AKC CANINE HEALTH FOUNDATION

Discoveries

AMERICAN KENNEL CLUB® CANINE HEALTH FOUNDATION® PREVENT TREAT & CURE®

Fall 2022

A Genetic Test for Cruciate Ligament Rupture Risk in the Labrador Retriever

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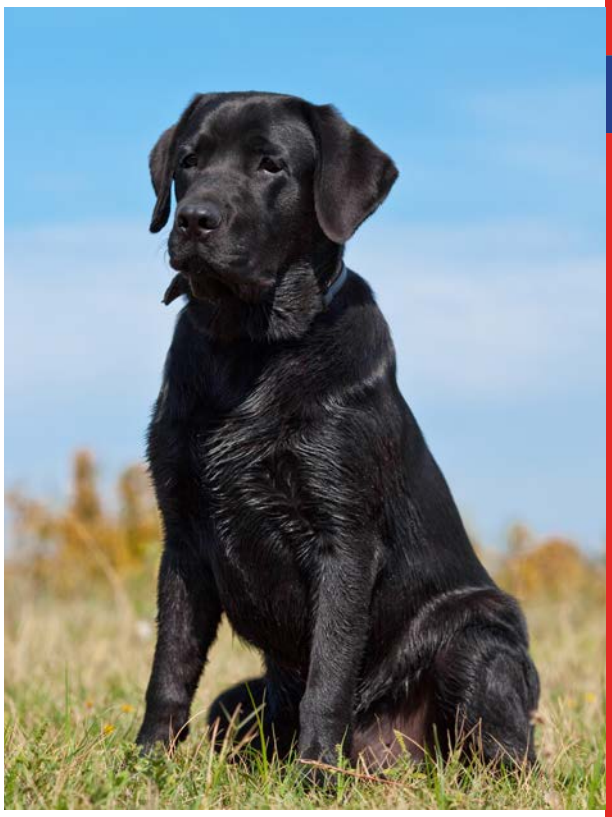
Cruciate ligament rupture is one of the most common orthopedic diagnoses in small animal clinical practice. It is like an ACL rupture in humans. In dogs, the cruciate ligament tissue frays little by little over time. Continued activity, joint instability, and inflammation eventually lead to complete tearing of the ligament. Surgery to stabilize the stifle (knee) joint is the recommended treatment and it is estimated that more than $1 billion is spent on surgical and medical management of canine cruciate ligament rupture in the United States each year.[1] Dogs can often return to full activity following surgical repair and rehabilitation therapy, but it is a long and expensive journey.



Certain breeds, such as the Labrador Retriever, Rottweiler, and Newfoundland are at higher risk of cruciate ligament rupture, indicating a genetic influence on disease development. But which genes are involved and how much impact do they have on an individual dog's risk of cruciate ligament rupture? Investigators at the University of Wisconsin set out to answer these questions with funding from the AKC Canine Health Foundation (CHF).

Analyzing genetic data from just over 1,000 Labrador Retrievers, investigators found that the heritability of cruciate ligament rupture in Labs is estimated at 0.62. This means that 62% of the risk comes from genetic factors, with the remaining 38% resulting from environmental factors. Specific environmental factors that influence risk of cruciate ligament rupture are poorly understood.

There are many genes with thousands of variants that influence risk of cruciate ligament rupture in Labrador Retrievers. While this seems overwhelming, investigators have been able to develop a genetic test that predicts whether a Labrador is at high risk for the disease.

"It's important to understand that this test is predictive for disease risk," says Principal Investigator Dr. Peter Muir. "Cruciate ligament rupture is a common complex disease. This test determines an individual dog's risk of the disease, which is not the same as genotyping for a simple dominant or recessive trait."

