

BREED MIX

 German Shepherd Dog : 100.0%

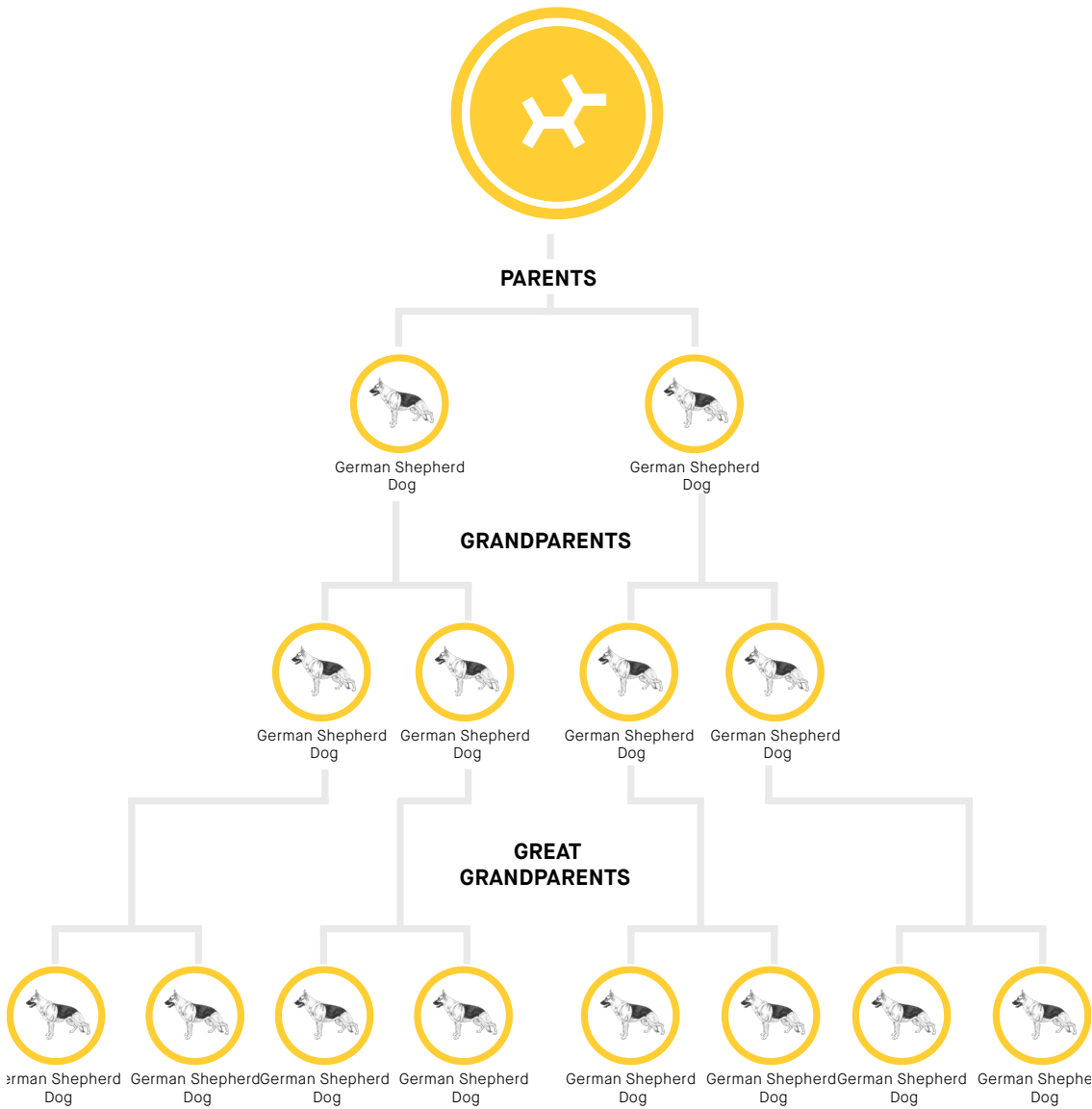
GENETIC STATS

Wolfiness: 0.6 % **LOW**
Predicted adult weight: **95 lbs**
Life stage: **Puppy**
Based on your dog's date of birth provided.

TEST DETAILS

Kit number: EM-28759321
Swab number: 31260260028083

FAMILY TREE

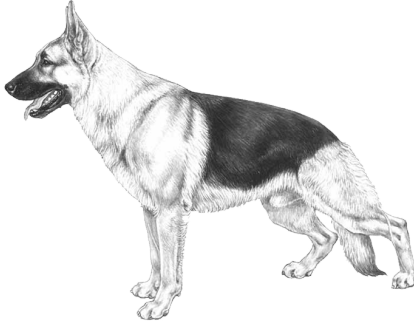




(<https://app.embarkvet.com/pet/d6721060-c4ed-49cf-9c2a-7e0a209ca506/breed-reveal>)



GERMAN SHEPHERD DOG



The German Shepherd dog is the second most popular dog breed in the United States, and the fourth most popular in the United Kingdom (where it is known as the Alsatian). This breed was standardized in Germany at the end of the 19th century from local dogs used for herding and livestock guarding. Their confidence, courageousness and keen sense of smell coupled with their notable intelligence make them highly suited to police work, military roles, and search and rescue. German Shepherds require regular physical and mental exercise and have a heavy shedding coat that comes in both short and long varieties. They were first recognized by the AKC in 1908 and later became fashionable as soldiers returning from WWI spoke highly of the German dogs and Hollywood popularized the breed with stars like Strongheart and Rin Tin Tin.

Fun Fact

Despite being sometimes called the "Alsatian wolf dog", German Shepherds are not true wolf dogs— they are 100% dog. Nevertheless, German shepherds were crossed with wolves in the past to form the Czechoslovakian and Saarloos wolfdog breeds. German Shepherds, along with other breeds and sled dogs, were also used in the creation of the Chinook breed.

MATERNAL LINE



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

HAPLOGROUP: C1

Congratulations, C1 is a very exotic female lineage! It is more closely associated with maternal lineages found in wolves, foxes and jackals than with other dog lineages. So it seems dogs in this group have a common male dog ancestor who, many thousands of years ago, mated with a female wolf! This is not a common lineage in any breed, though a good number of German Shepherds and Doberman Pinchers are C1. It is also found in breeds as diverse as Peruvian Inca Orchids and Pekingese; it is rarely found amongst Labrador Retrievers, Border Collies, Siberian Huskies, or Cocker Spaniels. Despite its fascinating origins, it is widely distributed around the globe, and even shows up frequently among Peruvian village dogs. It almost certainly survived at low frequency in Europe for millennia and then was dispersed outside of Europe by colonialism, though not as successfully as some other lineages.

