

DESCRIPTION: Horses differ in the way they respond to novel or stressful situations. Some horses react strongly and have problems adapting to these situations, while other horses exhibit more flexible behavior and quickly adapt. If horses consistently fail to adapt, their mental health will be affected and some horses might develop concerning behaviors, such as crib-biting or weaving, which results in health problems. Researchers will study whether behavioral inhibition, the ability to control prepotent behavioral responses, is linked to differences in coping capacity in individual horses. They will conduct behavioral inhibition tests, assess individual horse personalities, observe any stress behavior in daily activities, and measure long-term stress using hormonal analyses. Researchers hope to use these findings to develop an early warning strategy to help identify horses that might fail to cope with novel situations. Their goal is to help reduce the risk of subsequent mental and/or physical health problems and develop training programs to enhance a horse's flexibility to adjust to new and sometimes stressful situations.

D23EQ-803

Developing a New Pain Assessment Tool

UNIVERSITY OF PENNSYLVANIA

Projected Duration: 1 Year **Study Cost:** \$8,219 **Pilot Study Grant**

SUMMARY: Researchers will use remote video and heart rate monitoring to assess discomfort behaviors before and after epidural pain treatment to improve patient care and pain management.

DESCRIPTION: Despite the emergence of multiple pain scoring systems for horses, these systems have not been validated for a wide variety of clinical conditions, and they often rely on direct personal interaction with the horse. This human presence is believed to affect a horse's display of discomfort. Researchers will use video analysis to examine horses with painful health conditions from a distance, specifically referencing a catalog of equine discomfort behaviors. The team will focus on horses with painful bone or joint injuries that receive epidural treatment to relieve their discomfort, studying behaviors and changes in heart rate before and after epidural pain treatment. The team hopes their findings will be used to improve pain assessment and improve patient care and well-being of affected horses.

D23EQ-806

Developing a Drug Discovery Platform for African Horse Sickness

NATIONAL INSTITUTE FOR COMMUNICABLE DISEASES AND THE UNIVERSITY OF THE WITWATERSRAND, SOUTH AFRICA

Projected Duration: 1 Year

Study Cost: \$14,999

Pilot Study Grant

SUMMARY: Researchers will explore the use of a specific protein to develop a new drug therapy for African horse sickness, a serious, and often fatal hemorrhagic disease of horses, mules and donkeys.

DESCRIPTION: Transmitted by biting flies, African horse sickness is an extremely tragic and deadly disease of horses; mortality rates are as high as 90% in affected areas. Once exclusively found in Africa, outbreaks are now documented in the Middle East, Spain, and most recently in Southeast Asia. The risk for future outbreaks is slowly increasing due in part to climate change. While an available vaccine exists, it is not used outside of Africa due to safety concerns; this vaccine can revert to become fully infectious authentic virus. Furthermore, no drug or treatment is available for already infected horses and these animals are generally euthanized for outbreak control. Studies show, during a viral infection from this sickness, a protein called NS4 impairs the immune response in horses. Without this protein, infection with this virus is mild and non-fatal. Researchers believe the NS4 protein may be an ideal target for drug discovery. In this study, the team will perform the steps to prepare the NS4 protein for future drug fragment screens. These data will lay the foundation for rapid drug discovery targeting the NS4 protein of African horse sickness. Such drugs will be shelf-stable and can be purchased and stored in large quantities in preparation for future outbreaks, potentially saving the lives of thousands of horses who succumb to the disease with each outbreak.

D23Z0-431

Searching for Diagnostic Biomarkers for Bovine Tuberculosis in African Buffalo

YALE UNIVERSITY

Projected Duration: 2 Years **Study Cost:** \$125,000 **Fellowship Training Grant**

SUMMARY: Researchers will look for biomarkers in the blood of African buffalo that could provide a fast and accurate way to diagnose bovine tuberculosis and help control the spread of this common disease in animals.