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Calendar of Events

Where to Find Us

October 13-15
Veterinary Cancer Society Annual Conference
Norfolk, VA

November 4-6
North Carolina Veterinary Conference
Raleigh, NC

November 19-20
Kennel Club of Philadelphia – The National Dog Show
Philadelphia, PA

December 15
Canines & Cocktails
Orlando, FL

December 16-18
AKC National Championship
Orlando, FL

A Genetic Test for Cruciate Ligament Rupture Risk in the Labrador Retriever *continued*

Test results will be either 'predicted to be a case,' meaning the dog has genetic markers that predict it will likely develop cruciate ligament rupture, or 'predicted to be a control,' meaning that it is unlikely to develop the disease. Predictive accuracy in the reference population used to develop the test was 98%.

"If a dog receives the 'high genetic risk' result, it is highly likely that dog will develop a cruciate ligament rupture in its lifetime," Dr. Muir says. "But that risk could be reduced by personalized veterinary care once we better understand the relevant environmental risk factors that we can modify."

Owners of low-risk dogs must remember that their dogs still have a chance of developing cruciate ligament rupture because of environmental risk factors. In this regard, body condition is likely important.

How can breeders use this test? Because a large number of genetic variants influence risk of cruciate ligament rupture in the Labrador Retriever, breeding two low-risk dogs could produce high-risk puppies and vice versa. However, over time, the incidence of cruciate ligament rupture in this breed should decline if we continue to breed low-risk to low-risk dogs.

The genetic risk test for cruciate ligament rupture in Labrador Retrievers is an exciting development. It is one of the first genetic tests available for a canine complex disease. Results can inform breeding strategies to decrease the incidence of the disease in future generations of Labrador Retrievers. Owners of high-risk dogs can prioritize personalized care with their veterinarian to minimize modifiable environmental risk. While Labrador Retrievers continue playing and working without interruption, CHF will continue to find and fund ground-breaking studies like this to help all dogs live longer, healthier lives.

For more information about cruciate ligament rupture genetic test availability, visit **www.vetmed.wisc.edu/lab/corl/canine-genetic-testing/**.

1. Wilke VL, Robinson DA, Evans RB, Rothschild MF, Conzemius MG. Estimate of the annual economic impact of treatment of cranial cruciate ligament injury in dogs in the United States. *J Am Vet Med Assoc.* 2005 Nov 15;227(10):1604-7.

Research Benefiting the Canine Athlete

The AKC Canine Health Foundation (CHF) knows that all dogs are athletes. Whether they compete in agility, hunt with their owner, work as a seeing eye dog, or enjoy neighborhood walks, they deserve the best care and treatment to help maximize their enjoyment in life. All CHF-funded studies benefit the canine athlete, but exploration of orthopedic conditions, exercise physiology, and behavior directly relate to a dog's athletic performance.

A recently awarded grant to investigators at The Ohio State University (CHF Grant 03068-A) will support development of a canine wearable that recognizes agility movements and activity. The ability to collect data related to workload, speed, fatigue, and more will allow for objective study of these factors as they relate to injury risk. Results may help with development of injury prevention strategies – keeping the agility dog, or any canine athlete, on the field at peak performance.

Investigators at Penn Vet will use CHF funding (CHF Grant 03077-A) to study the effectiveness of various cooling strategies for dogs with exertional hyperthermia. An elevated core temperature puts a dog at risk for heat injury or heat stroke if activity continues or heat dissipation is compromised by physiology or environmental conditions. Investigators will compare the effectiveness of passive cooling, applying isopropyl alcohol to footpads, and submerging the dog in cool water to determine the best method(s) to prevent and treat heat stroke in active dogs.

CHF and its donors are committed to improving our understanding of the canine athlete. Optimizing the health and longevity of all dogs and returning them to activity after injury means that they can continue to enjoy the games and jobs they already love for longer. The human-animal bond is strengthened, and both ends of the leash benefit. Learn more about this important work at **akcchf.org/canineathlete**.

End of Year Giving

As you plan your year-end giving, we ask that you continue to make a difference in the health of the dogs we love.

Support our mission to advance the health of all dogs and their owners

Your donation will help the AKC Canine Health Foundation bring about a brighter future for dogs. Make a lasting impact at **akcchf.org/donate**.

