

Hip Dysplasia in Labrador Retrievers

New test available to assess the genetic predisposition of Labrador retrievers to develop hip dysplasia

Introduction

Canine hip dysplasia (CHD) is a common inherited orthopedic trait. This joint malformation (dysplasia) results in instability and subluxation of the hip, which ultimately causes erosion of the articular cartilage and synovitis. Secondary osteoarthritis precipitates the clinical signs of lameness. The disease affects dogs of all breeds with different prevalence. Breed occurrence, as estimated by the Orthopedic Foundation for Animals, varies widely from 1% to 75%.¹

For many years, veterinarians have relied on a phenotypic assessment of the hips of dogs based on radiography. The Orthopedic Foundation for Animals (OFA) evaluation, Federation Cynologique Internationale (FCI) screening, British Veterinary Association/Kennel Club (BVA/KC) scoring scheme, Pennsylvania Hip Improvement Program (PennHIP) and dorsolateral subluxation (DLS) test are the five most widespread and thoroughly investigated screening approaches for canine hip dysplasia.

The primary goal for each screening program is to exclude genetically burdened individuals from the breeding pool. Because CHD is a polygenic heritable trait and current screening systems rely on interpretation of radiographs, their efficacy for reducing CHD is limited. This method of diagnosis can be combined with a clinical examination to make treatment decisions, but because hip dysplasia is a complex or quantitative trait, it is not a reliable method for eliminating affected dogs from a breed or for selecting dogs with the most resistant genetic composition for breeding. Despite intensive screening for four decades, the prevalence of CHD is still as high as 40% in some breeds.¹ In addition to that, there is controversy regarding the perfect age for the testing, the x-ray technique involves general anesthesia and the performing veterinarian needs to have a special x-ray training and certification.

Therefore, the development of a genetic test has been the main goal for years, especially as even a phenotypically normal dog can carry mutations that influence trait expression in the next generation. The idea was to find the genes that contribute to hip dysplasia and to use molecular markers near these contributing genes or the genetic mutations themselves to identify susceptible or resistant dogs. These breeding values and genetic marker

information can be used to assess the potential orthopedic health of the animal. The information can then be used in conjunction with radiographic hip screening on a pedigree to derive breeding values that could be applied in breeding programs or registries to reduce the incidence of the trait.

Hip Dysplasia DNA Dysgen Test®

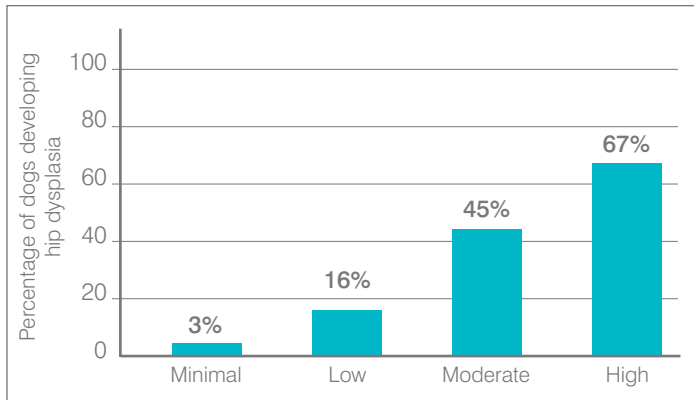
The Hip Dysplasia DNA Dysgen Test® is a test that can be used at an early age to predict the genetic predisposition to hip dysplasia in Labrador retrievers. The test was developed by researchers at Bioiberica, the University of Barcelona and Progenika Inc. The test has an accuracy of 85%, mean diagnostic sensitivity of 80% and specificity of 78% when compared to a hip dysplasia affected group (case) and a hip dysplasia-free (control) group.² One of its main advantages is that it can be performed at any age and is not dependant on the development of phenotypic changes. While classical x-ray-based diagnostics (PennHIP method) for joint laxity and osteoarthritis are recommended to be carried out not earlier than 4 months of age and ventrodorsal (VD) hip x-rays at even a later age, this genetic test has high value for breeders wanting to make breeding decisions, for pet owners as a purchase examination and also for veterinarians investigating hip dysplasia in their patients. The result of the test can help determine the frequency of the rechecks, which test would be suitable and if treatment might become necessary. Early detection is fundamental for better clinical management and follow-up.

The test assesses the presence or absence of seven single nucleotide polymorphisms (SNPs) that have been found to be linked to the presence of hip dysplasia in Labrador retrievers. Currently, the test is only available for Labrador retrievers, but the seven SNPs are believed to have use in other dog breeds, including golden retrievers and German shepherds, which are currently under clinical investigation.³

The Hip Dysplasia DNA Dysgen Test assesses the risk of developing hip dysplasia, but it is not a test to diagnose the presence of hip dysplasia. Diagnostic work flow to assess the presence of hip dysplasia still follows the scoring mode of these three CHD organizations: Orthopedic Foundation for Animals (OFA), Federation Cynologique Internationale (FCI) and British Veterinary Association/Kennel Club (BVA/KC).

Test Report

The Hip Dysplasia DNA Dysgen Test® analyzes the genetic profile of the animal and identifies the genetic susceptibility to develop hip dysplasia for the patient as minimal, low, moderate or high. Recommendations for follow-up and clinical management are provided based on the genetic susceptibility and should be considered together with the clinical evaluation of the individual animal.



