

## Tick-Borne Infections - Double Trouble

By Sharon Albright, DVM, CCRT  
 Manager of Communications & Veterinary Outreach, AKC Canine Health Foundation

Tick-borne infections are a growing threat for dogs and humans. As ticks expand their geographic reach, more tick species are discovered, and new infectious organisms are identified, there is an urgent need for improved diagnostic tests and treatment strategies. With funding from the AKC Canine Health Foundation's (CHF) Tick-Borne Disease Research Initiative, scientists are learning about these insidious infections and the many effects they have in dogs. Recent results suggest the potential role of tick-borne infections in canine immune-mediated disease and cancer.



Tick-borne disease and immune-mediated disease cause similar symptoms in dogs such as lethargy, weakness, loss of appetite, and anemia. It is important to identify any underlying infections in a dog with immune-mediated disease since, in some cases, treatment of the infection may resolve the immune system malfunction, thereby eliminating the need for immunosuppressive drugs. Also, immunosuppressive drugs can be harmful in the face of infection and may not successfully treat immune-mediated disease until the underlying infection is also addressed. CHF-funded researchers found that 33% of dogs that presented to participating California clinics with immune-mediated disease had evidence of exposure to at least one tick-borne disease.<sup>1</sup> That exposure rate increased to 41% when they added different testing methods and repeated testing. These results show that owners and veterinarians should critically evaluate potential tick exposure in any dog with clinical signs of immune-mediated disease.

At North Carolina State University, investigators have been exploring the possibility that tick-borne infection plays a role in canine hemangiosarcoma, a deadly cancer of the cells that line blood vessels. They screened blood and tissues from dogs with hemangiosarcoma for *Bartonella*, *Babesia*, and *Mycoplasma*, three bacteria spread by ticks and fleas.<sup>2</sup> Results showed that 73% of dogs studied had *Bartonella* DNA in their tumor tissue and non-tumor tissues, but not in their blood. *Mycoplasma* was detected in only a few dogs and *Babesia* was not detected in any

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## Spring 2021

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### CALENDAR OF EVENTS

#### Where to Find Us

June 9-13  
**ACVIM Forum (virtual)**

#### Upcoming Webinars

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

On Demand - April 2021  
**Vector-Borne Disease Diagnostics:  
 From "Ruff" To "Purrfect"**  
 Presented by Pedro P. Diniz, DVM, PhD

May 25, 2021  
**A Novel Non-Surgical Option to  
 Preserve Limbs in Canine Osteosarcoma**  
 Presented by Joanne Tuohy, DVM, PhD, DACVS

Sign up to receive CHF's latest canine health research information at [akcchf.org/registration](https://akcchf.org/registration).

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of the dogs studied. *Bartonella* are intracellular bacteria known to trigger chronic inflammation and secrete growth factors that stimulate the formation of new blood vessels. Given these qualities, investigators hypothesize that *Bartonella* could be contributing to development of canine hemangiosarcoma.

In addition to the primary symptoms of infection, tick-borne disease may also play a role in immune system malfunction and the development of cancer in dogs. Therefore, CHF and its donors remain committed to the fight against tick-borne disease. Since 1995, CHF has invested more than \$920,000 in tick-borne disease research. CHF is funding three active studies working to develop more accurate tests for these infections. Additional studies are examining how certain dogs stay healthy in the face of infection. The knowledge gained from these studies, along with vigilant tick prevention, will help all dogs live longer, healthier lives. Learn more about CHF's Tick-Borne Disease Research Initiative at [akcchf.org/ticks](https://akcchf.org/ticks). 🐾

1. Kidd, L., Quorollo, B., Lappin, M., Richter, K., Hart, J. R., Hill, S., Osmond, C., & Breitschwerdt, E. B. (2017). Prevalence of Vector-Borne Pathogens in Southern California Dogs With Clinical and Laboratory Abnormalities Consistent With Immune-Mediated Disease. *Journal of Veterinary Internal Medicine*, 31(4), 1081-1090.