HAPLOTYPE: C27/37

A member of the C1 haplogroup, this haplotype occurs most often in German Shepherd Dogs and Siberian Huskies.

PATERNAL LINE



Through Nitro vom Samherz's Y chromosome we can trace his father's ancestry back to where dogs and people first became friends. This map helps you visualize the routes that his ancestors took to your home. Their story is described below the map.

HAPLOGROUP: A1a

Some of the wolves that became the original dogs in Central Asia around 15,000 years ago came from this long and distinguished line of male dogs. After domestication, they followed their humans from Asia to Europe and then didn't stop there. They took root in Europe, eventually becoming the dogs that founded the Vizsla breed 1,000 years ago. The Vizsla is a Central European hunting dog, and all male Vizslas descend from this line. During the Age of Exploration, like their owners, these pooches went by the philosophy, "Have sail, will travel!" From the windy plains of Patagonia to the snug and homey towns of the American Midwest, the beaches of a Pacific paradise, and the broad expanse of the Australian outback, these dogs followed their masters to the outposts of empires. Whether through good fortune or superior genetics, dogs from the A1a lineage traveled the globe and took root across the world. Now you find village dogs from this line frolicking on Polynesian beaches, hanging out in villages across the Americas, and scavenging throughout Old World settlements. You can also find this "prince of patrilineages" in breeds as different as German Shepherds, Golden Retrievers, Pugs, Border Collies, Scottish Terriers, and Irish Wolfhounds. No male wolf line has been as successful as the A1a line!

HAPLOTYPE: H1a.15

Part of the large A1a haplogroup, this haplotype is found in village dogs from across the globe (outside of Asia). As for breeds, it is primarily seen in German Shepherds, Labrador Retrievers, Nova Scotia Duck Tolling Retriever. It is by far the most common haplotype in German Shepherds.

TRAITS: BASE COAT COLOR

TRAIT

RESULT

Dark or Light Fur | *E (Extension) Locus* | Gene: *Melanocortin Receptor 1 (MC1R)* | Genetic Result: **E^mE^m**

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 and will have lighter yellow or red hairs all over its entire body.

The overall MC1R genetic result is influenced by more subloci than those presented in this section. Additional MC1R subloci results can be found under the **Coat Color Modifiers > Facial Fur Pattern** section below.

Can have dark fur

Did You Know? If a dog has an **ee** result, then the fur's actual shade can range from a deep copper to white - the exact color cannot be predicted solely from this result and will depend on other genetic factors, including the red pigment intensity test.

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.

No impact on fur and skin color

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.

Red Pigment Intensity | *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.

No impact on coat pattern

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.

TRAITS: BASE COAT COLOR (CONTINUED)

TRAIT	RESULT
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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.

Black or gray fur and skin

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".

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 three different genetic variants that can work together to cause diluted pigmentation. These are the common **d** allele, also known as "**d1**", and the less common alleles known as "**d2**" and "**d3**". Dogs with two **d** alleles, regardless of which variant, are typically dilute.

Dark (non-dilute) fur and skin

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.

TRAITS: COAT COLOR MODIFIERS

TRAIT	RESULT
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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.

More likely to have a mostly solid black or brown fur coat

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.

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.

No impact on coat pattern

Did You Know? The ASIP gene causes interesting coat patterns in many other species of animals as well as dogs.

TRAITS: COAT COLOR MODIFIERS (CONTINUED)

TRAIT	RESULT
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Facial Fur Pattern | *E (Extension) Locus* | Gene: *Melanocortin Receptor 1 (MC1R)* | Genetic Result: **E^mE^m**

This gene determines whether a dog can have dark hair and can give it 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 may have a mask, which is dark facial fur as seen in the German Shepherd Dog and Pug. Dogs with no **E^m** in their result but one or two copies of the **E^g**, **E^a**, or **E^h** variants can instead have a "widow's peak", which is dark forehead fur.

Can have black
masking (dark facial
fur)

Did You Know?

The "widow's peak" is seen in the Afghan Hound and Borzoi, and is called either "grizzle" or "domino."

In the absence of **E^m**, dogs with the **E^g** variant can have a "widow's peak" phenotype. In the absence of both **E^m** and **E** variants, dogs with the **E^a** or **E^h** variants can express the "widow's peak" phenotype. Additionally, a dog with any combination of two of the **E^g**, **E^a**, or **E^h** variants (example: **E^gE^a**) is also expected to express the grizzle phenotype.

Saddle Tan | Gene: *RALY* | Genetic Result: **NN**

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.

No impact on coat
pattern

Did You Know? The Saddle Tan pattern is characteristic of breeds like the Corgi, Beagle, and German Shepherd.

TRAITS: COAT COLOR MODIFIERS (CONTINUED)

TRAIT

RESULT

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.

Likely to have little to no white in coat

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.

Roan | *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.

Likely no impact on coat pattern

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.

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.

Unlikely to have merle pattern

Did You Know? Merle coat patterning is common to several dog breeds including the Australian Shepherd, Catahoula Leopard Dog, and Shetland Sheepdog.

TRAITS: COAT COLOR MODIFIERS (CONTINUED)

TRAIT

RESULT

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.

No impact on coat pattern

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.

Panda White Spotting | Gene: *KIT* | Genetic Result: **NN**

Panda White Spotting originated in a line of German Shepherd Dogs and causes a mostly symmetrical white spotting of the head and/or body. This is a dominant variant of the KIT gene, which has a role in pigmentation.

Dogs with one copy of the **I** allele will exhibit this white spotting. Dogs with two copies of the **I** allele have never been observed, as two copies of the variant is suspected to be lethal to the developing embryo. Dogs with the **NN** result will not exhibit white spotting due to this variant.

Not expected to display Panda pattern

Did You Know? A de novo mutation (a genetic mutation not inherited from the parents) occurred in a female German Shepherd Dog named Lewcinka's Franka von Phenom. She was born in 2000, and all Panda Shepherds can trace their bloodline back to her.

TRAITS: OTHER COAT TRAITS

TRAIT

RESULT

Furnishings | Gene: *RSP02* | 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.

Likely unfurnished (no mustache, beard, and/or eyebrows)

Did You Know? In breeds that are expected to have furnishings, dogs without furnishings are the exception - this is sometimes called an “improper coat”.

