MAPLE

DNA Test Report | Test Date: April 14th, 2023 | embk.me/maple2106

BREED MIX

Labrador Retriever : 100.0%

GENETIC STATS

Wolfiness: 0.3 % **LOW**

Predicted adult weight: **55 lbs**

TEST DETAILS

Kit number: EM-61099920

Swab number: 31220610105893

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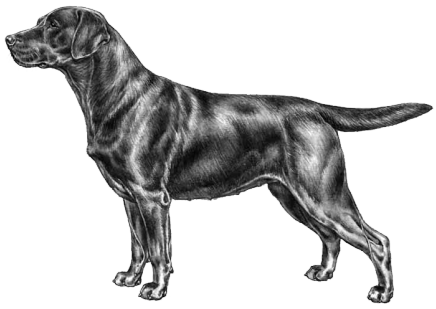

LABRADOR RETRIEVER

The Labrador Retriever has been the most popular AKC breed in the United States every year for the past 25 years. Their origins have been traced to the St. John's dog, named for the capital city of the Canadian province "Newfoundland and Labrador." The St. John's was developed from imported European dogs for fishing and hunting on the island of Newfoundland in the 18th century. During the 19th century St John's were bred in England and developed into the Labradors we know and love. Labradors were recognized as a breed by the British Kennel Club in 1903 and by the AKC in 1917. With their friendly dispositions and weatherproof build, they are terrific family dogs and outdoor companions. Most Labradors are very active with an appetite to match, and need plenty of exercise. Labradors often love to swim. Their double-coated weather-resistant fur can cause heavy shedding. Great hunting dogs and popular household companions, Labrador Retrievers are also employed as guide dogs and search-and-rescue dogs.

Fun Fact

We're pretty sure Labradors came from the island of Newfoundland, and many experts believe that the Newfoundland breed was developed in neighboring Labrador! By our calculations, there are 10 times as many Labradors in North America than there are people living in Labrador and Newfoundland.

RELATED BREEDS

Flat-Coated Retriever
Sibling breed

Golden Retriever
Sibling breed

Chesapeake Bay Retriever
Cousin breed

Newfoundland
Cousin breed

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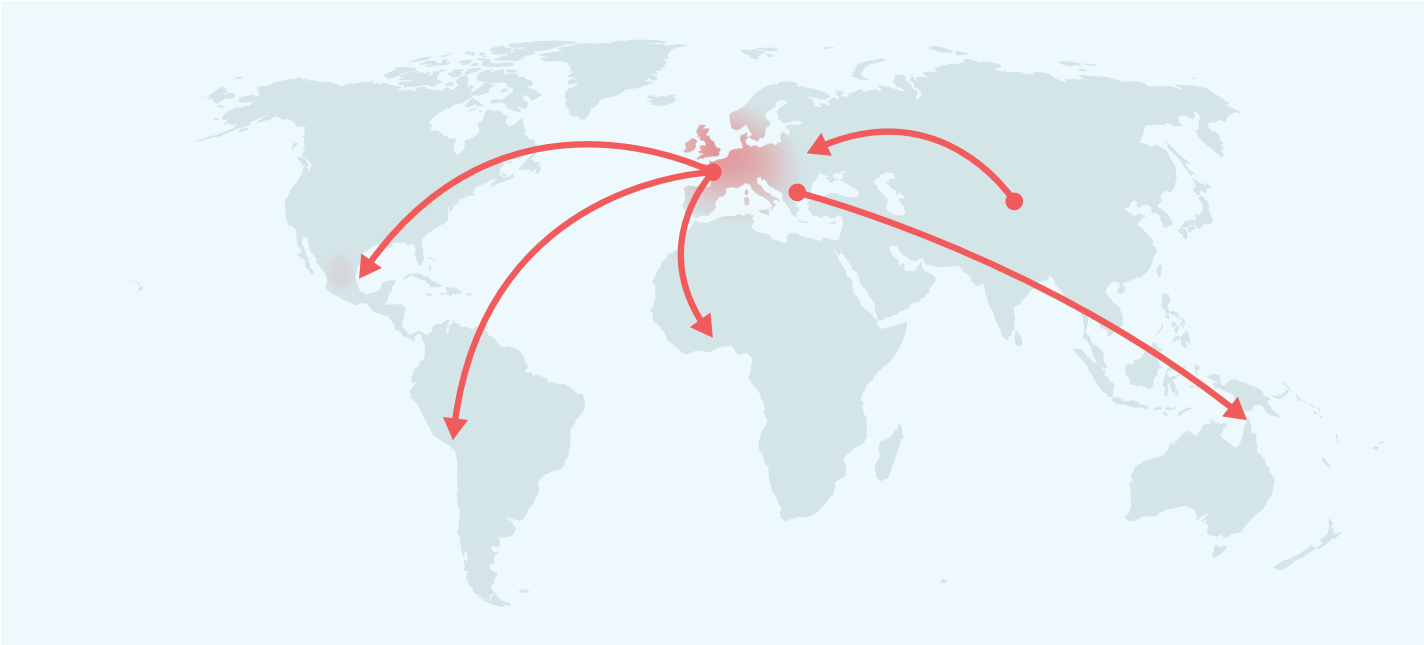
MATERNAL LINE



Through Maple's mitochondrial DNA we can trace her mother's ancestry back to where dogs and people first became friends. This map helps you visualize the routes that her ancestors took to your home. Their story is described below the map.

HAPLOGROUP: A1b

This female lineage was very likely one of the original lineages in the wolves that were first domesticated into dogs in Central Asia about 15,000 years ago. Since then, the lineage has been very successful and travelled the globe! Dogs from this group are found in ancient Bronze Age fossils in the Middle East and southern Europe. By the end of the Bronze Age, it became exceedingly common in Europe. These dogs later became many of the dogs that started some of today's most popular breeds, like German Shepherds, Pugs, Whippets, English Sheepdogs and Miniature Schnauzers. During the period of European colonization, the lineage became even more widespread as European dogs followed their owners to far-flung places like South America and Oceania. It's now found in many popular breeds as well as village dogs across the world!

HAPLOTYPE: A268

Part of the large A1b haplogroup, this uncommon haplotype occurs most frequently in Labrador Retrievers and has been spotted less often in Golden Retrievers, Poodles, and Chihuahuas.