Genetic susceptibility to hip dysplasia given by the test

Minimal predisposition

The genetic predisposition of this dog to develop hip dysplasia is below the average (20%) of the general population of Labrador retrievers. 3% of dogs in this risk group develop hip dysplasia, representing 6.7 times lower risk than the average Labrador retriever.

Recommendations:

- General preventive measures: Despite the minimal risk of developing hip dysplasia, preventing the animal from becoming overweight and promoting moderate exercise is recommended.
- Follow-up: Clinical examination and x-ray study at 8 months of age are recommended. In dogs under consideration for breeding, a clinical examination and x-ray study is encouraged at 24 months of age (OFA).
- Reproduction: If other positive traits are present, encourage the owner/breeder to breed his animal, preferably with dogs with a minimal or low predisposition as measured by the Dysgen test.

Low predisposition

The genetic predisposition of this dog to develop hip dysplasia is similar to the average (20%) of the general population of Labrador retrievers. 16% of dogs in this risk group develop hip dysplasia.

Recommendations:

- General preventive measures: Despite the low risk of developing hip dysplasia, preventing the animal from becoming overweight and encouraging moderate exercise, especially of the posterior body,

is recommended. Avoid high-intensity exercise, particularly in dogs less than 9–10 months of age. An appropriate diet should be selected for a growing large-breed dog.

- Follow-up: Clinical examination and x-ray study at 6 months of age are recommended. In dogs under consideration for breeding, a clinical examination and x-ray study is encouraged at 24 months of age (OFA).
- Reproduction: Advise that this animal only be bred with dogs with a minimal or low predisposition as measured by the Dysgen test.

Moderate predisposition

The genetic predisposition of this dog to develop hip dysplasia is above the average (20%) of the general population of Labrador retrievers. 45% of dogs in this risk group develop hip dysplasia, representing 2.3 times higher risk than the average Labrador retriever.

Recommendations:

- General preventive measures: Because of the moderate risk of developing hip dysplasia, it is especially important to prevent the animal from becoming overweight. Promote moderate exercise (not intensive) to improve range of motion, maintain cartilage in good condition and increase muscle tone. For example, walk with belt slowly at first, working up to a trot, squats and cavaletti exercises. Avoid slippery surfaces. An appropriate diet should be selected for a growing large-breed dog. The administration of products that promote joint health should be considered.
- Follow-up: Clinical examination and x-ray study at 6 months of age are recommended. In animals with a limp or joint pain, joint laxity (positive Ortolani sign) or osteoarthritic changes in the hip, consult with the orthopedic surgeon. In asymptomatic dogs, a second x-ray at 24 months and a clinical examination and x-ray every 2–3 years is encouraged to identify possible changes in the hips. In symptomatic dogs, concomitant medical therapy is recommended to limit pain and the progression of osteoarthritis.
- Reproduction: Advise the owner/breeder to avoid the reproduction of this animal

High predisposition

The genetic predisposition of this dog to develop hip dysplasia is above the average (20%) of the general population of Labrador retrievers. 67% of dogs in this risk group develop hip dysplasia, representing 3.4 times higher risk than the average Labrador retriever.

Recommendations:

Same as for moderate predisposition but with increased exercise restriction as indicated by clinical presentation.

Ordering Information

test code test name and contents

3537 Hip Dysplasia DNA Dysgen Test®

PCR for seven genetic markers for predisposition to hip dysplasia in the Labrador retriever

Specimen requirements: 2 mL EDTA whole blood (LTT);

keep refrigerated

Turnaround time: 7–14 working days

Contacting IDEXX

Laboratory Customer Support

If you have any questions regarding test codes, turnaround times or pricing, please contact our Laboratory Customer Support Team at 1-888-433-9987.

Expert feedback when you need it

Our team of internal medicine specialists is always available for complimentary consultation. Please call 1-888-433-9987 if you have questions.

References

1. Verhoeven G, Fortrie R, Van Ryssen B, Coopman F. Worldwide screening for canine hip dysplasia: where are we now? *Vet Surg.* 2012;41(1):10–19.
2. Blume V, Segarra S, Bartolomé N, Artieda M, Francino O, Sánchez A, Velasco A. DNA chip to assess the genetic predisposition of Labrador Retrievers to develop hip dysplasia. Paper presented at: Southern European Veterinary Conference; October 18–20, 2012; Barcelona, Spain.
3. Zhu L, Zhang Z, FriedenberG S, et al. The long (and winding) road to gene discovery for canine hip dysplasia. *Vet J.* 2009;181(2):97–110.

The information contained herein is intended to provide general guidance only. As with any diagnosis or treatment, you should use clinical discretion with each patient based on a complete evaluation of the patient, including history, physical presentation and complete laboratory data. With respect to any drug therapy or monitoring program, you should refer to product inserts for a complete description of dosages, indications, interactions and cautions.

DNA extraction for the Hip Dysplasia DNA Dysgen Test is performed by the IDEXX RealPCR™ Laboratory, with genetic analysis performed by Progenika Inc. PCR testing is a service performed pursuant to an agreement with Roche Molecular Systems, Inc.

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