DESCRIPTION: Bovine tuberculosis is a chronic contagious disease caused by *Mycobacterium bovis* that can affect a wide range of mammals, including wildlife, livestock and humans. Several wildlife species maintain the pathogen in the wild and spread the disease to other animals, creating an additional threat to the health and conservation of rare and endangered species. One such species is the African buffalo, which is sub-Saharan Africa's main reservoir of bTB. To manage the disease spread from infected buffalo, improved diagnostics options are needed for bTB in wildlife. Researchers will investigate signals or biomarkers in the blood of African buffalo that they hope can be used to diagnose bTB infections. This bTB diagnostic test will be based on extracellular vesicles – tiny particles released by cells into the blood that carry signals from their cell of origin. Findings will provide managers with a much-needed tool for their ongoing efforts to control bTB in South Africa and species affected by bTB worldwide. The team hopes their findings will help inspire similar EV-based solutions for future wildlife disease outbreaks.

D23Z0-457

Measuring Health and Stress of Wildlife Amphibian Populations

UNIVERSITY OF CALIFORNIA, LOS ANGELES

Projected Duration: 2 Years **Study Cost:** \$135,000 **Fellowship Training Grant**

SUMMARY: Researchers will study the health and well-being of amphibian populations using epigenetics, a molecular process that controls gene expression, as a potential new tool for amphibian conservation.

DESCRIPTION: One of the central questions in wildlife management is also the most difficult to answer: What constitutes a healthy population of animals? Researchers feel that epigenetics can offer new insights into wildlife health. Epigenetics is a field of study that focuses on changes in gene activity that do not involve changes in DNA sequences. One epigenetic process, DNA methylation, is attracting a great deal of attention because of how well it aligns to age. DNAm occurs when molecules, or methyl groups, bind to DNA and alter how genes are expressed. As individuals age, methyl groups accumulate in our DNA. Notably, this accumulation is thought to happen faster during periods of stress or otherwise unhealthy living conditions, leading to faster aging of the body relative to calendar age. By measuring DNAm levels in organisms, researchers hope to get a clear picture of both the calendar age and overall health of three closely related toad species – western toads, Yosemite toads and Dixie Valley toads. The team will use tools recently developed by UCLA scientists for measuring DNAm from easily obtainable DNA samples. They hope findings will show how epigenetics can successfully measure the health of threatened and endangered amphibians, with broader insights to help with conservation efforts of multiple animal species.

D23Z0-461

Finding Ways to Protect Bats from White-Nose Syndrome

UNIVERSITY OF WISCONSIN -MADISON

Projected Duration: 2 Years **Study Cost:** \$125,000 **Fellowship Training Grant**

SUMMARY: Researchers will develop a first-of-its-kind cell culture system to test a promising new drug to protect bats against white-nose syndrome, a serious and highly fatal fungal infection.

DESCRIPTION: Hibernating bats are dying in vast numbers from white-nose syndrome, a rapidly spreading fungal infection in North America. However, little is known about how WNS invades the bat's skin and causes fatal infections. In early studies, researchers exposed bat cells to the fungal agent that causes WNS and discovered a receptor on the bat skin cells that allows entry of the infectious agent. They also identified a promising drug that blocks the receptor, thwarting invasion of the infectious agent into the skin cells. In this study, the team will further investigate the role of the receptor in the development of WNS and its influence on the susceptibility of different bat species to WNS. The team will use this new information to inform the development of preventive strategies using the receptor-blocking drug to help protect susceptible bats against WNS.

D23Z0-527

Developing a Rapid Test for Deadly Fungal Disease

UNIVERSITY OF CALIFORNIA, DAVIS

Projected Duration: 1 Year **Study Cost:** \$71,124 **Established Investigator Grant**

SUMMARY: Researchers will develop an easy-to-use, rapid detection field test for chytrid, an infectious and often deadly disease in frogs and other amphibians.

DESCRIPTION: Chytridiomycosis, or chytrid, is an infectious amphibian skin disease caused by the fungus *Batrachochytrium dendrobatidis*. Chytrid has been detected in 55% of amphibian species worldwide and implicated in the decline of more than 500 species and extinction in the wild of up to 90 species. Current chytrid mitigation strategies rely on the rapid detection of small quantities of *Bd*, but it can take anywhere from hours to days to obtain results from standard genetic tests. To solve this problem, researchers will use new CRISPR technologies to develop a test for rapid detection – less than 30 mins – of *Bd* from water and amphibian skin, a much-needed tool for rapid field detection and research. Findings will help improve disease monitoring for breeding and reintroduction efforts as well as monitoring disease risk from the global pet trade.