MAPLE

TRAITS: BASE COAT COLOR

TRAIT	RESULT
Dark or Light Fur | *E (Extension) Locus* | *Gene: Melanocortin Receptor 1 (MC1R)* | Genetic Result: **EE** This gene helps determine whether a dog can produce dark (black or brown) hairs or lighter yellow or red hairs. Any result except for **ee** means that the dog can produce dark hairs. An **ee** result means that the dog does not produce dark hairs at all, and will have lighter yellow or red hairs over their entire body. **Did You Know?** If a dog has a **ee** result then the fur's actual shade can range from a deep copper to yellow/gold to cream - the exact color cannot be predicted solely from this result, and will depend on other genetic factors.	**Can have dark fur**
Dark brown pigment | *Cocoa* | *Gene: HPS3* | Genetic Result: **NN** Dogs with the **coco** genotype will produce dark brown pigment instead of black in both their hair and skin. Dogs with the **Nco** genotype will produce black pigment, but can pass the **co** variant on to their puppies. Dogs that have the **coco** genotype as well as the **bb** genotype at the B locus are generally a lighter brown than dogs that have the **Bb** or **BB** genotypes at the B locus. **Did You Know?** The **co** variant and the dark brown "cocoa" coat color have only been documented in French Bulldogs. Dogs with the cocoa coat color are sometimes born with light brown coats that darken as they reach maturity.	**No impact on fur and skin color**
Red Pigment Intensity LINKAGE | *I (Intensity) Loci* | Genetic Result: **Intermediate Red Pigmentation** Intensity refers to the concentration of red pigment in the coat. Dogs with more densely concentrated (intense) pigment will be a deeper red, while dogs with less concentrated (dilute) pigment will be tan, yellow, cream, or white. Five locations in the dog genome explain approximately 70% of red pigmentation intensity variation across all dogs. Because the locations we test may not directly cause differences in red pigmentation intensity, we consider this to be a linkage test. **Did You Know?** One of the genes that influences pigment intensity in dogs, TYR, is also responsible for intensity variation in domestic mice, cats, cattle, rabbits, and llamas. In dogs and humans, more genes are involved.	**No impact on coat pattern**

TRAITS: BASE COAT COLOR (CONTINUED)

TRAIT	RESULT
Brown or Black Pigment | *B (Brown) Locus* | *Gene: Tyrosinase Related Protein 1 (TYRP1)* | Genetic Result: **bb** This gene helps determine whether a dog produces brown or black pigments. Dogs with a **bb** result produce brown pigment instead of black in both their hair and skin, while dogs with a **Bb** or **BB** result produce black pigment. Dogs that have **ee** at the E (Extension) Locus and **bb** at this B (Brown) Locus are likely to have red or cream coats and brown noses, eye rims, and footpads, which is sometimes referred to as "Dudley Nose" in Labrador Retrievers. **Did You Know?** "Liver" or "chocolate" is the preferred color term for brown in most breeds; in the Doberman Pinscher it is referred to as "red".	**Brown fur and skin**
Color Dilution | *D (Dilute) Locus* | *Gene: Melanophilin (MLPH)* | Genetic Result: **DD** This gene helps determine whether a dog has lighter "diluted" pigment. A dog with a **Dd** or **DD** result will not be dilute. A dog with a **dd** result will have all their black or brown pigment lightened ("diluted") to gray or light brown, and may lighten red pigment to cream. This affects their fur, skin, and sometimes eye color. The D locus result that we report is determined by two different genetic variants that can work together to cause diluted pigmentation. These are the common **d** allele, also known as "**d1**", and a less common allele known as "**d2**". Dogs with one **d1** allele and one **d2** allele are typically dilute. To view your dog's **d1** and **d2** test results, click the "SEE DETAILS" link in the upper right hand corner of the "Base Coat Color" section of the Traits page, and then click the "VIEW SUBLOCUS RESULTS" link at the bottom of the page. **Did You Know?** There are many breed-specific names for these dilute colors, such as "blue", "charcoal", "fawn", "silver", and "Isabella". Dilute dogs, especially in certain breeds, have a higher incidence of Color Dilution Alopecia which causes hair loss in some patches.	**Dark (non-dilute) fur and skin**

MAPLE

TRAITS: COAT COLOR MODIFIERS

TRAIT	RESULT
Hidden Patterning | *K (Dominant Black) Locus* | *Gene: Canine Beta-Defensin 103 (CBD103)* | Genetic Result: **K^Bk^y** This gene helps determine whether the dog has a black coat. Dogs with a **k^yk^y** result will show a coat color pattern based on the result they have at the A (Agouti) Locus. A **K^BK^B** or **K^Bk^y** result means the dog is dominant black, which overrides the fur pattern that would otherwise be determined by the A (Agouti) Locus. These dogs will usually have solid black or brown coats, or if they have **ee** at the E (Extension) Locus then red/cream coats, regardless of their result at the A (Agouti) Locus. Dogs who test as **K^Bk^y** may be brindle rather than black or brown. **Did You Know?** Even if a dog is "dominant black" several other genes could still impact the dog's fur and cause other patterns, such as white spotting.	**More likely to have a mostly solid black or brown fur coat**
Body Pattern | *A (Agouti) Locus* | *Gene: Agouti Signalling Protein (ASIP)* | Genetic Result: **a^ta^t** This gene is responsible for causing different coat patterns. It only affects the fur of dogs that do not have **ee** at the E (Extension) Locus and do have **k^yk^y** at the K (Dominant Black) Locus. It controls switching between black and red pigment in hair cells, which means that it can cause a dog to have hairs that have sections of black and sections of red/cream, or hairs with different colors on different parts of the dog's body. Sable or Fawn dogs have a mostly or entirely red coat with some interspersed black hairs. Agouti or Wolf Sable dogs have red hairs with black tips, mostly on their head and back. Black and tan dogs are mostly black or brown with lighter patches on their cheeks, eyebrows, chest, and legs. Recessive black dogs have solid-colored black or brown coats. **Did You Know?** The ASIP gene causes interesting coat patterns in many other species of animals as well as dogs.	**No impact on coat pattern**
Facial Fur Pattern | *E (Extension) Locus* | *Gene: Melanocortin Receptor 1 (MC1R)* | Genetic Result: **EE** In addition to determining if a dog can develop dark fur at all, this gene can give a dog a black "mask" or "widow's peak," unless the dog has overriding coat color genetic factors. Dogs with one or two copies of **E^m** in their result will have a mask, which is dark facial fur as seen in the German Shepherd and Pug. Dogs with no **E^m** in their result but one or two copies of **E^g** will instead have a "widow's peak", which is dark forehead fur. **Did You Know?** The widow's peak is seen in the Afghan Hound and Borzoi, where it is called either "grizzle" or "domino".	**No dark mask or grizzle facial fur patterns**

TRAITS: COAT COLOR MODIFIERS (CONTINUED)