Coat Length | Gene: *FGF5* | Genetic Result: **LhLh**

This gene affects hair length in many species, including cats, dogs, mice, and humans. In dogs, an **Lh** allele confers a long, silky hair coat across many breeds, including Yorkshire Terriers, Cocker Spaniels, and Golden Retrievers. An **ShSh** or **ShLh** result is likely to mean a shorter coat, like in the Boxer or the American Staffordshire Terrier. The coat length determined by FGF5, as reported by us, is influenced by four genetic variants that work together to promote long hair.

The most common of these is the **Lh1** variant (G/T, CanFam3.1, chr32, g.4509367) and the less common ones are **Lh2** (C/T, CanFam3.1, chr32, g.4528639), **Lh3** (16bp deletion, CanFam3.1, chr32, g.4528616), and **Lh4** (GG insertion, CanFam3.1, chr32, g.4528621). The FGF5_Lh1 variant is found across many dog breeds. The less common variants, FGF5_Lh2 have been found in the Akita, Samoyed, and Siberian Husky, FGF5_Lh3 have been found in the Eurasier, and FGF5_Lh4 have been found in the Afghan Hound, Eurasier, and French Bulldog.

Likely long coat

The **Lh** alleles have a recessive mode of inheritance, meaning that two copies of the **Lh** alleles are required to have long hair. The presence of two Lh alleles at any of these FGF5 loci is expected to result in long hair. One copy each of **Lh1** and **Lh2** have been found in Samoyeds, one copy each of **Lh1** and **Lh3** have been found in Eurasiers and one copy each of **Lh1** and **Lh4** have been found in Afghan Hounds and Eurasiers.

Did You Know? In certain breeds, such as Pembroke Welsh Corgi and French Bulldog, the long coat is described as “fluffy.”

TRAITS: OTHER COAT TRAITS (CONTINUED)

TRAIT	RESULT
Shedding <i>Gene: MC5R</i> Genetic Result: CC 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 heavy/seasonal shedding
Coat Texture <i>Gene: KRT71</i> Genetic Result: CT 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 wavy coat
Hairlessness (Xolo type) <i>Gene: FOXI3</i> Genetic Result: NN This gene can cause hairlessness over most of the body as well as changes in tooth shape and number. This particular gene occurs in Peruvian Inca Orchid, Xoloitzcuintli (Mexican Hairless), and Chinese Crested; other hairless breeds are due to different genes. Dogs with the NDup result are likely to be hairless while dogs with the NN result are likely to have a normal coat. We measure this result using a linkage test. Did You Know? The DupDup result has never been observed, suggesting that dogs with that genotype cannot survive to birth.	Very unlikely to be hairless
Hairlessness (Terrier type) <i>Gene: SGK3</i> 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 | 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.

Likely not albino

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.



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.

Likely medium or long muzzle

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.

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.

Likely normal-length tail

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.

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.

Unlikely to have hind dew claws

Did You Know? Hind dew claws are commonly found in certain breeds such as the Saint Bernard.

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.

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.

Eye Color | 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.

Less likely to have blue eyes

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!

Chondrodysplasia (Leg Length) | Gene: *Chr. 18 FGF4 Retrogene* | Genetic Result: **NN**

This variant is associated with a type of disproportionate dwarfism known as chondrodysplasia (CDPA). CDPA is a breed-defining characteristic of many breeds exhibiting a "short-legged, long-bodied" appearance, such as Corgis, Dachshunds, Basset Hounds, and others. Dogs with the **II** result display the largest reduction in leg length. Dogs with the **NI** genotype will have an intermediate leg length, while dogs with the **NN** result will not exhibit leg shortening due to this variant.

Likely to have normal leg length

Did You Know? A similar genetic variant called the chondrodystrophy (CDDY) variant also plays an important role in shortening the leg length of many breeds. Dog breeds with the shortest legs, like the Corgi, Dachshund, and Basset Hound generally have one or two copies of the CDDY and CDPA variants. CDDY (but not CDPA) is also associated with an increased risk of Type I Intervertebral Disc Disease (IVDD). You can see the CDDY result in the health test results under "Intervertebral Disc Disease Type I".

TRAITS: BODY SIZE

TRAIT	RESULT
Body Size 1 <i>Gene: IGF1</i> Genetic Result: NN 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.	Larger
Body Size 2 <i>Gene: IGFR1</i> 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 <i>Gene: STC2</i> Genetic Result: TA 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.	Intermediate
Body Size 4 <i>Gene: GHR - E191K</i> 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 <i>Gene: GHR - P177L</i> 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

TRAITS: PERFORMANCE

TRAIT	RESULT
Altitude Adaptation <i>Gene: EPAS1</i> 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 <i>Gene: POMC</i> 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

HEALTH REPORT

How to interpret Nitro vom Samherz's genetic health results:

If Nitro vom Samherz 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 Nitro vom Samherz 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.

Summary

Of the 273 genetic health risks we analyzed, we found 2 results that you should learn about.

Notable results (2)

Copper Toxicosis (Accumulating)

Degenerative Myelopathy, DM

Clear results

Breed-relevant (11)

Other (260)

BREED-RELEVANT RESULTS

Research studies indicate that these results are more relevant to dogs like Nitro vom Samherz, and may influence his chances of developing certain health conditions.

 Degenerative Myelopathy, DM (SOD1A)	Notable
 Anhidrotic Ectodermal Dysplasia (EDA Intron 8)	Clear
 Canine Leukocyte Adhesion Deficiency Type III, CLAD III (FERMT3, German Shepherd Variant)	Clear
 Day Blindness (CNGA3 Exon 7, German Shepherd Variant)	Clear
 Hemophilia A (F8 Exon 11, German Shepherd Variant 1)	Clear
 Hemophilia A (F8 Exon 1, German Shepherd Variant 2)	Clear
 Ichthyosis (ASPRV1 Exon 2, German Shepherd Variant)	Clear
 MDR1 Drug Sensitivity (ABCB1)	Clear
 Mucopolysaccharidosis Type VII, Sly Syndrome, MPS VII (GUSB Exon 3, German Shepherd Variant)	Clear
 Platelet Factor X Receptor Deficiency, Scott Syndrome (TMEM16F)	Clear
 Renal Cystadenocarcinoma and Nodular Dermatofibrosis (FLCN Exon 7)	Clear
 Urate Kidney & Bladder Stones (SLC2A9)	Clear

OTHER RESULTS

Research has not yet linked these conditions to dogs with similar breeds to Nitro vom Samherz. Review any increased risk or notable results to understand his potential risk and recommendations.