AmazonSmile

Remember CHF during your holiday shopping. Go to **smile.amazon.com**, select American Kennel Club Canine Health Foundation, Inc. as your charitable organization, and Amazon will donate 0.5% of eligible purchases to CHF.

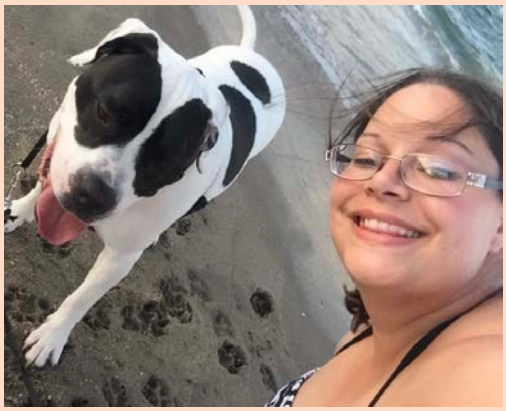
Honor a special dog or person

You can demonstrate your compassion and commitment to canine health by honoring or memorializing a special dog or person with an AKC Canine Health Foundation tribute at **akcchf.org/tribute**. We'll send an announcement of your gift to the person you designate.

For even more ways to give, visit **akcchf.org/how-to-help**.

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.*

Donor Spotlight: Amber Koerner



Deuce was a wedding present from Amber's fiancé and easily wiggled his way into the hearts of his new, animal-loving family. Amber had always dreamed of helping animals through a rescue sanctuary or other efforts. So, in 2021, after the sudden loss of 7-year-old Deuce to hemangiosarcoma, she turned her devastation into action to help other dogs and their families affected by cancer.

While researching canine hemangiosarcoma treatments, Amber learned about the AKC Canine Health Foundation (CHF) and its dedication to finding new diagnostic, treatment, and prevention strategies for this deadly cancer. Instead of a one-time donation, Amber organized "Deuce's Legacy Walk-a-Thon" to raise money for CHF-funded canine cancer research and educate other dog owners about this important work. The walk was held at a park where Amber and Deuce regularly enjoyed their walks together and it has become an annual event.

"If you want to be part of a good cause – this one is the best!" says Amber. "If you have to go through a cancer diagnosis with your dog at some point, you'll feel better knowing that there are people out there supporting research to help all dogs fight cancer."

Plans are already underway for the third annual walk in 2023. Learn more about *"Deuces Legacy" Annual Walk-A-Thon Club for Canine Cancer* on Facebook and find ways that you can support canine cancer research. Thank you, Amber, for remembering Deuce in such a meaningful way!

Recent CHF Grant Highlights

Grant 03083-A: Investigation into the Prevalence and Clinical Significance of Vector-borne Pathogen Coinfections in a Population of *Trypanosoma cruzi*-infected Dogs from Texas
Principal Investigator: Gregory K. Wilkerson, DVM, PhD; North Carolina State University
Determine if development of clinical Chagas Disease is affected by coinfections with other vector-borne pathogens. If so, treating those coinfections may decrease the risk of heart damage secondary to Chagas.

Grant 03055: Evaluating Reproductive Diseases *in vitro* with a 3D Canine Endometrial Organoid Model
Principal Investigator: Fiona Hollinshead, BVSc, PhD; Colorado State University
Develop miniature organs in a culture dish to improve the study of canine pyometra and endometritis.

Grant 03040: Identification of Novel Epilepsy Genes in Dogs
Principal Investigator: Hannes Lohi, PhD; The Folkhälsan Institute of Genetics
Identify genes that cause specific forms of epilepsy in the Labrador Retriever and potentially other breeds.

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

Canines & Cocktails

Join the fun at Canine & Cocktails, CHF's annual gala to celebrate achievements in canine health research. The event will be held Thursday, December 15, 2022, in conjunction with the AKC National Championship in Orlando, FL. For more information and to purchase tickets, visit **akcchf.org/caninesandcocktails**. We hope to see you there!

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