TRAIT	RESULT
Saddle Tan | *Gene: RALY* | Genetic Result: **II** The "Saddle Tan" pattern causes the black hairs to recede into a "saddle" shape on the back, leaving a tan face, legs, and belly, as a dog ages. The Saddle Tan pattern is characteristic of breeds like the Corgi, Beagle, and German Shepherd. Dogs that have the **II** genotype at this locus are more likely to be mostly black with tan points on the eyebrows, muzzle, and legs as commonly seen in the Doberman Pinscher and the Rottweiler. This gene modifies the A Locus **a^t** allele, so dogs that do not express **a^t** are not influenced by this gene. **Did You Know?** The Saddle Tan pattern is characteristic of breeds like the Corgi, Beagle, and German Shepherd.	**No impact on coat pattern**
White Spotting | *S (White Spotting) Locus* | *Gene: MITF* | Genetic Result: **SS** This gene is responsible for most of the white spotting observed in dogs. Dogs with a result of **spsp** will have a nearly white coat or large patches of white in their coat. Dogs with a result of **Ssp** will have more limited white spotting that is breed-dependent. A result of **SS** means that a dog likely has no white or minimal white in their coat. The S Locus does not explain all white spotting patterns in dogs and other causes are currently being researched. Some dogs may have small amounts of white on the paws, chest, face, or tail regardless of their result at this gene. **Did You Know?** Any dog can have white spotting regardless of coat color. The colored sections of the coat will reflect the dog's other genetic coat color results.	**Likely to have little to no white in coat**
Roan LINKAGE | *R (Roan) Locus* | *Gene: USH2A* | Genetic Result: **rr** This gene, along with the S Locus, regulates whether a dog will have roaning. Dogs with at least one copy of **R** will likely have roaning on otherwise uniformly unpigmented white areas created by the S Locus. Roan may not be visible if white spotting is limited to small areas, such as the paws, chest, face, or tail. The extent of roaning varies from uniform roaning to non-uniform roaning, and patchy, non-uniform roaning may look similar to ticking. Roan does not appear in white areas created by other genes, such as a combination of the E Locus and I Locus (for example, Samoyeds). The roan pattern can appear with or without ticking. **Did You Know?** Roan, tick, and Dalmatians' spots become visible a few weeks after birth. The R Locus is probably involved in the development of Dalmatians' spots.	**Likely no impact on coat pattern**

TRAITS: COAT COLOR MODIFIERS (CONTINUED)

TRAIT	RESULT
Merle | *M (Merle) Locus* | *Gene: PMEL* | Genetic Result: **mm** This gene is responsible for mottled or patchy coat color in some dogs. Dogs with an **M*m** result are likely to appear merle or could be "non-expressing" merle, meaning that the merle pattern is very subtle or not at all evident in their coat. Dogs with an **M*M*** result are likely to have merle or double merle coat patterning. Dogs with an **mm** result are unlikely to have a merle coat pattern. **Did You Know?** Merle coat patterning is common to several dog breeds including the Australian Shepherd, Catahoula Leopard Dog, and Shetland Sheepdog.	**Unlikely to have merle pattern**
Harlequin | *Gene: PSMB* | Genetic Result: **hh** This gene, along with the M Locus, determines whether a dog will have harlequin patterning. This pattern is recognized in Great Danes and causes dogs to have a white coat with patches of darker pigment. A dog with an **Hh** result will be harlequin if they are also **M*m** or **M*M*** at the M Locus and are not **ee** at the E locus. Dogs with a result of **hh** will not be harlequin. **Did You Know?** While many harlequin dogs are white with black patches, some dogs have grey, sable, or brindle patches of color, depending on their genotypes at other coat color genes.	**No impact on coat pattern**

MAPLE

TRAITS: OTHER COAT TRAITS

TRAIT	RESULT
Furnishings LINKAGE | *Gene: RSPO2* | Genetic Result: **II** This gene is responsible for "furnishings", which is another name for the mustache, beard, and eyebrows that are characteristic of breeds like the Schnauzer, Scottish Terrier, and Wire Haired Dachshund. A dog with an **FF** or **FI** result is likely to have furnishings. A dog with an **II** result will not have furnishings. We measure this result using a linkage test. **Did You Know?** In breeds that are expected to have furnishings, dogs without furnishings are the exception - this is sometimes called an "improper coat".	**Likely unfurnished (no mustache, beard, and/or eyebrows)**
Coat Length | *Gene: FGF5* | Genetic Result: **GG** This gene is known to affect hair/fur length in many different species, including cats, dogs, mice, and humans. In dogs, a **TT** result means the dog is likely to have a long, silky coat as seen in the Yorkshire Terrier and the Long Haired Whippet. A **GG** or **GT** result is likely to mean a shorter coat, like in the Boxer or the American Staffordshire Terrier. **Did You Know?** In certain breeds, such as Corgi, the long coat is described as "fluff."	**Likely short or mid-length coat**
Shedding | *Gene: MC5R* | Genetic Result: **TT** This gene affects how much a dog sheds. Dogs with furnishings or wire-haired coats tend to be low shedders regardless of their result for this gene. In other dogs, a **CC** or **CT** result indicates heavy or seasonal shedding, like many Labradors and German Shepherd Dogs. Dogs with a **TT** result tend to be lighter shedders, like Boxers, Shih Tzus and Chihuahuas.	**Likely light shedding**
Coat Texture | *Gene: KRT71* | Genetic Result: **CC** For dogs with long fur, dogs with a **TT** or **CT** result will likely have a wavy or curly coat like the coat of Poodles and Bichon Frises. Dogs with a **CC** result will likely have a straight coat—unless the dog has a "Likely Furnished" result for the Furnishings trait, since this can also make the coat more curly. **Did You Know?** Dogs with short coats may have straight coats, whatever result they have for this gene.	**Likely straight coat**
Hairlessness (Xolo type) LINKAGE | *Gene: FOXI3* | Genetic Result: **NN**	

TRAITS: OTHER COAT TRAITS (CONTINUED)

TRAIT	RESULT
Hairlessness (Terrier type) | *Gene: SGK3* | Genetic Result: **NN** This gene is responsible for Hairlessness in the American Hairless Terrier. Dogs with the **DD** result are likely to be hairless. Dogs with the **ND** genotype will have a normal coat, but can pass the **D** variant on to their offspring.	**Very unlikely to be hairless**
Oculocutaneous Albinism Type 2 LINKAGE | *Gene: SLC45A2* | Genetic Result: **NN** This gene causes oculocutaneous albinism (OCA), also known as Doberman Z Factor Albinism. Dogs with a **DD** result will have OCA. Effects include severely reduced or absent pigment in the eyes, skin, and hair, and sometimes vision problems due to lack of eye pigment (which helps direct and absorb ambient light) and are prone to sunburn. Dogs with a **ND** result will not be affected, but can pass the mutation on to their offspring. We measure this result using a linkage test. **Did You Know?** This particular mutation can be traced back to a single white Doberman Pinscher born in 1976, and it has only been observed in dogs descended from this individual.	**Likely not albino**