 Copper Toxicosis (Accumulating) (ATP7B)	Notable
 2-DHA Kidney & Bladder Stones (APRT)	Clear
 Acral Mutilation Syndrome (GDNF-AS, Spaniel and Pointer Variant)	Clear
 Alaskan Husky Encephalopathy (SLC19A3)	Clear
 Alaskan Malamute Polyneuropathy, AMPN (NDRG1 SNP)	Clear
 Alexander Disease (GFAP)	Clear
 ALT Activity (GPT)	Clear
 Autosomal Dominant Progressive Retinal Atrophy (RHO)	Clear
 Bald Thigh Syndrome (IGFBP5)	Clear
 Bernard-Soulier Syndrome, BSS (GP9, Cocker Spaniel Variant)	Clear
 Bully Whippet Syndrome (MSTN)	Clear
 Canine Elliptocytosis (SPTB Exon 30)	Clear
 Canine Fucosidosis (FUCA1)	Clear
 Canine Leukocyte Adhesion Deficiency Type I, CLAD I (ITGB2, Setter Variant)	Clear
 Canine Multifocal Retinopathy, cmr1 (BEST1 Exon 2)	Clear
 Canine Multifocal Retinopathy, cmr2 (BEST1 Exon 5, Coton de Tulear Variant)	Clear
 Canine Multifocal Retinopathy, cmr3 (BEST1 Exon 10 Deletion, Finnish and Swedish Lapphund, Lapponian Herder Variant)	Clear
 Canine Multiple System Degeneration (SERAC1 Exon 4, Chinese Crested Variant)	Clear

OTHER RESULTS

✓ Canine Multiple System Degeneration (SERAC1 Exon 15, Kerry Blue Terrier Variant)	Clear
✓ Cardiomyopathy and Juvenile Mortality (YARS2)	Clear
✓ Centronuclear Myopathy, CNM (PTPLA)	Clear
✓ Cerebellar Hypoplasia (VLDLR, Eurasier Variant)	Clear
✓ Chondrodysplasia (ITGA10, Norwegian Elkhound and Karelian Bear Dog Variant)	Clear
✓ Cleft Lip and/or Cleft Palate (ADAMTS20, Nova Scotia Duck Tolling Retriever Variant)	Clear
✓ Cleft Palate, CP1 (DLX6 intron 2, Nova Scotia Duck Tolling Retriever Variant)	Clear
✓ Cobalamin Malabsorption (CUBN Exon 8, Beagle Variant)	Clear
✓ Cobalamin Malabsorption (CUBN Exon 53, Border Collie Variant)	Clear
✓ Collie Eye Anomaly (NHEJ1)	Clear
✓ Complement 3 Deficiency, C3 Deficiency (C3)	Clear
✓ Congenital Cornification Disorder (NSDHL, Chihuahua Variant)	Clear
✓ Congenital Dyserythropoietic Anemia and Polymyopathy (EHPB1L1, Labrador Retriever Variant)	Clear
✓ Congenital Hypothyroidism (TPO, Rat, Toy, Hairless Terrier Variant)	Clear
✓ Congenital Hypothyroidism (TPO, Tenterfield Terrier Variant)	Clear
✓ Congenital Hypothyroidism with Goiter (TPO Intron 13, French Bulldog Variant)	Clear
✓ Congenital Hypothyroidism with Goiter (SLC5A5, Shih Tzu Variant)	Clear
✓ Congenital Macrothrombocytopenia (TUBB1 Exon 1, Cairn and Norfolk Terrier Variant)	Clear

OTHER RESULTS

✓ Congenital Muscular Dystrophy (LAMA2, Italian Greyhound)	Clear
✓ Congenital Myasthenic Syndrome, CMS (COLQ, Labrador Retriever Variant)	Clear
✓ Congenital Myasthenic Syndrome, CMS (COLQ, Golden Retriever Variant)	Clear
✓ Congenital Myasthenic Syndrome, CMS (CHAT, Old Danish Pointing Dog Variant)	Clear
✓ Congenital Myasthenic Syndrome, CMS (CHRNE, Jack Russell Terrier Variant)	Clear
✓ Congenital Stationary Night Blindness (LRIT3, Beagle Variant)	Clear
✓ Congenital Stationary Night Blindness (RPE65, Briard Variant)	Clear
✓ Copper Toxicosis (Attenuating) (ATP7A, Labrador Retriever)	Clear
✓ Copper Toxicosis (Attenuating) (RETN, Labrador Retriever)	Clear
✓ Craniomandibular Osteopathy, CMO (SLC37A2)	Clear
✓ Craniomandibular Osteopathy, CMO (SLC37A2 Intron 16, Basset Hound Variant)	Clear
✓ Cystinuria Type I-A (SLC3A1, Newfoundland Variant)	Clear
✓ Cystinuria Type II-A (SLC3A1, Australian Cattle Dog Variant)	Clear
✓ Cystinuria Type II-B (SLC7A9, Miniature Pinscher Variant)	Clear
✓ Darier Disease (ATP2A2, Irish Terrier Variant)	Clear
✓ Day Blindness (CNGB3 Deletion, Alaskan Malamute Variant)	Clear
✓ Day Blindness (CNGA3 Exon 7, Labrador Retriever Variant)	Clear
✓ Day Blindness (CNGB3 Exon 6, German Shorthaired Pointer Variant)	Clear