[doi.org/10.1111/jvim.14735](https://doi.org/10.1111/jvim.14735)

2. Lashnits E, Neupane P, Bradley JM, Richardson T, Thomas R, Linder KE, et al. (2020) Molecular prevalence of Bartonella, Babesia, and hemotropic Mycoplasma species in dogs with hemangiosarcoma from across the United States. *PLoS ONE* 15(1): e0227234. [doi.org/ 10.1371/journal.pone.0227234](https://doi.org/10.1371/journal.pone.0227234)

### May is Pet Cancer Awareness Month

The AKC Canine Health Foundation marks Pet Cancer Awareness Month each May. It is an opportunity to recognize important CHF-funded canine cancer research seeking better treatments, more accurate diagnoses, and an improved understanding of the mechanisms that cause cancer in dogs and humans. Follow us on Facebook and visit [akcchf.org/caninecancer](https://akcchf.org/caninecancer) for more information about CHF's canine cancer research – including over \$650,000 in new oncology grants awarded this year.

## Lymphoma Study Looks at Personalized Diagnostics in Preparation for Precision Medicine

By Barbara Fawver

Purina Manager of Pet Influential Communications



Precision medicine for treatment of the most common subtype of canine lymphoma, diffuse large B-cell lymphoma (DLBCL), may one day help extend the lives of affected dogs. Researchers at the University of Pennsylvania



report success using a personalized diagnostic tool to classify a dog's lymphoma. The next phase of research focuses on precision medicine in which patient-specific therapies will be developed.

The recently completed study (AKC Canine Health Foundation (CHF) Grant O2502) was conducted *in vitro* from tumor biopsies of dogs diagnosed with DLBCL. Lead investigator Nicola J. Mason, BVetMed, PhD, DACVIM (Internal Medicine), FCPP, who holds the Paul A. James and Charles A. Gilmore Endowed Chair Professorship, says, "The diagnostic test we have developed is intended to be rapid and affordable. It is used to identify mutations in common cancer driver genes present in a patient's tumors. Using this test, we found driver mutations in 85%

of the 60 DLBCL tumors we evaluated and were able to determine the number and type of mutations within those tumors."

The research team developed a next-generation sequencing (NGS) panel to identify genetic abnormalities within the malignant cells that aid in understanding what drives the tumor to proliferate and survive and might provide insight into the patient's prognosis. "The distinction of tumor subtypes based on molecular drivers may have



particular importance as it serves to determine the most appropriate targeted therapy for each individual patient,” Dr. Mason explains.

One of the most common canine cancers, lymphoma affects all breeds of dog and mixed breeds. The late-onset cancer typically occurs in dogs from 8 to 11 years of age. About 70% of lymphomas in dogs are B-cell lymphoma in which the malignancy arises from B lympho-

cytes, a type of white blood cell that helps the immune system fight off infection. Up to 85% of dogs with lymphoma respond initially to the standard CHOP-based chemotherapy; however, the long-term response is highly variable with some dogs relapsing within weeks of starting treatment, while others may not relapse for two years.

Support for this study came from 13 breed foundations, parent clubs and individual donors. Some of the clubs are using their Donor Advised Fund held at CHF, which includes Purina Parent Club Partnership funding, to help fund the study.

“We chose this study to support because it will help determine the best treatments for individual dogs,” says Karen Potter, DVM, CHIC liaison for the German Wirehaired Pointer Club of America. “Not all dogs with this cancer go to oncologists so the information this study generates on lymphoma subtypes will help veterinarians and owners make important decisions that hopefully will improve life expectancy.”

The ongoing research involves determining whether there is a correlation between specific driver mutations and the dog’s response to CHOP therapy. “We want to learn if a dog’s clinical outcome in response to standard chemotherapy could be predicted by the type of genetic driver mutation present in the malignant B cell,” says Dr. Mason. “If you knew the mutational profile of your dog’s cancer predicts a shorter survival with CHOP, then you might be more inclined to use a novel approach to inhibit the mutated proteins and hopefully have a better chance at controlling the malignancy.”