TRAITS: OTHER BODY FEATURES

TRAIT	RESULT
Muzzle Length | *Gene: BMP3* | Genetic Result: **CC** This gene affects muzzle length. A dog with a **AC** or **CC** result is likely to have a medium-length muzzle like a Staffordshire Terrier or Labrador, or a long muzzle like a Whippet or Collie. A dog with a **AA** result is likely to have a short muzzle, like an English Bulldog, Pug, or Pekingese. **Did You Know?** At least five different genes affect snout length in dogs, with BMP3 being the only one with a known causal mutation. For example, the muzzle length of some breeds, including the long-snouted Scottish Terrier or the short-snouted Japanese Chin, appear to be caused by other genes. This means your dog may have a long or short snout due to other genetic factors. Embark is working to figure out what these might be.	**Likely medium or long muzzle**
Tail Length | *Gene: T* | Genetic Result: **CC** This is one of the genes that can cause a short bobtail. Most dogs have a **CC** result and a long tail. Dogs with a **CG** result are likely to have a bobtail, which is an unusually short or absent tail. This can be seen in many "natural bobtail" breeds including the Pembroke Welsh Corgi, the Australian Shepherd, and the Brittany Spaniel. Dogs with **GG** genotypes have not been observed, suggesting that dogs with such a result do not survive to birth. **Did You Know?** While certain lineages of Boston Terrier, English Bulldog, Rottweiler, Miniature Schnauzer, Cavalier King Charles Spaniel, and Parson Russell Terrier, and Dobermans are born with a natural bobtail, it is not always caused by this gene. This suggests that other unknown genetic effects can also lead to a natural bobtail.	**Likely normal-length tail**
Hind Dew Claws | *Gene: LMBR1* | Genetic Result: **CC** This is one of the genes that can cause hind dew claws, which are extra, nonfunctional digits located midway between a dog's paw and hock. Dogs with a **CT** or **TT** result have about a 50% chance of having hind dewclaws. Hind dew claws can also be caused by other, still unknown, genes. Embark is working to figure those out. **Did You Know?** Hind dew claws are commonly found in certain breeds such as the Saint Bernard.	**Unlikely to have hind dew claws**

TRAITS: OTHER BODY FEATURES (CONTINUED)

TRAIT	RESULT
Back Muscling & Bulk (Large Breed) | *Gene: ACSL4* | Genetic Result: **CC** This gene can cause heavy muscling along the back and trunk in characteristically "bulky" large-breed dogs including the Saint Bernard, Bernese Mountain Dog, Greater Swiss Mountain Dog, and Rottweiler. A dog with the **TT** result is likely to have heavy muscling. Leaner-shaped large breed dogs like the Great Dane, Irish Wolfhound, and Scottish Deerhound generally have a **CC** result. The **TC** result also indicates likely normal muscling. **Did You Know?** This gene does not seem to affect muscling in small or even mid-sized dog breeds with lots of back muscling, including the American Staffordshire Terrier, Boston Terrier, and the English Bulldog.	**Likely normal muscling**
Eye Color LINKAGE | *Gene: ALX4* | Genetic Result: **NN** This gene is associated with blue eyes in Arctic breeds like Siberian Husky as well as tri-colored (non-merle) Australian Shepherds. Dogs with a **DupDup** or **NDup** result are more likely to have blue eyes, although some dogs may have only one blue eye or may not have blue eyes at all; nevertheless, they can still pass blue eyes to their offspring. Dogs with a **NN** result may have blue eyes due to other factors, such as merle or white spotting. We measure this result using a linkage test. **Did You Know?** Embark researchers discovered this gene by studying data from dogs like yours. Who knows what we will be able to discover next? Answer the questions on our research surveys to contribute to future discoveries!	**Less likely to have blue eyes**

MAPLE

TRAITS: BODY SIZE

TRAIT	RESULT
Body Size 1 | *Gene: IGF1* | Genetic Result: **NI** This is one of several genes that influence the size of a dog. A result of **II** for this gene is associated with smaller body size. A result of **NN** is associated with larger body size.	**Intermediate**
Body Size 2 | *Gene: IGFR1* | Genetic Result: **GG** This is one of several genes that influence the size of a dog. A result of **AA** for this gene is associated with smaller body size. A result of **GG** is associated with larger body size.	**Larger**
Body Size 3 | *Gene: STC2* | Genetic Result: **TT** This is one of several genes that influence the size of a dog. A result of **AA** for this gene is associated with smaller body size. A result of **TT** is associated with larger body size.	**Larger**
Body Size 4 | *Gene: GHR - E191K* | Genetic Result: **GG** This is one of several genes that influence the size of a dog. A result of **AA** for this gene is associated with smaller body size. A result of **GG** is associated with larger body size.	**Larger**
Body Size 5 | *Gene: GHR - P177L* | Genetic Result: **CC** This is one of several genes that influence the size of a dog. A result of **TT** for this gene is associated with smaller body size. A result of **CC** is associated with larger body size.	**Larger**

MAPLE

TRAITS: PERFORMANCE

TRAIT	RESULT
Altitude Adaptation | *Gene: EPAS1* | Genetic Result: **GG** This gene causes dogs to be especially tolerant of low oxygen environments, such as those found at high elevations. Dogs with a **AA** or **GA** result will be less susceptible to "altitude sickness." **Did You Know?** This gene was originally identified in breeds from high altitude areas such as the Tibetan Mastiff.	**Normal altitude tolerance**
Appetite LINKAGE | *Gene: POMC* | Genetic Result: **NN** This gene influences eating behavior. An **ND** or **DD** result would predict higher food motivation compared to **NN** result, increasing the likelihood to eat excessively, have higher body fat percentage, and be more prone to obesity. Read more about the genetics of POMC, and learn how you can contribute to research, in our blog post (https://embarkvet.com/resources/blog/pomc-dogs/). We measure this result using a linkage test. **Did You Know?** POMC is actually short for "proopiomelanocortin," and is a large protein that is broken up into several smaller proteins that have biological activity. The smaller proteins generated from POMC control, among other things, distribution of pigment to the hair and skin cells, appetite, and energy expenditure.	**Normal food motivation**

MAPLE

CLINICAL TOOLS

These clinical genetic tools can inform clinical decisions and diagnoses. These tools do not predict increased risk for disease.

Alanine Aminotransferase Activity (GPT)

Maple's baseline ALT level may be Low Normal

Why is this important to your vet?
Maple has one copy of a variant associated with reduced ALT activity as measured on veterinary blood chemistry panels. Please inform your veterinarian that Maple has this genotype, as ALT is often used as an indicator of liver health and Maple is likely to have a lower than average resting ALT activity. As such, an increase in Maple's ALT activity could be evidence of liver damage, even if it is within normal limits by standard ALT reference ranges.

What is Alanine Aminotransferase Activity?
Alanine aminotransferase (ALT) is a clinical tool that can be used by veterinarians to better monitor liver health. This result is not associated with liver disease. ALT is one of several values veterinarians measure on routine blood work to evaluate the liver. It is a naturally occurring enzyme located in liver cells that helps break down protein. When the liver is damaged or inflamed, ALT is released into the bloodstream.

How vets diagnose this condition
Genetic testing is the only way to provide your veterinarian with this clinical tool.

How this condition is treated
Veterinarians may recommend blood work to establish a baseline ALT value for healthy dogs with one or two copies of this variant.