OTHER RESULTS

✓ Deafness and Vestibular Syndrome of Dobermans, DVDob, DINGS (MYO7A)	Clear
✓ Demyelinating Polyneuropathy (SBF2/MTRM13)	Clear
✓ Dental-Skeletal-Retinal Anomaly (MIA3, Cane Corso Variant)	Clear
✓ Diffuse Cystic Renal Dysplasia and Hepatic Fibrosis (INPP5E Intron 9, Norwich Terrier Variant)	Clear
✓ Dilated Cardiomyopathy, DCM (RBM20, Schnauzer Variant)	Clear
✓ Dilated Cardiomyopathy, DCM1 (PDK4, Doberman Pinscher Variant 1)	Clear
✓ Dilated Cardiomyopathy, DCM2 (TTN, Doberman Pinscher Variant 2)	Clear
✓ Disproportionate Dwarfism (PRKG2, Dogo Argentino Variant)	Clear
✓ Dry Eye Curly Coat Syndrome (FAM83H Exon 5)	Clear
✓ Dystrophic Epidermolysis Bullosa (COL7A1, Central Asian Shepherd Dog Variant)	Clear
✓ Dystrophic Epidermolysis Bullosa (COL7A1, Golden Retriever Variant)	Clear
✓ Early Bilateral Deafness (LOXHD1 Exon 38, Rottweiler Variant)	Clear
✓ Early Onset Adult Deafness, EOAD (EPS8L2 Deletion, Rhodesian Ridgeback Variant)	Clear
✓ Early Onset Cerebellar Ataxia (SEL1L, Finnish Hound Variant)	Clear
✓ Ehlers Danlos (ADAMTS2, Doberman Pinscher Variant)	Clear
✓ Ehlers-Danlos Syndrome (EDS) (COL5A1, Labrador Retriever Variant)	Clear
✓ Enamel Hypoplasia (ENAM Deletion, Italian Greyhound Variant)	Clear
✓ Enamel Hypoplasia (ENAM SNP, Parson Russell Terrier Variant)	Clear

OTHER RESULTS

✓ Episodic Falling Syndrome (BCAN)	Clear
✓ Exercise-Induced Collapse, EIC (DNM1)	Clear
✓ Factor VII Deficiency (F7 Exon 5)	Clear
✓ Factor XI Deficiency (F11 Exon 7, Kerry Blue Terrier Variant)	Clear
✓ Familial Nephropathy (COL4A4 Exon 3, Cocker Spaniel Variant)	Clear
✓ Familial Nephropathy (COL4A4 Exon 30, English Springer Spaniel Variant)	Clear
✓ Fanconi Syndrome (FAN1, Basenji Variant)	Clear
✓ Fetal-Onset Neonatal Neuroaxonal Dystrophy (MFN2, Giant Schnauzer Variant)	Clear
✓ Glanzmann's Thrombasthenia Type I (ITGA2B Exon 13, Great Pyrenees Variant)	Clear
✓ Glanzmann's Thrombasthenia Type I (ITGA2B Exon 12, Otterhound Variant)	Clear
✓ Globoid Cell Leukodystrophy, Krabbe disease (GALC Exon 5, Terrier Variant)	Clear
✓ Glycogen Storage Disease Type IA, Von Gierke Disease, GSD IA (G6PC1, German Pinscher Variant)	Clear
✓ Glycogen Storage Disease Type IA, Von Gierke Disease, GSD IA (G6PC, Maltese Variant)	Clear
✓ Glycogen Storage Disease Type IIIA, GSD IIIA (AGL, Curly Coated Retriever Variant)	Clear
✓ Glycogen storage disease Type VII, Phosphofructokinase Deficiency, PFK Deficiency (PFKM, Whippet and English Springer Spaniel Variant)	Clear
✓ Glycogen storage disease Type VII, Phosphofructokinase Deficiency, PFK Deficiency (PFKM, Wachtelhund Variant)	Clear
✓ GM1 Gangliosidosis (GLB1 Exon 2, Portuguese Water Dog Variant)	Clear
✓ GM1 Gangliosidosis (GLB1 Exon 15, Shiba Inu Variant)	Clear

OTHER RESULTS

✓ GM1 Gangliosidosis (GLB1 Exon 15, Alaskan Husky Variant)	Clear
✓ GM2 Gangliosidosis (HEXA, Japanese Chin Variant)	Clear
✓ GM2 Gangliosidosis (HEXB, Poodle Variant)	Clear
✓ Golden Retriever Progressive Retinal Atrophy 1, GR-PRA1 (SLC4A3)	Clear
✓ Golden Retriever Progressive Retinal Atrophy 2, GR-PRA2 (TTC8)	Clear
✓ Goniodysgenesis and Glaucoma, Pectinate Ligament Dysplasia, PLD (OLFM3)	Clear
✓ Hemophilia A (F8 Exon 10, Boxer Variant)	Clear
✓ Hemophilia B (F9 Exon 7, Terrier Variant)	Clear
✓ Hemophilia B (F9 Exon 7, Rhodesian Ridgeback Variant)	Clear
✓ Hereditary Ataxia (PNPLA8, Australian Shepherd Variant)	Clear
✓ Hereditary Ataxia, Cerebellar Degeneration (RAB24, Old English Sheepdog and Gordon Setter Variant)	Clear
✓ Hereditary Cataracts (HSF4 Exon 9, Australian Shepherd Variant)	Clear
✓ Hereditary Cataracts (FYCO1, Wirehaired Pointing Griffon Variant)	Clear
✓ Hereditary Cerebellar Ataxia (SELENOP, Belgian Shepherd Variant)	Clear
✓ Hereditary Footpad Hyperkeratosis (FAM83G, Terrier and Kromfohrlander Variant)	Clear
✓ Hereditary Footpad Hyperkeratosis (DSG1, Rottweiler Variant)	Clear
✓ Hereditary Nasal Parakeratosis (SUV39H2 Intron 4, Greyhound Variant)	Clear
✓ Hereditary Nasal Parakeratosis, HNPk (SUV39H2)	Clear

OTHER RESULTS

✓ Hereditary Vitamin D-Resistant Rickets (VDR)	Clear
✓ Hypocatalasia, Acatalasemia (CAT)	Clear
✓ Hypomyelination and Tremors (FNIP2, Weimaraner Variant)	Clear
✓ Hypophosphatasia (ALPL Exon 9, Karelian Bear Dog Variant)	Clear
✓ Ichthyosis (NIPAL4, American Bulldog Variant)	Clear
✓ Ichthyosis (SLC27A4, Great Dane Variant)	Clear
✓ Ichthyosis, Epidermolytic Hyperkeratosis (KRT10, Terrier Variant)	Clear
✓ Ichthyosis, ICH1 (PNPLA1, Golden Retriever Variant)	Clear
✓ Ichthyosis, ICH2 (ABHD5, Golden Retriever Variant)	Clear
✓ Inflammatory Myopathy (SLC25A12)	Clear
✓ Inherited Myopathy of Great Danes (BIN1)	Clear
✓ Inherited Selected Cobalamin Malabsorption with Proteinuria (CUBN, Komondor Variant)	Clear
✓ Intervertebral Disc Disease (Type I) (FGF4 retrogene - CFA12)	Clear
✓ Intestinal Lipid Malabsorption (ACSL5, Australian Kelpie)	Clear
✓ Junctional Epidermolysis Bullosa (LAMA3 Exon 66, Australian Cattle Dog Variant)	Clear
✓ Junctional Epidermolysis Bullosa (LAMB3 Exon 11, Australian Shepherd Variant)	Clear
✓ Juvenile Epilepsy (LG12)	Clear
✓ Juvenile Laryngeal Paralysis and Polyneuropathy (RAB3GAP1, Rottweiler Variant)	Clear

