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Dog Tips

Detect Your Dog's Risk of Ligament Injury With 98% Accuracy

While certain breeds (including America's most popular breed) may be more susceptible to developing cruciate ligament rupture, the reality is, this painful and debilitating condition can occur in any dog, no matter the breed, size or age. Now there's a way to know your dog's risk with 98% accuracy.

Analysis by Dr. Karen Shaw Becker
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STORY AT-A-GLANCE

- A genetic test is now available that screens for risk of cruciate ligament rupture in Labrador retrievers
- For about $250, the genetic screening evaluates multiple gene variations that, in combination, predict a dog's genetic risk of cruciate ligament rupture with 98% accuracy
- Knowing in advance if your dog is at high risk — before cruciate ligament rupture — allows for personalized interventions that could help reduce the risk and even prevent the condition from occurring
- In most cases, ligament rupture occurs due to gradual deterioration that took place over a period of months or years
- In my experience, under-exercised dogs that eat poor-quality ultraprocessed diets, or those that eat homemade prey model diets lacking in important nutrients are at increased risk of CCL injury

A genetic test is now available from the University of Wisconsin-Madison School of Veterinary Medicine that screens for risk of cruciate ligament rupture. Up to 10% of Labrador retrievers — the most popular dog breed in the U.S. — suffer from a cruciate ligament rupture in their lifetime.[1]

Other breeds, like Newfoundlands and rottweilers, are also at high risk of this common condition, but it can occur in dogs of every breed, size and age. Cruciate ligament rupture is a painful and debilitating condition that can lead to permanent joint damage if left untreated. In most cases, however, ligament rupture occurs due to gradual deterioration that took place over a period of months or years.[2]

This means that early discovery, and treatment, may help prevent serious damage from occurring. Knowing in advance if your dog is at high risk — before cruciate ligament rupture — allows for personalized veterinary care that could help reduce the risk and even prevent the condition from occurring.

Genetic Test to Screen for Risk of Cruciate Ligament Rupture

The cruciate ligaments are bands of fibrous tissue around the knee. Each knee joint (called a stifle in dogs) in the hind legs has two cruciate ligaments that connect the femur (the bone above the knee joint) with the tibia (the bone below the knee joint). These are the cranial cruciate ligament (CCL) and the caudal cruciate ligament. In humans, the CCL is called the anterior cruciate ligament (ACL).

"In dogs, ligament degeneration and progressive rupture of collagen fibers in the ligament tissue leads to the development of knee joint instability over time," Peter Muir, laboratory co-director and a professor in the department of surgical sciences in the University of Wisconsin (UW) School of Veterinary Medicine, explained.[3] Both genetics and environmental factors are thought to play a role in this deterioration and subsequent CCL rupture.

"Cruciate ligament rupture has both genetic and environmental risk factors. For dogs predicted to develop disease, early interventional changes in lifestyle may be able to help minimize overall risk for disease development," according to UW's canine genetic testing website.[4]

For about $250, the genetic screening doesn't check just one part of a dog's DNA but rather evaluates multiple gene variations. "There are all these little variants that act together," Muir says, "So, any individual Labrador that inherits enough small effect variants in combination will have high genetic risk typical of a cruciate ligament rupture case."[5]

Test Categorizes Labs' Risk of CCL Rupture

For now, the genetic test is only available for Labrador retrievers. Muir and colleagues evaluated the genotype of more than 1,000 Labrador retrievers to screen for cruciate ligament rupture, identify gene variants associated with it and develop a genetic test for the condition.

"They found a heritability estimate of 0.62, meaning for each individual Labrador that develops cruciate ligament rupture, about 62 percent of the risk is genetic, and approximately 38 percent is environmental," a news release explained.[6]

Using DNA from a saliva or blood sample, the test is said to be 98% accurate in determining a Labrador retriever's genetic risk of a cruciate ligament rupture. Dogs that are screened will receive a report with one of these results:[7]

- **Predicted to be a case —** This means a dog is very likely to experience cruciate ligament rupture, although environmental interventions can help prevent it from occurring.
- **Predicted to be a control —** This means the dog is unlikely to experience cruciate ligament rupture, although the possibility still exists depending on environmental factors.