MAPLE

HEALTH REPORT

How to interpret Maple's genetic health results:
If Maple inherited any of the variants that we tested, they will be listed at the top of the Health Report section, along with a description of how to interpret this result. We also include all of the variants that we tested Maple for that we did not detect the risk variant for.

A genetic test is not a diagnosis
This genetic test does not diagnose a disease. Please talk to your vet about your dog's genetic results, or if you think that your pet may have a health condition or disease.

Good news!

Maple is not at increased risk for the genetic health conditions that Embark tests.

Breed-Relevant Genetic Conditions	**18 variants not detected**
Additional Genetic Conditions	**224 variants not detected**

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BREED-RELEVANT CONDITIONS TESTED

Maple did not have the variants that we tested for, that are relevant to her breed:

- Canine Elliptocytosis (SPTB Exon 30)
- Pyruvate Kinase Deficiency (PKLR Exon 7, Labrador Retriever Variant)
- Progressive Retinal Atrophy, prcd (PRCD Exon 1)
- Golden Retriever Progressive Retinal Atrophy 2, GR-PRA2 (TTC8)
- Progressive Retinal Atrophy, crd4/cord1 (RPGRIP1)
- Achromatopsia (CNGA3 Exon 7, Labrador Retriever Variant)
- Macular Corneal Dystrophy, MCD (CHST6)
- Hyperuricosuria and Hyperuricemia or Urolithiasis, HUU (SLC2A9)
- Alexander Disease (GFAP)
- Narcolepsy (HCRTR2 Intron 6, Labrador Retriever Variant)
- Ullrich-like Congenital Muscular Dystrophy (COL6A3 Exon 10, Labrador Retriever Variant)
- Centronuclear Myopathy, CNM (PTPLA)
- Exercise-Induced Collapse, EIC (DNM1)
- Myotubular Myopathy 1, X-linked Myotubular Myopathy, XL-MTM (MTM1, Labrador Retriever Variant)
- Congenital Myasthenic Syndrome, CMS (COLQ, Labrador Retriever Variant)
- Hereditary Nasal Parakeratosis, HNPK (SUV39H2)
- Skeletal Dysplasia 2, SD2 (COL11A2, Labrador Retriever Variant)
- Stargardt Disease (ABCA4 Exon 28, Labrador Retriever Variant)

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ADDITIONAL CONDITIONS TESTED

Maple did not have the variants that we tested for, in the following conditions that the potential effect on dogs with Maple's breed may not yet be known.

- MDR1 Drug Sensitivity (ABCB1)
- P2Y12 Receptor Platelet Disorder (P2Y12)
- Factor IX Deficiency, Hemophilia B (F9 Exon 7, Terrier Variant)
- Factor IX Deficiency, Hemophilia B (F9 Exon 7, Rhodesian Ridgeback Variant)
- Factor VII Deficiency (F7 Exon 5)
- Factor VIII Deficiency, Hemophilia A (F8 Exon 10, Boxer Variant)
- Factor VIII Deficiency, Hemophilia A (F8 Exon 11, German Shepherd Variant 1)
- Factor VIII Deficiency, Hemophilia A (F8 Exon 1, German Shepherd Variant 2)
- Thrombopathia (RASGRP1 Exon 5, Basset Hound Variant)
- Thrombopathia (RASGRP1 Exon 8, Landseer Variant)
- Thrombopathia (RASGRP1 Exon 5, American Eskimo Dog Variant)
- Von Willebrand Disease Type III, Type III vWD (VWF Exon 4, Terrier Variant)
- Von Willebrand Disease Type III, Type III vWD (VWF Exon 7, Shetland Sheepdog Variant)
- Von Willebrand Disease Type I, Type I vWD (VWF)
- Von Willebrand Disease Type III, Type III vWD (VWF Intron 16, Nederlandse Kooikerhondje Variant)
- Von Willebrand Disease Type II, Type II vWD (VWF, Pointer Variant)
- Canine Leukocyte Adhesion Deficiency Type I, CLAD I (ITGB2, Setter Variant)
- Canine Leukocyte Adhesion Deficiency Type III, CLAD III (FERMT3, German Shepherd Variant)
- Congenital Macrothrombocytopenia (TUBB1 Exon 1, Cairn and Norfolk Terrier Variant)
- Glanzmann's Thrombasthenia Type I (ITGA2B Exon 13, Great Pyrenees Variant)
- Glanzmann's Thrombasthenia Type I (ITGA2B Exon 12, Otterhound Variant)
- May-Hegglin Anomaly (MYH9)
- Prekallikrein Deficiency (KLKB1 Exon 8)

MAPLE

ADDITIONAL CONDITIONS TESTED

- Pyruvate Kinase Deficiency (PKLR Exon 7, Beagle Variant)
- Pyruvate Kinase Deficiency (PKLR Exon 10, Terrier Variant)
- Trapped Neutrophil Syndrome, TNS (VPS13B)
- Ligneous Membranitis, LM (PLG)
- Platelet Factor X Receptor Deficiency, Scott Syndrome (TMEM16F)
- Methemoglobinemia (CYB5R3)
- Bernard-Soulier Syndrome, BSS (GP9, Cocker Spaniel Variant)
- Congenital Hypothyroidism (TPO, Tenterfield Terrier Variant)
- Congenital Hypothyroidism with Goiter (TPO Intron 13, French Bulldog Variant)
- Congenital Hypothyroidism (TPO, Rat, Toy, Hairless Terrier Variant)
- Congenital Dyshormonogenic Hypothyroidism with Goiter (SLC5A5, Shih Tzu Variant)
- Complement 3 Deficiency, C3 Deficiency (C3)
- Severe Combined Immunodeficiency, SCID (PRKDC, Terrier Variant)
- Severe Combined Immunodeficiency, SCID (RAG1, Wetterhoun Variant)
- X-linked Severe Combined Immunodeficiency, X-SCID (IL2RG Exon 1, Basset Hound Variant)
- X-linked Severe Combined Immunodeficiency, X-SCID (IL2RG, Corgi Variant)
- Progressive Retinal Atrophy, rcd1 (PDE6B Exon 21, Irish Setter Variant)
- Progressive Retinal Atrophy, rcd3 (PDE6A)
- Progressive Retinal Atrophy, CNGA (CNGA1 Exon 9)
- Progressive Retinal Atrophy, PRA1 (CNGB1)
- Progressive Retinal Atrophy (SAG)
- Golden Retriever Progressive Retinal Atrophy 1, GR-PRA1 (SLC4A3)
- Progressive Retinal Atrophy, crd1 (PDE6B, American Staffordshire Terrier Variant)
- X-Linked Progressive Retinal Atrophy 1, XL-PRA1 (RPGR)
- Progressive Retinal Atrophy, PRA3 (FAM161A)