OTHER RESULTS

✓ Juvenile Myoclonic Epilepsy (DIRAS1)	Clear
✓ L-2-Hydroxyglutaricaciduria, L2HGA (L2HGDH, Staffordshire Bull Terrier Variant)	Clear
✓ Lagotto Storage Disease (ATG4D)	Clear
✓ Laryngeal Paralysis (RAPGEF6, Miniature Bull Terrier Variant)	Clear
✓ Laryngeal Paralysis and Polyneuropathy (CNTNAP1, Leonberger, Saint Bernard, and Labrador Retriever variant)	Clear
✓ Late Onset Spinocerebellar Ataxia (CAPN1)	Clear
✓ Late-Onset Neuronal Ceroid Lipofuscinosis, NCL 12 (ATP13A2, Australian Cattle Dog Variant)	Clear
✓ Leonberger Polyneuropathy 1 (LPN1, ARHGEF10)	Clear
✓ Leonberger Polyneuropathy 2 (GJA9)	Clear
✓ Lethal Acrodermatitis, LAD (MKLN1)	Clear
✓ Leukodystrophy (TSEN54 Exon 5, Standard Schnauzer Variant)	Clear
✓ Ligneous Membranitis, LM (PLG)	Clear
✓ Limb Girdle Muscular Dystrophy (SGCD, Boston Terrier Variant)	Clear
✓ Limb-Girdle Muscular Dystrophy 2D (SGCA Exon 3, Miniature Dachshund Variant)	Clear
✓ Long QT Syndrome (KCNQ1)	Clear
✓ Lundehund Syndrome (LEPREL1)	Clear
✓ Macular Corneal Dystrophy, MCD (CHST6)	Clear
✓ Malignant Hyperthermia (RYR1)	Clear

OTHER RESULTS

✓ May-Hegglin Anomaly (MYH9)	Clear
✓ Medium-Chain Acyl-CoA Dehydrogenase Deficiency, MCADD (ACADM, Cavalier King Charles Spaniel Variant)	Clear
✓ Methemoglobinemia (CYB5R3, Pit Bull Terrier Variant)	Clear
✓ Methemoglobinemia (CYB5R3)	Clear
✓ Microphthalmia (RBP4 Exon 2, Soft Coated Wheaten Terrier Variant)	Clear
✓ Mucopolysaccharidosis IIIB, Sanfilippo Syndrome Type B, MPS IIIB (NAGLU, Schipperke Variant)	Clear
✓ Mucopolysaccharidosis Type IIIA, Sanfilippo Syndrome Type A, MPS IIIA (SGSH Exon 6, Dachshund Variant)	Clear
✓ Mucopolysaccharidosis Type IIIA, Sanfilippo Syndrome Type A, MPS IIIA (SGSH Exon 6, New Zealand Huntaway Variant)	Clear
✓ Mucopolysaccharidosis Type VI, Maroteaux-Lamy Syndrome, MPS VI (ARSB Exon 5, Miniature Pinscher Variant)	Clear
✓ Mucopolysaccharidosis Type VII, Sly Syndrome, MPS VII (GUSB Exon 5, Terrier Brasileiro Variant)	Clear
✓ Muscular Dystrophy (DMD, Cavalier King Charles Spaniel Variant 1)	Clear
✓ Muscular Dystrophy (DMD, Golden Retriever Variant)	Clear
✓ Muscular Dystrophy-Dystroglycanopathy (LARGE1, Labrador Retriever Variant)	Clear
✓ Musladin-Lueke Syndrome, MLS (ADAMTSL2)	Clear
✓ Myasthenia Gravis-Like Syndrome (CHRNE, Heideterrier Variant)	Clear
✓ Myotonia Congenita (CLCN1 Exon 23, Australian Cattle Dog Variant)	Clear
✓ Myotonia Congenita (CLCN1 Exon 19, Labrador Retriever Variant)	Clear
✓ Myotonia Congenita (CLCN1 Exon 7, Miniature Schnauzer Variant)	Clear

OTHER RESULTS

✔ Narcolepsy (HCRT2 Exon 1, Dachshund Variant)	Clear
✔ Narcolepsy (HCRT2 Intron 4, Doberman Pinscher Variant)	Clear
✔ Narcolepsy (HCRT2 Intron 6, Labrador Retriever Variant)	Clear
✔ Nemaline Myopathy (NEB, American Bulldog Variant)	Clear
✔ Neonatal Cerebellar Cortical Degeneration (SPTBN2, Beagle Variant)	Clear
✔ Neonatal Encephalopathy with Seizures, NEWS (ATF2)	Clear
✔ Neonatal Interstitial Lung Disease (LAMP3)	Clear
✔ Neuroaxonal Dystrophy, NAD (VPS11, Rottweiler Variant)	Clear
✔ Neuroaxonal Dystrophy, NAD (TECPR2, Spanish Water Dog Variant)	Clear
✔ Neuronal Ceroid Lipofuscinosis 1, NCL 1 (PPT1 Exon 8, Dachshund Variant 1)	Clear
✔ Neuronal Ceroid Lipofuscinosis 10, NCL 10 (CTSD Exon 5, American Bulldog Variant)	Clear
✔ Neuronal Ceroid Lipofuscinosis 2, NCL 2 (TPP1 Exon 4, Dachshund Variant 2)	Clear
✔ Neuronal Ceroid Lipofuscinosis 5, NCL 5 (CLN5 Exon 4 SNP, Border Collie Variant)	Clear
✔ Neuronal Ceroid Lipofuscinosis 5, NCL 5 (CLN5 Exon 4 Deletion, Golden Retriever Variant)	Clear
✔ Neuronal Ceroid Lipofuscinosis 6, NCL 6 (CLN6 Exon 7, Australian Shepherd Variant)	Clear
✔ Neuronal Ceroid Lipofuscinosis 7, NCL 7 (MFSD8, Chihuahua and Chinese Crested Variant)	Clear
✔ Neuronal Ceroid Lipofuscinosis 8, NCL 8 (CLN8, Australian Shepherd Variant)	Clear
✔ Neuronal Ceroid Lipofuscinosis 8, NCL 8 (CLN8 Exon 2, English Setter Variant)	Clear