As for which dogs should be screened, pet guardians may prefer to know if their Labrador retriever is at high risk so they can be proactive about prevention. As noted in the news release:[8]

> *"Gold-standard treatment for cruciate ligament rupture costs between $4,000-$7,000 per affected knee. At least 50% of dogs that rupture one knee's cruciate ligament will go on to rupture the other side … Knowing your dog is at risk for cruciate ligament rupture will enable you to work with your veterinarian to help minimize risk and monitor for disease initiation."*

Responsible dog breeders may also screen breeding dogs, as cruciate ligament rupture is a heritable disease. For those considering a puppy from a breeder, the genetic screening can also be used to determine future risk of the condition.[9]

Proactive Steps to Reduce Risk of CCL Injury

There are several factors that pet parents can hone in on to help reduce CCL injury and damage. Dogs who've been spayed/neutered have more CCL damage than intact animals, which makes sense since sex hormones appear to have a protective effect on the musculoskeletal system.

Overweight and poorly conditioned dogs tax their ligaments more than lean dogs, as well. In addition to balance and core strengthening exercises, research suggests activities like dock diving, barn hunt and scent work are associated with a decreased rate of CCL rupture.[10]

Exercise “weekend warriors” are also high-risk for soft tissue damage; a crazy-active weekend, after a sedentary week, is the recipe for injuries, as are the dogs whose sole form of exercise is chasing a ball in the backyard.

Daily ligament-strengthening, controlled exercise (swimming, running, jogging, etc.) is necessary for strengthening tendons and ligaments and injury prevention. Lifelong, daily exercise also decreases the likelihood of injury when dogs have fun (playing frisbee or retrieving balls).

A diet rich in minerals, collagen, DHA/EPA and unadulterated (unheated) meat-based protein is also important. **Joint supportive nutraceuticals** can also go a long way in providing the body the extra nutrients needed to specifically support joints. In my experience, dogs that eat nutritionally unbalanced prey model diets lacking in important nutrients are at increased risk of CCL injury.

To support ligaments and overall health, I recommend feeding a homemade, fresh food diet that is nutritionally balanced for optimal nutrient intake, including 3.1 milligrams of manganese per 1,000 kcal (calories). This is the average amount of manganese provided by the canine ancestral diet.

How do you know if your homemade diet provides adequate trace minerals? Associated with each homemade recipe should be a nutritional analysis that provides this information. I don’t recommend guessing at whether or not you are meeting your dog’s vast mineral requirements, so if you feed a homemade diet, follow a recipe that provides a nutritional analysis demonstrating nutritional adequacy.

Dogs fed a ligament-supportive diet should not have nutritionally related degenerative cruciate damage over time. My recommendations for feeding a manganese-rich diet include:

- Follow a homemade recipe that provides nutritional information (including amounts of manganese per serving or 1,000 kcal). Supplement the recipe, as necessary (with whole foods or a product such as Standard Process E-Manganese) to meet manganese requirements
- Use chondroprotective supplements to support joints and soft tissues
- Call your pet food company and ask what guidelines they follow, or how much manganese (per 1,000 kcal) is in their food, so you know you're meeting optimal intake for your dog (AAFCO minimum is 1.25mg/1,000 calories)

In addition, it's very important to keep your dog lean and well-conditioned, preferably intact (opt for an ovary-sparing spay or vasectomy, when possible), and titered — not over-vaccinated. If your dog already has CCL disease, you can read details on my recovery and maintenance protocols in Everything You Need to Know About CCL Injuries.

Sources and References

[1,3,5,6,8,9] University of Wisconsin-Madison, School of Veterinary Medicine September 13, 2022

[2,7] American College of Veterinary Surgeons, Cranial Cruciate Ligament Disease

[4] University of Wisconsin-Madison, School of Veterinary Medicine, Canine Genetic Testing

[10] BMC Veterinary Research, Volume 18, Article number: 39 (2022)