MAPLE

ADDITIONAL CONDITIONS TESTED

- Collie Eye Anomaly, Choroidal Hypoplasia, CEA (NHEJ1)
- Day Blindness, Cone Degeneration, Achromatopsia (CNGB3 Deletion, Alaskan Malamute Variant)
- Day Blindness, Cone Degeneration, Achromatopsia (CNGB3 Exon 6, German Shorthaired Pointer Variant)
- Achromatopsia (CNGA3 Exon 7, German Shepherd Variant)
- Autosomal Dominant Progressive Retinal Atrophy (RHO)
- Canine Multifocal Retinopathy, cmr1 (BEST1 Exon 2)
- Canine Multifocal Retinopathy, cmr2 (BEST1 Exon 5, Coton de Tulear Variant)
- Canine Multifocal Retinopathy, cmr3 (BEST1 Exon 10 Deletion, Finnish and Swedish Lapphund, Lapponian Herder Variant)
- Primary Open Angle Glaucoma (ADAMTS10 Exon 9, Norwegian Elkhound Variant)
- Primary Open Angle Glaucoma (ADAMTS10 Exon 17, Beagle Variant)
- Primary Open Angle Glaucoma (ADAMTS17 Exon 11, Basset Fauve de Bretagne Variant)
- Primary Open Angle Glaucoma and Primary Lens Luxation (ADAMTS17 Exon 2, Chinese Shar-Pei Variant)
- Goniodysgenesis and Glaucoma, Pectinate Ligament Dysplasia, PLD (OLFM3)
- Hereditary Cataracts, Early-Onset Cataracts, Juvenile Cataracts (HSF4 Exon 9, Australian Shepherd Variant)
- Primary Lens Luxation (ADAMTS17)
- Congenital Stationary Night Blindness (RPE65, Briard Variant)
- Congenital Stationary Night Blindness (LRIT3, Beagle Variant)
- Microphthalmia (RBP4 Exon 2, Soft Coated Wheaten Terrier Variant)
- 2,8-Dihydroxyadenine Urolithiasis, 2,8-DHA Urolithiasis (APRT)
- Cystinuria Type I-A (SLC3A1, Newfoundland Variant)
- Cystinuria Type II-A (SLC3A1, Australian Cattle Dog Variant)
- Cystinuria Type II-B (SLC7A9, Miniature Pinscher Variant)
- Polycystic Kidney Disease, PKD (PKD1)
- Primary Hyperoxaluria (AGXT)
- Protein Losing Nephropathy, PLN (NPHS1)

MAPLE

ADDITIONAL CONDITIONS TESTED

- X-Linked Hereditary Nephropathy, XLHN (COL4A5 Exon 35, Samoyed Variant 2)
- Autosomal Recessive Hereditary Nephropathy, Familial Nephropathy, ARHN (COL4A4 Exon 30, English Springer Spaniel Variant)
- Autosomal Recessive Hereditary Nephropathy, Familial Nephropathy, ARHN (COL4A4 Exon 3, Cocker Spaniel Variant)
- Fanconi Syndrome (FAN1, Basenji Variant)
- Primary Ciliary Dyskinesia, PCD (CCDC39 Exon 3, Old English Sheepdog Variant)
- Primary Ciliary Dyskinesia, PCD (NME5, Alaskan Malamute Variant)
- Congenital Keratoconjunctivitis Sicca and Ichthyosiform Dermatosis, Dry Eye Curly Coat Syndrome, CKCSID (FAM83H Exon 5)
- X-linked Ectodermal Dysplasia, Anhidrotic Ectodermal Dysplasia, XHED (EDA Intron 8)
- Renal Cystadenocarcinoma and Nodular Dermatofibrosis, RCND (FLCN Exon 7)
- Canine Fucosidosis (FUCA1)
- Glycogen Storage Disease Type II, Pompe's Disease, GSD II (GAA, Finnish and Swedish Lapphund, Lapponian Herder Variant)
- Glycogen Storage Disease Type IA, Von Gierke Disease, GSD IA (G6PC, Maltese Variant)
- Glycogen Storage Disease Type IIIA, GSD IIIA (AGL, Curly Coated Retriever Variant)
- Mucopolysaccharidosis Type IIIA, Sanfilippo Syndrome Type A, MPS IIIA (SGSH Exon 6, Dachshund Variant)
- Mucopolysaccharidosis Type IIIA, Sanfilippo Syndrome Type A, MPS IIIA (SGSH Exon 6, New Zealand Huntaway Variant)
- Mucopolysaccharidosis Type VII, Sly Syndrome, MPS VII (GUSB Exon 5, Terrier Brasileiro Variant)
- Mucopolysaccharidosis Type VII, Sly Syndrome, MPS VII (GUSB Exon 3, German Shepherd Variant)
- Glycogen storage disease Type VII, Phosphofructokinase Deficiency, PFK Deficiency (PFKM, Whippet and English Springer Spaniel Variant)
- Glycogen storage disease Type VII, Phosphofructokinase Deficiency, PFK Deficiency (PFKM, Wachtelhund Variant)
- Lagotto Storage Disease (ATG4D)
- Neuronal Ceroid Lipofuscinosis 1, NCL 1 (PPT1 Exon 8, Dachshund Variant 1)
- Neuronal Ceroid Lipofuscinosis 2, NCL 2 (TPP1 Exon 4, Dachshund Variant 2)
- Neuronal Ceroid Lipofuscinosis, Cerebellar Ataxia, NCL4A (ARSG Exon 2, American Staffordshire Terrier Variant)
- Neuronal Ceroid Lipofuscinosis 5, NCL 5 (CLN5 Exon 4 SNP, Border Collie Variant)
- Neuronal Ceroid Lipofuscinosis 6, NCL 6 (CLN6 Exon 7, Australian Shepherd Variant)

