



Canine Genetic Health Certificate™

Call Name: Matteo
Registered Name: -
Breed: Labrador Retriever
Sex: Male
DOB: Nov. 2022

Laboratory #: 376001
Certificate Date: Jan. 16, 2023

This canine's DNA showed the following genotype(s):

Disease	Gene	Genotype	Interpretation
Centronuclear Myopathy	PTPLA	WT/WT	Normal (clear)
Chondrodystrophy with Intervertebral Disc Disease Risk Factor (CDDY with IVDD)	CFA12 FGF4	WT/WT	Normal (Clear) - No CDDY or Increased IVDD Risk
Cone Degeneration (Labrador Retriever Type)	CNGA3	WT/WT	Normal (clear)
Congenital Myasthenic Syndrome (Labrador Retriever Type)	COLQ	WT/WT	Normal (clear)
Copper Toxicosis (Labrador Retriever Type) ATP7A	ATP7A	WT/Y	Normal/Clear Male
Copper Toxicosis (Labrador Retriever Type) ATP7B	ATP7B	WT/WT	Normal (clear)
Cystinuria (Labrador Retriever Type)	SLC3A1	WT/WT	Normal (clear)
Degenerative Myelopathy	SOD1	WT/WT	Normal (clear)
Elliptocytosis	SPTB	WT/WT	Normal (clear)
Exercise-Induced Collapse	DNM1	WT/WT	Normal (clear)
Hereditary Nasal Parakeratosis (Labrador Retriever Type)	SUV39H2	WT/WT	Normal (clear)
Hyperuricosuria	SLC2A9	WT/WT	Normal (clear)

WT, wild type (normal); M, mutant; Y, Y chromosome (male)

Blake C Ballif, PhD
Laboratory & Scientific Director

Christina J Ramirez, PhD, DVM, DACVP
Medical Director

Paw Print Genetics® performed the testing on the dog listed on this certificate. See the Laboratory Report for interpretation and recommendations based on these findings. The genes/diseases reported here were selected by the client. Normal results do not exclude inherited mutations not tested in these or other genes that may cause medical problems or may be passed on to offspring. The results included in this report relate only to the items tested using the sample provided. These tests were developed and their performance determined by Paw Print Genetics. This laboratory has established and verified the test(s)' accuracy and precision with >99.9% sensitivity and specificity. The presence of mosaicism may not be detected by this test. Non-paternity may lead to unexpected results. This is not a breed identification test. Because all tests performed are DNA-based, rare genomic variations may interfere with the performance of some tests producing false results. If you think these results are in error, please contact the laboratory immediately for further evaluation. In the event of a valid dispute of results claim, Paw Print Genetics will do its best to resolve such a claim to the customer's satisfaction. If no resolution is possible after investigation by Paw Print Genetics with the cooperation of the customer, the extent of the customer's sole remedy is a refund of the fee paid. In no event shall Paw Print Genetics be liable for indirect, consequential or incidental damages of any kind. Any claim must be asserted within 60 days of the report of the test results. Genetic counseling is available at Paw Print Genetics.



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Disease	Gene	Genotype	Interpretation
Ichthyosis (Golden Retriever Type 1)	PNPLA1	WT/WT	Normal (clear)
Macular Corneal Dystrophy (Labrador Retriever Type)	CHST6	WT/M	Carrier
Myotubular Myopathy 1	MTM1	WT/Y	Normal/Clear Male
Narcolepsy (Labrador Retriever Type)	HCRT2	WT/WT	Normal (clear)
Progressive Retinal Atrophy, Cone-Rod Dystrophy 4	RPGRIP1	WT/WT	Normal (clear)
Progressive Retinal Atrophy, Golden Retriever 2	TTC8	WT/WT	Normal (clear)
Progressive Retinal Atrophy, Progressive Rod-Cone Degeneration	PRCD	WT/WT	Normal (clear)
Pyruvate Kinase Deficiency (Labrador Retriever Type)	PKLR	WT/WT	Normal (clear)
Retinal Dysplasia/Oculoskeletal Dysplasia 1	COL9A3	WT/WT	Normal (clear)
Skeletal Dysplasia 2	COL11A2	WT/WT	Normal (clear)
Stargardt Disease	ABCA4	WT/WT	Normal (clear)

WT, wild type (normal); M, mutant; Y, Y chromosome (male)

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Coat Color and Trait Certificate

Call Name: Matteo

Laboratory #: 376001

Registered Name: -

Breed: Labrador Retriever

Certificate Date: Jan. 16, 2023

Sex: Male

DOB: Nov. 2022

This canine's DNA showed the following genotype(s):

Coat Color/Trait Test	Gene	Genotype	Interpretation
Chondrodysplasia (CDPA)	<i>CFA18 FGF4</i>	cd/cd	No Leg Shortening Associated with CDPA
D Locus (Dilute)	<i>MLPH</i>	D/D	Non-dilute (does not carry dilute)

Interpretation:

Two genetic mutations are associated with shortened legs in dogs. Both mutations consist of copied sections (duplication) of the canine *FGF4* gene (called an *FGF4*-retrogene) that have been inserted into two aberrant locations in the genome; one in chromosome 12 (*CFA12 FGF4*; associated with CDDY and IVDD risk) and one in chromosome 18 (*CFA18 FGF4*; associated with chondrodysplasia [CDPA], but not associated with IVDD). Appropriate breeding decisions regarding dogs which have inherited the *CFA12 FGF4* mutation (WT/M or M/M) need to address both the potential loss of genetic diversity in a population which would occur if dogs with this mutation were prohibited from breeding as well as the loss of the short-legged appearance that is a defining physical characteristic for some breeds. In breeds which inherit both mutations, breeders may use genetic testing results to selectively breed for the CDPA (*CFA18 FGF4*) mutation while breeding away from the CDDY and IVDD risk (*CFA12 FGF4*) mutation to reduce IVDD risk and retain the short-legged appearance. However, the frequency of each mutation varies between breeds and, in some cases, may not be conducive to such a breeding strategy. For example, breeds with extreme limb shortening (e.g. Basset hound, Dachshund, Corgi) typically develop their appearance due to inheritance of both the *CFA12 FGF4* and *CFA18 FGF4* mutations. In addition, depending on the breed, offspring born without either the *CFA12 FGF4* or *CFA18 FGF4* mutations may display longer limbs than cohorts and, therefore, not meet specific breed standards.

This dog carries two copies of the **cd** allele which does not result in leg shortening. However, the actual leg length of the dog is a result of a combination of factors including the mutation associated with CDDY and IVDD risk (*CFA12 FGF4*) as well as variants in other genes. This dog will pass one copy of **cd** to 100% of its offspring.

This dog does not carry any copies of the d1 or d2 mutations and has a D locus genotype of **D/D** which does not result in the "dilution" or lightening of the pigments that produce the dog's coat color. This dog will pass one copy of **D** to 100% of its offspring and cannot produce d/d dogs.

Paw Print Genetics® has genetic counseling available to you at no additional charge to answer any questions about these test results, their implications and potential outcomes in breeding this dog.