

## Unraveling Canine Degenerative Myelopathy

By Sharon Albright, DVM, CCRT

Manager of Communications & Veterinary Outreach, AKC Canine Health Foundation

Canine degenerative myelopathy (DM) is a non-painful, slowly progressive disease affecting the nervous system of dogs. It is typically seen in larger dogs, but cases have been confirmed in many different breeds. Symptoms appear later in life and include weakness and paralysis of the rear limbs. The disease can progress to involve the front limbs and result in complete paralysis, but due to the difficulties of managing a large, non-ambulatory dog, many patients are euthanized before the later stages of disease. Since it was originally described in 1973, much has been learned about DM. It is also studied as a model for some forms of amyotrophic lateral sclerosis (ALS) in people.



The AKC Canine Health Foundation (CHF) has supported research on the genetics of DM which revealed that a mutation in the gene coding for the enzyme superoxide dismutase 1 (*SOD1*) confers a greater risk for clinical disease in some dogs. [*SOD1* converts damaging superoxide radical molecules into harmless hydrogen peroxide and oxygen molecules.] A commercial test was developed from this research and is offered by several laboratories. The majority of DM affected dogs are homozygous, having two copies of the mutated gene. However, not all homozygous dogs develop disease. Additional genetic studies have identified variations in the *SOD1* gene mutation and even gene modifiers (genes that alter the expression of another gene) among different dog breeds and mixed breeds. For example, a gene modifier associated with increased risk and earlier onset of clinical disease in Pembroke Welsh Corgis does not have the same effect in Boxers. This complexity demonstrates why additional exploration is needed to understand the genetic and clinical expression of DM, and CHF remains committed to making that happen.

Clinical signs of degenerative myelopathy are ultimately caused by degeneration of the axons (the long threadlike part of a nerve cell that transmits information

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## Summer 2018

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### CALENDAR OF EVENTS

#### WHERE TO FIND US

##### July 20-22

Houston World Series of Dog Shows,  
Houston, TX

##### August 28-30

AKC US Detection Dog Conference 2018,  
Durham, NC

##### September 2

Tarheel Labor Day Cluster, Raleigh, NC

##### September 8

AKC Responsible Dog Ownership Day,  
Raleigh, NC

#### UPCOMING WEBINARS

Register at [akcchf.org/vetvine](http://akcchf.org/vetvine).

##### August 22

Underlying Disease Screening in Dogs with  
Immune-Mediated Hemolytic Anemia:  
What should I be Looking for?  
Presented by: Linda Kidd, DVM, PhD, DACVIM

##### September 6

Crash, Boom, Bang: Updates on Canine  
Noise Phobia Treatments  
Presented by: Julia Albright, MA, DVM, DACVB

# Unraveling Canine Degenerative Myelopathy

continued

## Degenerative Myelopathy—CHF's Impact

20 years of funding

\$925,000 invested

14 grants

13 peer-reviewed publications

to different neurons, muscles, and glands) and myelin (an insulating layer around nerve cells that improves the speed and efficiency of signal transmission) of motor neurons (cells that transmit messages from the central nervous system to muscles). Numerous CHF-funded studies have focused on the structural and functional changes in nerve and muscle tissue in various stages of DM in hopes that understanding these changes will lead to better diagnostic tools and development of effective treatments. For example, a structural protein of myelinated motor axons called phosphorylated neurofilament heavy (pNF-H) can be measured in canine cerebrospinal fluid (CSF) providing a much-needed tool in DM diagnosis. (Toedebusch, C. M., et al (2017). Cerebrospinal Fluid Levels of Phosphorylated Neurofilament Heavy as a Diagnostic Marker of Canine Degenerative Myelopathy. J Vet Intern Med, 31(2), 513-520. doi:10.1111/jvim.14659) Additional studies are exploring the use of a vaccine to decrease expression of mutated *SOD1* in dogs; this treatment could improve quality of life and survival of affected dogs.