MAPLE

ADDITIONAL CONDITIONS TESTED

- Neuronal Ceroid Lipofuscinosis 8, NCL 8 (CLN8 Exon 2, English Setter Variant)
- Neuronal Ceroid Lipofuscinosis 7, NCL 7 (MFSD8, Chihuahua and Chinese Crested Variant)
- Neuronal Ceroid Lipofuscinosis 8, NCL 8 (CLN8, Australian Shepherd Variant)
- Neuronal Ceroid Lipofuscinosis 10, NCL 10 (CTSD Exon 5, American Bulldog Variant)
- Neuronal Ceroid Lipofuscinosis 5, NCL 5 (CLN5 Exon 4 Deletion, Golden Retriever Variant)
- Neuronal Ceroid Lipofuscinosis 8, NCL 8 (CLN8 Insertion, Saluki Variant)
- Late-Onset Neuronal Ceroid Lipofuscinosis, NCL 12 (ATP13A2, Australian Cattle Dog Variant)
- GM1 Gangliosidosis (GLB1 Exon 15, Shiba Inu Variant)
- GM1 Gangliosidosis (GLB1 Exon 15, Alaskan Husky Variant)
- GM1 Gangliosidosis (GLB1 Exon 2, Portuguese Water Dog Variant)
- GM2 Gangliosidosis (HEXB, Poodle Variant)
- GM2 Gangliosidosis (HEXA, Japanese Chin Variant)
- Globoid Cell Leukodystrophy, Krabbe disease (GALC Exon 5, Terrier Variant)
- Autosomal Recessive Amelogenesis Imperfecta, Familial Enamel Hypoplasia (ENAM Deletion, Italian Greyhound Variant)
- Autosomal Recessive Amelogenesis Imperfecta, Familial Enamel Hypoplasia (ENAM SNP, Parson Russell Terrier Variant)
- Persistent Mullerian Duct Syndrome, PMDS (AMHR2)
- Deafness and Vestibular Syndrome of Dobermans, DVDob, DINGS (MYO7A)
- Unilateral Deafness and Vestibular Syndrome (PTPRQ Exon 39, Doberman Pinscher)
- Shar-Pei Autoinflammatory Disease, SPAID, Shar-Pei Fever (MTBP)
- Neonatal Interstitial Lung Disease (LAMP3)
- Recurrent Inflammatory Pulmonary Disease, RIPD (AKNA, Rough Collie Variant)
- Alaskan Husky Encephalopathy, Subacute Necrotizing Encephalomyelopathy (SLC19A3)
- Cerebellar Abiotrophy, Neonatal Cerebellar Cortical Degeneration, NCCD (SPTBN2, Beagle Variant)
- Cerebellar Ataxia, Progressive Early-Onset Cerebellar Ataxia (SEL1L, Finnish Hound Variant)
- Cerebellar Hypoplasia (VLDLR, Eurasier Variant)

MAPLE

ADDITIONAL CONDITIONS TESTED

- Spinocerebellar Ataxia, Late-Onset Ataxia, LoSCA (CAPN1)
- Spinocerebellar Ataxia with Myokymia and/or Seizures (KCNJ10)
- Hereditary Ataxia, Cerebellar Degeneration (RAB24, Old English Sheepdog and Gordon Setter Variant)
- Benign Familial Juvenile Epilepsy, Remitting Focal Epilepsy (LGI2)
- Degenerative Myelopathy, DM (SOD1A)
- Fetal-Onset Neonatal Neuroaxonal Dystrophy (MFN2, Giant Schnauzer Variant)
- Hypomyelination and Tremors (FNIP2, Weimaraner Variant)
- Shaking Puppy Syndrome, X-linked Generalized Tremor Syndrome (PLP1, English Springer Spaniel Variant)
- Neuroaxonal Dystrophy, NAD (TECPR2, Spanish Water Dog Variant)
- Neuroaxonal Dystrophy, NAD (VPS11, Rottweiler Variant)
- L-2-Hydroxyglutaricaciduria, L2HGA (L2HGDH, Staffordshire Bull Terrier Variant)
- Neonatal Encephalopathy with Seizures, NEWS (ATF2)
- Alaskan Malamute Polyneuropathy, AMPN (NDRG1 SNP)
- Narcolepsy (HCRTR2 Intron 4, Doberman Pinscher Variant)
- Narcolepsy (HCRTR2 Exon 1, Dachshund Variant)
- Progressive Neuronal Abiotrophy, Canine Multiple System Degeneration, CMSD (SERAC1 Exon 15, Kerry Blue Terrier Variant)
- Progressive Neuronal Abiotrophy, Canine Multiple System Degeneration, CMSD (SERAC1 Exon 4, Chinese Crested Variant)
- Juvenile Laryngeal Paralysis and Polyneuropathy, Polyneuropathy with Ocular Abnormalities and Neuronal Vacuolation, POANV (RAB3GAP1, Rottweiler Variant)
- Hereditary Sensory Autonomic Neuropathy, Acral Mutilation Syndrome, AMS (GDNF-AS, Spaniel and Pointer Variant)
- Sensory Neuropathy (FAM134B, Border Collie Variant)
- Juvenile-Onset Polyneuropathy, Leonberger Polyneuropathy 1, LPN1 (LPN1, ARHGEF10)
- Juvenile Myoclonic Epilepsy (DIRAS1)
- Juvenile-Onset Polyneuropathy, Leonberger Polyneuropathy 2, LPN2 (GJA9)
- Spongy Degeneration with Cerebellar Ataxia 1, SDCA1, SeSAME/EAST Syndrome (KCNJ10)
- Spongy Degeneration with Cerebellar Ataxia 2, SDCA2 (ATP1B2)

MAPLE

ADDITIONAL CONDITIONS TESTED

- Dilated Cardiomyopathy, DCM1 (PDK4, Doberman Pinscher Variant 1)
- Dilated Cardiomyopathy, DCM2 (TTN, Doberman Pinscher Variant 2)
- Dilated Cardiomyopathy, DCM (RBM20, Schnauzer Variant)
- Long QT Syndrome (KCNQ1)
- Cardiomyopathy and Juvenile Mortality (YARS2)
- Muscular Dystrophy (DMD, Cavalier King Charles Spaniel Variant 1)
- Muscular Dystrophy (DMD, Golden Retriever Variant)
- Ullrich-like Congenital Muscular Dystrophy (COL6A1 Exon 3, Landseer Variant)
- Limb Girdle Muscular Dystrophy (SGCD, Boston Terrier Variant)
- Inherited Myopathy of Great Danes (BIN1)
- Myostatin Deficiency, Bully Whippet Syndrome (MSTN)
- Myotonia Congenita (CLCN1 Exon 7, Miniature Schnauzer Variant)
- Myotonia Congenita (CLCN1 Exon 23, Australian Cattle Dog Variant)
- Nemaline Myopathy (NEB, American Bulldog Variant)
- Inflammatory Myopathy (SLC25A12)
- Hypocatalasia, Acatalasemia (CAT)
- Pyruvate Dehydrogenase Deficiency (PDP1, Spaniel Variant)
- Malignant Hyperthermia (RYR1)
- Imerslund-Grasbeck Syndrome, Selective Cobalamin Malabsorption (CUBN Exon 53, Border Collie Variant)
- Imerslund-Grasbeck Syndrome, Selective Cobalamin Malabsorption (CUBN Exon 8, Beagle Variant)
- Inherited Selected Cobalamin Malabsorption with Proteinuria (CUBN, Komondor Variant)
- Lundehund Syndrome (LEPREL1)
- Congenital Myasthenic Syndrome, CMS (CHAT, Old Danish Pointing Dog Variant)
- Congenital Myasthenic Syndrome, CMS (CHRNE, Jack Russell Terrier Variant)
- Congenital Myasthenic Syndrome, CMS (COLQ, Golden Retriever Variant)