OTHER RESULTS

✓ Neuronal Ceroid Lipofuscinosis 8, NCL 8 (CLN8 Insertion, Saluki Variant)	Clear
✓ Neuronal Ceroid Lipofuscinosis, Cerebellar Ataxia, NCL4A (ARSG Exon 2, American Staffordshire Terrier Variant)	Clear
✓ Oculocutaneous Albinism, OCA (SLC45A2 Exon 6, Bullmastiff Variant)	Clear
✓ Oculocutaneous Albinism, OCA (SLC45A2, Small Breed Variant)	Clear
✓ Oculoskeletal Dysplasia 2 (COL9A2, Samoyed Variant)	Clear
✓ Osteochondrodysplasia (SLC13A1, Poodle Variant)	Clear
✓ Osteogenesis Imperfecta (COL1A2, Beagle Variant)	Clear
✓ Osteogenesis Imperfecta (SERPINH1, Dachshund Variant)	Clear
✓ Osteogenesis Imperfecta (COL1A1, Golden Retriever Variant)	Clear
✓ P2Y12 Receptor Platelet Disorder (P2Y12)	Clear
✓ Pachyonychia Congenita (KRT16, Dogue de Bordeaux Variant)	Clear
✓ Paroxysmal Dyskinesia, PxD (PIGN)	Clear
✓ Persistent Mullerian Duct Syndrome, PMDS (AMHR2)	Clear
✓ Pituitary Dwarfism (POU1F1 Intron 4, Karelian Bear Dog Variant)	Clear
✓ Polycystic Kidney Disease, PKD (PKD1)	Clear
✓ Pompe's Disease (GAA, Finnish and Swedish Lapphund, Lapponian Herder Variant)	Clear
✓ Prekallikrein Deficiency (KLKB1 Exon 8)	Clear
✓ Primary Ciliary Dyskinesia, PCD (NME5, Alaskan Malamute Variant)	Clear

OTHER RESULTS

✓ Primary Ciliary Dyskinesia, PCD (STK36, Australian Shepherd Variant)	Clear
✓ Primary Ciliary Dyskinesia, PCD (CCDC39 Exon 3, Old English Sheepdog Variant)	Clear
✓ Primary Hyperoxaluria (AGXT)	Clear
✓ Primary Lens Luxation (ADAMTS17)	Clear
✓ Primary Open Angle Glaucoma (ADAMTS17 Exon 11, Basset Fauve de Bretagne Variant)	Clear
✓ Primary Open Angle Glaucoma (ADAMTS10 Exon 17, Beagle Variant)	Clear
✓ Primary Open Angle Glaucoma (ADAMTS10 Exon 9, Norwegian Elkhound Variant)	Clear
✓ Primary Open Angle Glaucoma and Primary Lens Luxation (ADAMTS17 Exon 2, Chinese Shar-Pei Variant)	Clear
✓ Progressive Retinal Atrophy (SAG)	Clear
✓ Progressive Retinal Atrophy (IFT122 Exon 26, Lapponian Herder Variant)	Clear
✓ Progressive Retinal Atrophy 5, PRA5 (NECAP1 Exon 6, Giant Schnauzer Variant)	Clear
✓ Progressive Retinal Atrophy, Bardet-Biedl Syndrome (BBS2 Exon 11, Shetland Sheepdog Variant)	Clear
✓ Progressive Retinal Atrophy, CNGA (CNGA1 Exon 9)	Clear
✓ Progressive Retinal Atrophy, crd1 (PDE6B, American Staffordshire Terrier Variant)	Clear
✓ Progressive Retinal Atrophy, crd4/cord1 (RPGRIP1)	Clear
✓ Progressive Retinal Atrophy, PRA1 (CNGB1)	Clear
✓ Progressive Retinal Atrophy, PRA3 (FAM161A)	Clear
✓ Progressive Retinal Atrophy, prcd (PRCD Exon 1)	Clear

OTHER RESULTS

✓ Progressive Retinal Atrophy, rcd1 (PDE6B Exon 21, Irish Setter Variant)	Clear
✓ Progressive Retinal Atrophy, rcd3 (PDE6A)	Clear
✓ Proportionate Dwarfism (GH1 Exon 5, Chihuahua Variant)	Clear
✓ Protein Losing Nephropathy, PLN (NPHS1)	Clear
✓ Pyruvate Dehydrogenase Deficiency (PDP1, Spaniel Variant)	Clear
✓ Pyruvate Kinase Deficiency (PKLR Exon 5, Basenji Variant)	Clear
✓ Pyruvate Kinase Deficiency (PKLR Exon 7, Beagle Variant)	Clear
✓ Pyruvate Kinase Deficiency (PKLR Exon 10, Terrier Variant)	Clear
✓ Pyruvate Kinase Deficiency (PKLR Exon 7, Labrador Retriever Variant)	Clear
✓ Pyruvate Kinase Deficiency (PKLR Exon 7, Pug Variant)	Clear
✓ Raine Syndrome (FAM20C)	Clear
✓ Recurrent Inflammatory Pulmonary Disease, RIPD (AKNA, Rough Collie Variant)	Clear
✓ Retina Dysplasia and/or Optic Nerve Hypoplasia (SIX6 Exon 1, Golden Retriever Variant)	Clear
✓ Sensory Neuropathy (FAM134B, Border Collie Variant)	Clear
✓ Severe Combined Immunodeficiency, SCID (PRKDC, Terrier Variant)	Clear
✓ Severe Combined Immunodeficiency, SCID (RAG1, Wetterhoun Variant)	Clear
✓ Shaking Puppy Syndrome (PLP1, English Springer Spaniel Variant)	Clear
✓ Shar-Pei Autoinflammatory Disease, SPAID, Shar-Pei Fever (MTBP)	Clear

