

Hunting for Answers About Lyme Disease

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Lyme disease is the most well-known and most studied tick-borne infection in dogs and humans. Caused by infection with the bacteria *Borrelia burgdorferi*, Lyme disease is most common in the Northeast United States but there is a risk of infection throughout North America. Co-infections, infection with more than one disease-causing organism, are common in dogs and humans. This makes Lyme disease, and tick-borne diseases in general, a great example of the need for One Health research. Collaboration between veterinary and human medical researchers means that what we learn about infection and disease in one species can also benefit the other.

The high prevalence of clinical Lyme disease and the need for better treatment and prevention strategies in dogs and humans are what motivated AKC Canine Health Foundation funded investigator Dr. Christine Petersen to hunt for answers about this tick-borne infection. They are also why English Springer Spaniel breeder and trainer Mark Haglin encouraged English Springer Spaniel Field Trial Association (ESSFTA) members to participate in Lyme disease research.

According to Mr. Haglin, “The potential for learning more on how to prevent our dogs from getting Lyme disease and learning new treatment options was critical because we all have had dogs that have suffered from this disease.”

From 2019 to 2021, Dr. Petersen performed physical exams and collected clinical histories and blood samples from dogs participating in ESSFTA field trials in the upper Midwest. The dogs and their owners had traveled from all over the United States and Canada, allowing data collection from dogs living and traveling in areas with high or low risk of tick-borne disease. The data is being analyzed by Dr. Petersen and her team to determine why some dogs infected with *B. burgdorferi* have no ill effects, while others experience severe clinical signs including fever, swollen/painful joints, and even life-threatening kidney disease. These different clinical responses are thought to be caused by interactions between the bacteria and each dog’s immune system.

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July 29 – August 2

AVMA Convention
 Philadelphia, PA

August 23-25

AKC National Detection Dog Conference
 Durham, NC

September 3

Tarheel Cluster
 Raleigh, NC

September 17

Responsible Dog Ownership Day
 Raleigh, NC

October 13-15

Veterinary Cancer Society
 Annual Conference
 Norfolk, VA

Upcoming Webinars

Register at akcchf.org/vetvine.

August 10

Pain sensitivity in dogs of different breeds: What do we know, and what do we believe?

Presented by Dr. Margaret Gruen

October 5

Cognitive and Emotional Development in Assistance Dog Puppies

Presented by Dr. Brian Hare

Hunting for Answers About Lyme Disease *continued*

Dr. Petersen's preliminary research found increased levels of a specific type of immune cell in dogs with subclinical Lyme disease – those that were infected but not overtly ill. The increased immune cells were natural killer T-like cells (or NKT-like cells), which can kill infected cells and make chemical signals that modify the immune response. Research continues to explore exactly how these NKT-like cells interact with *B. burgdorferi*. A better understanding of what these cells do to prevent clinical illness may help us alter the inflammatory molecules produced after infection and ultimately alter the course of disease in dogs, and potentially humans.

“Almost 100% of the dogs and owners who attended these field trials participated in the research study,” says Mr. Haglin. “Dr. Petersen and her team were just awesome to work with and interacted with the owners of the dogs and collected samples, gathered the data, and were very open to sharing the results and learning about each dog from each owner.” He continues, “One of the biggest reasons for our support of this research project is the potential for this to carry over to the human side of Lyme disease. We all know people who have been affected by Lyme disease in debilitating ways because of misdiagnosis or lack of early treatment. So, we figured any research on canine Lyme disease was going to be great to possibly help with treatment in humans.”

Dr. Petersen and her team enjoyed meeting the field trial dogs and owners who were eager and happy to participate in this research, despite the occasional cold and wet conditions. “This research does not happen without dog owners that are willing to participate,” she says. “In addition to the blood sample, we need to know the clinical history of each dog. We need the follow-up to know the full patient story.”

The AKC Canine Health Foundation and its donors are proud to collaborate with investigators like Dr. Petersen and dedicated dog owners like Mr. Haglin and ESSFTA members to tackle tough questions about Lyme disease and other tick-borne diseases. Working together, we can find, fund, and complete the quality studies needed to develop better treatment and prevention strategies for dogs and their owners. Learn more about CHF's tick-borne disease research, including how you can participate, at akcchf.org/ticks.