Degenerative myelopathy is a slowly progressive but devastating disease. CHF and its donors are dedicated to providing researchers the necessary funding to better understand, diagnose and treat DM. The fact that dogs share our environment and lifestyle, along with the genetic, structural, and biochemical similarities between canine DM and *SOD1*-related human ALS means that scientific discovery can benefit both ends of the leash. Support additional research on DM at [akcCHF.org/donate](https://akcCHF.org/donate). 🐾



## Canine Leptospirosis – On the Rise?

By Aaron Stepanek, MBS, MPH

Projects Manager, AKC Canine Health Foundation

Leptospirosis is a zoonotic disease; in both dogs and humans, leptospirosis can cause severe kidney or liver failure, meningitis, difficulty breathing, and in some cases, lead to death. The bacteria responsible for this disease, *Leptospira interrogans*, is typically found in warm, wet, stagnant areas such as lakes, ponds or puddles and can survive for several months in these environments. Wildlife and rodents can harbor disease and spread the bacteria when they urinate. Direct transmission from one infected individual



to another is rare, but exposure to bodily fluids from infected individuals is an important risk factor for contracting the disease. The exposure does not need to be direct and may occur through contact with urine-contaminated items such as water bowls, bedding, or food. In recent years, there appears to be an increase in cases of canine leptospirosis within North America. The role of the environment, including number of trees and amount of standing water or wetlands, is being investigated to better understand

# Canine Leptospirosis – On the Rise?

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methods to prevent outbreaks in dogs. Another contributing factor to the prevalence of leptospirosis outbreaks is limited access to clean drinking water. Consequently, areas that are prone to flooding tend to result in a higher chance of exposure.

The AKC Canine Health Foundation (CHF) is currently funding two studies that aim to increase the understanding of leptospirosis and how to better combat it. The goal of the first study ([02380-A: Estimating Prevalence and Identifying Risk Factors for Canine Leptospirosis in North America](#)) is to identify risk factors for canine leptospirosis that lead to increased likelihood of an outbreak. Data on leptospirosis cases is being compared to environmental and socioeconomic data to identify trends in the prevalence of canine leptospirosis. This information will be compiled into maps that will allow veterinarians and pet owners to become better informed about potential outbreak locations and disease severity.

The second study ([02461-A: Innate Immune Response to Leptospira in Naturally Exposed Dogs](#)) looks at the immune response in dogs naturally exposed to *Leptospira*. Some animals may carry the bacteria yet do not show any clinical signs of disease. Comparing the role of the innate immune system between animals with and without clinical signs will provide a better understanding of the immunopathogenic mechanisms of infection. Furthermore, the data from this study may one day lead to an improved vaccine or more directed therapy for dogs. 🐾

**Additional resources at**  
[akcchf.org](http://akcchf.org):

🐾 [Leptospirosis Fact Sheet](#)

🐾 [Webinar: The Increasing Threat of Canine Leptospirosis: Keys to Diagnosis, Therapy and Prevention](#)

## 2018 Theriogenology Residents

The [Theriogenology Residency Program](#), started in 2016, is a collaboration between the American Kennel Club, the AKC Canine Health Foundation, and the Theriogenology Foundation to increase the number of trained practitioners in companion animal theriogenology and clinical genetics. Theriogenology is the branch of veterinary medicine concerned with reproduction, including the physiology and pathology of male and female reproductive systems, and the clinical practice of veterinary obstetrics, gynecology, and andrology.



### **Alyssa Helms, DVM** (CHF Grant 02390-E)

Residency Coordinator: Julie T. Cecere, DVM, MS  
Virginia-Maryland College of Veterinary Medicine  
Grant Period: 7/1/2018- 6/30/2021

Dr. Alyssa Helms attended the University of Tennessee for both her undergraduate degree in animal science (summa cum laude) and her veterinary degree. She has extensive experience in dog training and works with canine breeders to educate them on the preservation of purpose-bred dogs and canine reproductive medicine.



### **Katie Withowski, DVM** (CHF Grant 02395-E)

Residency Coordinator: Scott Bailey, DVM, MS  
North Carolina State University College of Veterinary Medicine  
Grant Period: 7/1/2018- 6/30/2021

Dr. Katie Withowski completed her veterinary degree at St. George's University School of Veterinary Medicine after receiving her Bachelor of Arts from Stony Brook University. During her undergraduate experience, Dr. Withowski also worked as a veterinary assistant. Most recently, she spent a year in field service and completed a theriogenology internship at the University of Georgia.