D23Z0-538

Developing a Genetic Toolkit to Save Endangered Newts

UNIVERSITY OF KENTUCKY

Project Duration: 2 Years **Study Cost:** \$211,400 **Established Investigator Grant**

SUMMARY: Researchers will use genetic data to inform reintroduction efforts of the endangered Lao warty newt, a species of salamander.

DESCRIPTION: The Lao warty newt is found only in a small region in northern Laos. This salamander species is threatened by human activities, including burn-based agriculture, its use as food and medicine, and by the international pet trade. The research team, composed of researchers based in Laos and the United States, will design a cost-effective molecular toolkit based on genetic data that will help inform reintroduction efforts of captive-bred and confiscated animals. Data will provide a clearer picture of whether Lao warty newts from different places are breeding with each other, the genetic diversity of wild populations, population trends, and whether individuals living in different environments have unique adaptations needed for survival in the wild. The team hopes the new toolkit will also help identify geographic origin of confiscated newts so they can be returned to where they were originally collected.

D23Z0-706

Saving Black Abalone through Conservation Genomics

CENTRO DE INVESTIGACION CIENTIFICA Y DE EDUCACION SUPERIOR
DE ENSENADA (CICESE), MEXICO

Projected Duration: 2 Years **Study Cost:** \$164,150 **Established Investigator Grant**

SUMMARY: Researchers will generate much-needed genomic data on surviving populations of black abalone to help with conservation of this endangered species.

DESCRIPTION: Black abalone populations have plummeted since the 1980's due to overharvesting, disease and environmental changes impacting the kelp forest habitats vital for their survival. To help save these plant-eating marine snails, researchers will generate basic genomic information to learn more about the diversity and structure of surviving populations. A better understanding of the complex adaptive patterns of surviving black abalone, including genetic adaptations to survive devastating disease outbreaks, will greatly benefit conservation efforts. The team hopes this new information will help inform captive breeding of black abalone as well as strategies to reintroduce them to once-abundant areas of abalone habitat in the kelp forest ecosystems along the Pacific coast from Mexico to Northern California.

D23Z0-713

Assessing the Health and Resiliency of Sea Dragons

UNIVERSITY OF COPENHAGEN, DENMARK

Projected Duration: 2 Years **Study Cost:** \$124,649 **Established Investigator Grant**

SUMMARY: Researchers will sequence the genomes of leafy and common sea dragons to better understand current population health status and improve the conservation risk assessment of these kelp-dwelling fishes.

DESCRIPTION: Although sea dragons are beloved by aquarium visitors worldwide, wild sea dragons can only be seen off Australia's southern coast. Little is known about the current conservation status of these animals, due in part to habitat loss secondary to climate change and the difficulty in monitoring these well-camouflaged animals. Researchers have been collecting tissue clips from leafy and common sea dragons all across their ranges for over a decade. The team will use these samples to sequence the genomes of the two sea dragon species to help assess population health. These data will help provide estimates of population sizes, levels of gene flow across the landscape, assessment of genetic variants, and a forecast of how sea dragons may respond to ongoing climate change. The researchers hope to use the data to inform conservation efforts by identifying which sea dragon populations are vulnerable and which are more resilient to changes in their habitats.

Notes

Notes

Established in 1948, Morris Animal Foundation is dedicated to improving and protecting the health of animals through scientific innovation, education and inspiration. Our investment in research has yielded life-saving vaccines, new treatments for critical diseases, superior screening tests and advanced diagnostic tools. We respond to emerging animal health threats that endanger entire species and make new discoveries in basic animal biology to support applied research. With every study we fund – more than 3,000 to date – we strive to advance the science of veterinary medicine, honoring the founding principles of Dr. Mark L. Morris Sr. to benefit animals worldwide.

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