2022 Theriogenology Residents



AMERICAN
KENNEL CLUBSM



The American Kennel Club/AKC Canine Health Foundation/Theriogenology Foundation Small Animal Theriogenology Residency Program is a collaboration between these organizations 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. Learn more about this program at akcchf.org/therio.



Lily Lewis, DVM (CHF Grant 02972-E)

Residency Coordinator: Dr. Robyn R. Wilborn, DVM, MS, DACT
Auburn University

Dr. Lewis completed her veterinary degree at the University of Illinois after receiving a Bachelor of Science degree in Veterinary Business Management from Virginia Tech. She completed a small animal rotating internship at Nashville Veterinary Specialists.



Gail McRae, DVM (CHF Grant 02970-E)

Residency Coordinator: Dr. Erin E Runcan, DVM, DACT
The Ohio State University

Dr. McRae earned her veterinary degree from the University of Sydney after receiving a Bachelor of Science degree from the University of Cincinnati. She completed a theriogenology internship at the Ohio State University.

Vector-Borne Disease & One Health

Throughout July 2022, the AKC Canine Health Foundation (CHF) is highlighting its funded research on vector-borne diseases - those spread by ticks and insects such as fleas and mosquitoes. Since 1995, CHF and its donors have invested in the study of challenging diseases such as Chagas Disease, heartworms, bartonellosis, babesiosis, and more. This includes more than \$1.1 million invested in our Tick-Borne Disease Research Initiative studying Lyme disease and other common tick-borne infections. Many of these diseases also affect humans, so what we learn about them in humans may translate to dogs and vice versa. This concept of One Health recognizes the interconnected health of humans, animals, and our shared environments and is a core value of CHF's work.

CHF-funded research has already demonstrated the important role that vector-borne diseases play in the development of immune-mediated disease and the deadly cancer hemangiosarcoma. It also laid the groundwork for more accurate testing - scanning for specific DNA fragments from various infectious organisms using the genetic technology known as next-generation sequencing. Active CHF-funded research continues to explore the role of *Bartonella* infection in hemangiosarcoma, is examining how the canine immune system responds to Lyme disease, and is developing potential vaccines for common tick-borne infections. Follow us on Facebook and visit akcchf.org/onehealth to learn more about this important work advancing the health of all dogs and their owners.



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 - Dr. Christine Petersen



Christine Petersen, DVM, PhD is Director of the Center for Emerging Infectious Diseases (CEID) at the University of Iowa where she leads a research team studying infectious diseases that spread between humans and animals. She works with immunologists, vaccinologists, and biostatisticians to develop effective treatments and/or vaccinations for vector-borne diseases (those spread by insects and ticks).

Dr. Petersen has led extensive research on Leishmaniasis, a parasitic infection spread through the bite of sand flies, in dogs and humans. Her current AKC Canine Health Foundation (CHF) funded research is studying how the canine immune system responds to, and can fight off, Lyme disease. Dr. Petersen enjoys working with CHF and dog lovers. The experience has provided her with new research opportunities and helped her think about the interconnected nature of canine health and infectious disease research. She loves being in the field – collecting samples from dogs, interacting with their owners, and reminding her university students and research partners of the patients that will benefit from their work...the dogs.

Recent CHF Grant Highlights

Grant 03036-A: Mapping Microstructural Myelin and Axonal Damage in Dogs with Idiopathic Epilepsy using Diffusion MRI and Tract-Based Spatial Statistics

Principal Investigator: Philippa Johnson, BVSc; Cornell University

Map brain lesions in epileptic dogs using advanced MRI techniques that are sensitive enough to show such lesions in human studies.

Grant 03032-MOU: Early Detection of Canine Osteosarcoma

Principal Investigator: Jamie Modiano, VMD, PhD; University of Minnesota

Develop a blood test for early detection of osteosarcoma as the first step in a long-term plan for early detection and targeted prevention.

Grant 03026: Evaluation of the Efficacy of Antioxidant Treatment on Active Kidney Damage and Oxidative Stress

Principal Investigator: Gilad Segev, DVM and Hilla Chen, DVM; The Koret School of Veterinary Medicine

Evaluate the effect of antioxidant treatment on active damage and chronic kidney disease progression using novel kidney biomarkers.

See our full research grants portfolio at akcchf.org/research.

How You Can Help

Support the AKC Canine Health Foundation to help find better treatments, more accurate diagnoses, and an improved understanding of the mechanisms that cause disease in dogs. Whatever your capacity to give, there is a way for you to help. Learn more at akcchf.org/how-to-help.



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