The goal is to improve the outcome for canine patients with lymphoma. “Fortunately, there are an increasing number of drugs becoming available that are known to specifically block pathways that are driving these mutations,” Dr. Mason says. “In the near future, these clinical options combined with a precision medicine approach are likely to improve treatment of lymphoma because we can target the Achilles’ heel of each patient’s cancer.” 🐾

## Purina Parent Club Partnership Program



## Parent Club PARTNERSHIP

The Purina Parent Club Partnership (PPCP) Program raised \$108,872.16 in 2020 to support canine health research funded by the AKC Canine Health Foundation (CHF). The program enables Purina Pro Club members to earn Purina Points by purchasing qualifying Purina pet foods and submitting proofs of purchase. Based on the accrual of Purina Points, an annual donation from Purina is shared between Purina Pro Club members’ designated parent breed club and that breed club’s Donor Advised Fund held at CHF. Since it began in 2002, the PPCP Program has provided over \$8.4 million for canine health research, breed rescue, and educational efforts to positively impact the general health and well-being of dogs.

Learn more at [akcCHF.org/ppcp](https://akcCHF.org/ppcp).



**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- Linda Kidd, DVM, PhD, DACVIM (SAIM)



Linda Kidd, DVM, PhD, DACVIM (Small Animal Internal Medicine) is a Professor of Small Animal Internal Medicine at the Western University of Health Sciences, College of Veterinary Medicine in Pomona, CA. Her clinical research interests include the role of vector-borne disease in triggering immune-mediated diseases and mechanisms of blood clot formation in immune-mediated hemolytic anemia in dogs.

After completing her internal medicine residency at the University of Wisconsin-Madison's School of Veterinary Medicine, Dr. Kidd earned a PhD in Immunology and Molecular Biology under the mentorship of Dr. Ed Breitshwerdt, a CHF-funded researcher at the Intracellular Pathogens

Research Laboratory at North Carolina State University's College of Veterinary Medicine. Dr. Kidd's CHF-funded studies contribute to research that explores the complicated interactions between the infectious organism, the environment, an individual's genetic make-up, and everything else that is happening in the body at the time of infection. Her work has provided important insights on the complex relationship between vector-borne infections and the immune system. Dr. Kidd has presented at the AKC Canine Health Foundation National Parent Club Canine Health Conference as well as through CHF's Canine Health Bytes webinar series. She is grateful to CHF and its donors for providing an important mechanism to research the health of our closest companions.

### Recent CHF Grant Highlights

#### **Grant 02910: Open-Label, Phase-2 Clinical Trial of Chlorambucil and Toceranib for Canine Mast Cell Tumors**

*Principal Investigator: Kristen Weishaar, DVM, MS; Colorado State University*

A clinical trial to characterize the efficacy and adverse effects associated with combination chemotherapy in dogs with mast cell tumor(s).

#### **Grant 02861-A: Cardiovascular Complications of Acute Pancreatitis in Dogs**

*Principal Investigator: Harry Cridge, MVB, MS; Michigan State University*

Investigators are identifying and characterizing the cardiovascular abnormalities that occur in acute pancreatitis in dogs. Results may inform treatment targets to improve outcomes for this deadly disease.

#### **Grant 02829: Investigating the Potential of Phage Therapy to Tackle *Staphylococcus pseudintermedius* Infections in Dogs**

*Principal Investigator: Gavin Paterson, PhD; R(D)SVS and Roslin Institute, University of Edinburgh*

Investigators are evaluating the use of naturally occurring viruses (phages) which infect and kill bacteria to treat bacterial skin infections. This novel therapy may provide a needed alternative to antibiotic use for common skin infections.

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

### How You Can Help

#### Support canine cancer research

An estimated 1 in 4 dogs will experience cancer at some point in their lives. We need your help to continue CHF's robust canine cancer research. Your gift will help us build on the important research already in progress for hemangiosarcoma, lymphoma, bone cancer, and more.

Help us fight canine cancer. Donate now at [akcchf.org/cancer](http://akcchf.org/cancer).



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