MAPLE

ADDITIONAL CONDITIONS TESTED

- Myasthenia Gravis-Like Syndrome (CHRNE, Heideterrier Variant)
- Episodic Falling Syndrome (BCAN)
- Paroxysmal Dyskinesia, PxD (PIGN)
- Demyelinating Polyneuropathy (SBF2/MTRM13)
- Laryngeal Paralysis (RAPGEF6, Miniature Bull Terrier Variant)
- Dystrophic Epidermolysis Bullosa (COL7A1, Golden Retriever Variant)
- Dystrophic Epidermolysis Bullosa (COL7A1, Central Asian Shepherd Dog Variant)
- Ectodermal Dysplasia, Skin Fragility Syndrome (PKP1, Chesapeake Bay Retriever Variant)
- Ichthyosis, Epidermolytic Hyperkeratosis (KRT10, Terrier Variant)
- Ichthyosis, ICH1 (PNPLA1, Golden Retriever Variant)
- Ichthyosis (SLC27A4, Great Dane Variant)
- Ichthyosis (NIPAL4, American Bulldog Variant)
- Ichthyosis (ASPRV1 Exon 2, German Shepherd Variant)
- Focal Non-Epidermolytic Palmoplantar Keratoderma, Pachyonychia Congenita (KRT16, Dogue de Bordeaux Variant)
- Hereditary Footpad Hyperkeratosis (FAM83G, Terrier and Kromfohrlander Variant)
- Hereditary Footpad Hyperkeratosis (DSG1, Rottweiler Variant)
- Musladin-Lueke Syndrome, MLS (ADAMTSL2)
- Oculocutaneous Albinism, OCA (SLC45A2, Small Breed Variant)
- Oculocutaneous Albinism, OCA (SLC45A2 Exon 6, Bullmastiff Variant)
- Bald Thigh Syndrome (IGFBP5)
- Lethal Acrodermatitis, LAD (MKLN1)
- Ehlers Danlos (ADAMTS2, Doberman Pinscher Variant)
- Cleft Lip and/or Cleft Palate (ADAMTS20, Nova Scotia Duck Tolling Retriever Variant)
- Hereditary Vitamin D-Resistant Rickets (VDR)
- Oculoskeletal Dysplasia 2, Dwarfism-Retinal Dysplasia 2, drd2, OSD2 (COL9A2, Samoyed Variant)

MAPLE

ADDITIONAL CONDITIONS TESTED

- Osteogenesis Imperfecta, Brittle Bone Disease (COL1A2, Beagle Variant)
- Osteogenesis Imperfecta, Brittle Bone Disease (SERPINH1, Dachshund Variant)
- Osteogenesis Imperfecta, Brittle Bone Disease (COL1A1, Golden Retriever Variant)
- Osteochondrodysplasia, Skeletal Dwarfism (SLC13A1, Poodle Variant)
- Craniomandibular Osteopathy, CMO (SLC37A2)
- Raine Syndrome, Canine Dental Hypomineralization Syndrome (FAM20C)
- Chondrodystrophy and Intervertebral Disc Disease, CDDY/IVDD, Type I IVDD (FGF4 retrogene - CFA12)
- Chondrodystrophy (ITGA10, Norwegian Elkhound and Karelian Bear Dog Variant)
- Junctional Epidermolysis Bullosa (LAMB3 Exon 11, Australian Shepherd Variant)
- Hypophosphatasia (ALPL Exon 9, Karelian Bear Dog Variant)
- Leukodystrophy (TSEN54 Exon 5, Standard Schnauzer Variant)
- Mucopolysaccharidosis IIIB, Sanfilippo Syndrome Type B, MPS IIIB (NAGLU, Schipperke Variant)
- Hereditary Nasal Parakeratosis (SUV39H2 Intron 4, Greyhound Variant)
- Retina Dysplasia and/or Optic Nerve Hypoplasia (SIX6 Exon 1, Golden Retriever Variant)
- Spinocerebellar Ataxia (SCN8A, Alpine Dachsbracke Variant)
- Junctional Epidermolysis Bullosa (LAMA3 Exon 66, Australian Cattle Dog Variant)
- Progressive Retinal Atrophy (IFT122 Exon 26, Lapponian Herder Variant)
- Mucopolysaccharidosis Type VI, Maroteaux-Lamy Syndrome, MPS VI (ARSB Exon 5, Miniature Pinscher Variant)
- Pituitary Dwarfism (POU1F1 Intron 4, Karelian Bear Dog Variant)
- Succinic Semialdehyde Dehydrogenase Deficiency (ALDH5A1 Exon 7, Saluki Variant)
- Early Bilateral Deafness (LOXHD1 Exon 38, Rottweiler Variant)
- Limb-Girdle Muscular Dystrophy 2D (SGCA Exon 3, Miniature Dachshund Variant)
- Progressive Retinal Atrophy, Bardet-Biedl Syndrome (BBS2 Exon 11, Shetland Sheepdog Variant)
- Early Onset Adult Deafness, EOAD (EPS8L2 Deletion, Rhodesian Ridgeback Variant)

MAPLE

DNA Test Report | Test Date: April 14th, 2023 | embk.me/maple2106

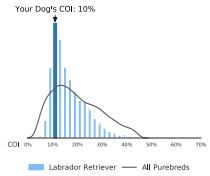
INBREEDING AND DIVERSITY

CATEGORY **RESULT**

Inbreeding | *Gene: n/a* | Genetic Result: **10%**

10%

Inbreeding is a measure of how closely related this dog's parents were. The higher the number, the more closely related the parents. In general, greater inbreeding is associated with increased incidence of genetically inherited conditions.

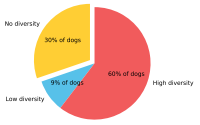


Immune Response 1 | *Gene: DRB1* | Genetic Result: **No Diversity**

No Diversity

How common is this amount of diversity in purebreds:

Diversity in the Major Histocompatibility Complex (MHC) region of the genome has been found in some studies to be associated with the incidence of certain autoimmune diseases. Dogs that have less diversity in the MHC region—i.e. the Dog Leukocyte Antigen (DLA) inherited from the mother is similar to the DLA inherited from the father—are considered less immunologically diverse. A High Diversity result means the dog has two highly dissimilar haplotypes. A Low Diversity result means the dog has two similar but not identical haplotypes. A No Diversity result means the dog has inherited identical haplotypes from both parents. Some studies have shown associations between certain DRB1 haplotypes and autoimmune diseases such as Cushing's disease, but these findings have yet to be scientifically validated.



Immune Response 2 | *Gene: DQA1 and DQB1* | Genetic Result: **Low Diversity**

Low Diversity

How common is this amount of diversity in purebreds:

Diversity in the Major Histocompatibility Complex (MHC) region of the genome has been found in some studies to be associated with the incidence of certain autoimmune diseases. Dogs that have less diversity in the MHC region—i.e. the Dog Leukocyte Antigen (DLA) inherited from the mother is similar to the DLA inherited from the father—are considered less immunologically diverse. A High Diversity result means the dog has two highly dissimilar haplotypes. A Low Diversity result means the dog has two similar but not identical haplotypes. A No Diversity result means the dog has inherited identical haplotypes from both parents. A number of studies have shown correlations of DQA-DQB1 haplotypes and certain autoimmune diseases; however, these have not yet been scientifically validated.