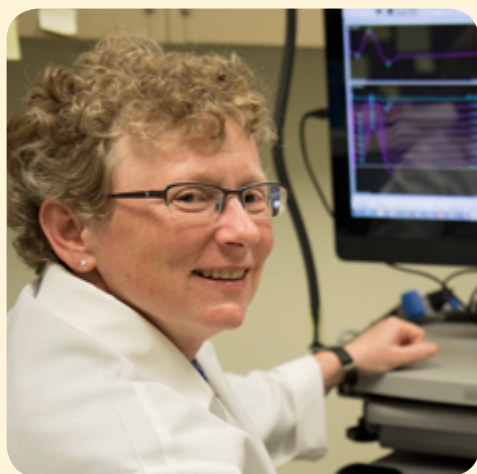
**MISSION:** The mission of the American Kennel Club Canine Health Foundation, Inc. is to advance the health of all dogs and their owners by funding scientific research and supporting the dissemination of health information to prevent, treat and cure canine disease.



## Researcher Spotlight

### Joan R. Coates, DVM, MS, DACVIM-Neurology

Professor of Neurology and Neurosurgery at the University of Missouri Veterinary Health Center



Dr. Joan Coates leads the University of Missouri Veterinary Health Center's neurology and neurosurgery services. She is also a member of the Comparative Neurology Program, which explores inherited developmental and degenerative diseases of the nervous system. Her research focus is the study of canine degenerative myelopathy (DM), a companion animal disease with similarities to amyotrophic lateral sclerosis (ALS).

The AKC Canine Health Foundation was key in setting up the collaboration that led Dr. Coates to the pivotal discovery of the *SOD1* mutation associated with canine DM. "Now we have a more specific disease profile and a path to explore for potential treatments," states Coates. She also applauds CHF's efforts to educate dog owners about DM and other canine diseases.

Dr. Coates is grateful for the funding provided through CHF, as well as the dedication and sacrifice of the families with dogs that participate in DM clinical trials. Dr. Coates remains humbled by her patients and committed to giving her best effort to every dog she meets. 🐾

## Recent CHF-Awarded Grant Highlights

### **02531: Identification of Genetic Risk Allele(s) Associated with the Development of Tricuspid Valve Dysplasia (TVD) in the Labrador Retriever**

Principal Investigator: Kathryn M. Meurs, DVM, PhD; North Carolina State University

Investigators are searching for a genetic marker for tricuspid valve dysplasia in the Labrador Retriever to develop a strategy to reduce the prevalence of the disease-causing mutation in this breed.

*This research is generously supported by the Labrador Retriever Club of the Potomac Top Twenty Gala Foundation and the Labrador Retriever Club, Inc.*

### **02519: Prevalence of *Bartonella* spp. Infection in Dogs with Cardiac and Splenic Hemangiosarcomas within and between Geographic Locations**

Principal Investigators: Edward B. Breitschwerdt, DVM and Matthew Breen, PhD; North Carolina State University Investigators are performing a comprehensive examination of the potential association between canine *Bartonella* infection and hemangiosarcoma.

### **02441: Evaluation of a New Vaccine for Canine Brucellosis**

Principal Investigator: Angela M. Arenas, DVM, PhD; Texas A&M University

Investigators are exploring the ability of a vaccine candidate to induce appropriate immunity against *Brucellosis* prior to its testing in dogs. They will also develop a diagnostic test capable of differentiating naturally infected versus vaccinated animals.

**See our full research grants portfolio at [akcCHF.org/research](http://akcCHF.org/research)**

## How You Can Help

### Double Your Donation!

For the 4th year in a row, the American Kennel Club (AKC) will match donations to the AKC Canine Health Foundation. AKC will match all donations from new and lapsed\* donors in 2018 up to \$500,000!

Please visit [akcCHF.org/donate](http://akcCHF.org/donate) to help prevent, treat and cure canine disease.

\* last donation made on or before 12/31/15



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