OTHER RESULTS

✓ Skeletal Dysplasia 2, SD2 (COL11A2, Labrador Retriever Variant)	Clear
✓ Skin Fragility Syndrome (PKP1, Chesapeake Bay Retriever Variant)	Clear
✓ Spinocerebellar Ataxia (SCN8A, Alpine Dachsbracke Variant)	Clear
✓ Spinocerebellar Ataxia with Myokymia and/or Seizures (KCNJ10)	Clear
✓ Spongy Degeneration with Cerebellar Ataxia 1 (KCNJ10)	Clear
✓ Spongy Degeneration with Cerebellar Ataxia 2 (ATP1B2)	Clear
✓ Stargardt Disease (ABCA4 Exon 28, Labrador Retriever Variant)	Clear
✓ Succinic Semialdehyde Dehydrogenase Deficiency (ALDH5A1 Exon 7, Saluki Variant)	Clear
✓ Thrombopathia (RASGRP1 Exon 5, American Eskimo Dog Variant)	Clear
✓ Thrombopathia (RASGRP1 Exon 5, Basset Hound Variant)	Clear
✓ Thrombopathia (RASGRP1 Exon 8, Landseer Variant)	Clear
✓ Trapped Neutrophil Syndrome, TNS (VPS13B)	Clear
✓ Ullrich-like Congenital Muscular Dystrophy (COL6A3 Exon 10, Labrador Retriever Variant)	Clear
✓ Ullrich-like Congenital Muscular Dystrophy (COL6A1 Exon 3, Landseer Variant)	Clear
✓ Unilateral Deafness and Vestibular Syndrome (PTPRQ Exon 39, Doberman Pinscher)	Clear
✓ Von Willebrand Disease Type I, Type I vWD (VWF)	Clear
✓ Von Willebrand Disease Type II, Type II vWD (VWF, Pointer Variant)	Clear
✓ Von Willebrand Disease Type III, Type III vWD (VWF Exon 4, Terrier Variant)	Clear

OTHER RESULTS

	Von Willebrand Disease Type III, Type III vWD (VWF Intron 16, Nederlandse Kooikerhondje Variant)	Clear
	Von Willebrand Disease Type III, Type III vWD (VWF Exon 7, Shetland Sheepdog Variant)	Clear
	X-Linked Hereditary Nephropathy, XLHN (COL4A5 Exon 35, Samoyed Variant 2)	Clear
	X-Linked Myotubular Myopathy (MTM1, Labrador Retriever Variant)	Clear
	X-Linked Progressive Retinal Atrophy 1, XL-PRA1 (RPGR)	Clear
	X-linked Severe Combined Immunodeficiency, X-SCID (IL2RG Exon 1, Basset Hound Variant)	Clear
	X-linked Severe Combined Immunodeficiency, X-SCID (IL2RG, Corgi Variant)	Clear
	Xanthine Urolithiasis (XDH, Mixed Breed Variant)	Clear
	β -Mannosidosis (MANBA Exon 16, Mixed-Breed Variant)	Clear

HEALTH REPORT

Notable result

Copper Toxicosis (Accumulating)

Nitro vom Samherz inherited one copy of the variant we tested for Copper Toxicosis (Accumulating)

Nitro vom Samherz is not known to be at increased risk for Copper Toxicosis (Accumulating)

What does this result mean?

We do not know whether this increases the risk that Nitro vom Samherz will develop this disease.

Scientific Basis

Research studies for this variant have been based on dogs of other breeds. Not enough dogs with the breeds in Nitro vom Samherz have been studied to know whether or not this variant will increase Nitro vom Samherz's risk of developing this disease.

What is Copper Toxicosis (Accumulating)?

This condition affects the liver's ability to remove excess copper. Over time, copper can build up in the liver and damage liver cells. Both genetic and environmental factors play a role in how the condition develops.

When signs & symptoms develop in affected dogs

Signs typically develop in adults.

How vets diagnose this condition

Genetic testing, blood work, abdominal ultrasound, and surgical biopsy are all used to diagnose this condition.

How this condition is treated

Treatment includes a low copper diet and medical management to help bind excess copper. Antioxidant supplements may also be considered.

Actions to take if your dog is affected

- Talk to your vet about your dog's copper toxicosis result so you can discuss if dietary management or monitoring is indicated.
- Copper is an essential nutrient, but amounts can vary widely among commercial diets, so your vet may recommend a specific food or periodic testing to maintain safe levels.
- Many dogs with this result never develop clinical disease. Watch for signs that may indicate high copper levels, such as decreased appetite, vomiting, lethargy, or jaundice.
- Learn more about how the three variants for Copper Toxicosis are inherited and, if applicable, how results can be used in a breeding program here (<https://embarkvet.com/resources/embark-adds-copper-toxicosis-dna-test/>).

HEALTH REPORT

Notable result

Degenerative Myelopathy, DM

Nitro vom Samherz inherited one copy of the variant we tested for Degenerative Myelopathy, DM

What does this result mean?

This variant should not impact Nitro vom Samherz's health. This variant is inherited in an autosomal recessive manner, meaning that a dog needs two copies of the variant to show signs of this condition. Nitro vom Samherz is unlikely to develop this condition due to this variant because he only has one copy of the variant.

Impact on Breeding

This result is also important if you decide to breed this dog - to produce the healthiest puppies we recommend genetic testing any potential mates for this condition.

What is Degenerative Myelopathy, DM?

This condition affects the spinal cord nerves involved in movement, most noticeably in the hind limbs. It is progressive, meaning symptoms worsen over time, including weakness, muscle loss, and changes in walking.

When signs & symptoms develop in affected dogs

Affected dogs do not usually show signs of DM until they are at least 8 years old.

How vets diagnose this condition

Definitive diagnosis requires microscopic analysis of the spinal cord after death. However, veterinarians use clues such as genetic testing, breed, age, and other diagnostics to determine if DM is the most likely cause of your dog's clinical signs.

How this condition is treated

As dogs are seniors at the time of onset, the treatment for DM is aimed towards increasing their comfort through a combination of lifestyle changes, medication, and physical therapy.

Actions to take if your dog is affected

- Talk to your vet about your dog's degenerative myelopathy result, as it may influence how they monitor your dog's mobility and overall health, especially in their senior years.
- Keep your dog active with regular, low-impact exercise to help them maintain a healthy weight and support their mobility.
- Watch for changes in movement, such as wobbling, reluctance to jump, or dragging their back paws, and consult your vet if you notice any of these signs.
- Provide good traction in your home with rugs or mats to help prevent slipping as your dog ages. If mobility becomes difficult, ask your vet about supportive devices such as harnesses or wheelchairs.

INBREEDING AND DIVERSITY

CATEGORY

RESULT

Inbreeding | *Gene: n/a* | Genetic Result: **42%**

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.

42%

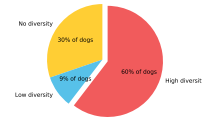


Immune Response 1 | *Gene: DRB1* | Genetic Result: **High Diversity**

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.

High Diversity

How common is this amount of diversity in purebreds:



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

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.

High Diversity

How common is this amount of diversity in purebreds:

