

Genetics Glossary

A Plain Language Guide for Bedlington Terrier Owners and Breeders

Allele

One version of a gene. Every dog inherits two copies of most genes—one from its sire (father) and one from its dam (mother).

At-Risk Dog

A dog that carries one or two copies of the CDDY mutation (N/CDDY or CDDY/CDDY). Carrying the mutation does **not** guarantee a dog will develop IVDD, but it increases the risk.

Autosomal Dominant

A pattern of inheritance in which only **one copy** of a gene mutation is needed to increase the likelihood of showing a trait or disease. The CDDY mutation is inherited in an autosomal dominant manner.

Breed-Specific Research

Research conducted specifically within the Bedlington Terrier breed rather than relying on studies from other breeds. Breed-specific research helps determine the true level of risk for Bedlington Terriers.

Calcification

The hardening of tissue due to calcium deposits. In CDDY, the intervertebral discs may calcify earlier than normal, making them more prone to injury.

Carrier

A term often used for recessive diseases. **CDDY is not a carrier condition.** Dogs with one copy of the mutation are considered genetically "at risk," not simply carriers.

CHIC (Canine Health Information Center)

A health database administered by the Orthopedic Foundation for Animals (OFA) that records health testing results for purebred dogs.

Chondrodystrophy (CDDY)

A genetic condition caused by the FGF4 retrogene on chromosome 12. It is associated with shorter legs and an increased risk of Intervertebral Disc Disease (IVDD).

Chromosome

A package of DNA that contains thousands of genes. Dogs have 39 pairs of chromosomes.

Clinical Signs

The symptoms of disease that can be observed, such as pain, weakness, difficulty walking, or paralysis.

DNA

The genetic blueprint that contains the instructions for building and maintaining every living organism.

DNA Test

A laboratory test that identifies whether a dog has zero, one, or two copies of a specific genetic mutation.

FGF4 Retrogene

An extra copy of the FGF4 gene that inserted into chromosome 12 long ago during canine evolution. This insertion is responsible for the CDDY mutation associated with shortened limbs and increased IVDD risk.

Gene

A section of DNA that provides instructions for a specific trait or biological function.

Genetic Diversity

The variety of genes within a breed. Maintaining genetic diversity helps reduce the risk of concentrating other inherited diseases and supports the long-term health of the breed.

Genetic Mutation

A permanent change in DNA. Most mutations are harmless, some are beneficial, and others can increase the risk of disease.

Genotype

A dog's genetic makeup for a particular trait or mutation.

For CDDY:

- **N/N** – No copies of the mutation detected.
- **N/CDDY** – One copy of the mutation detected.
- **CDDY/CDDY** – Two copies of the mutation detected.

Health Survey

Information submitted by owners regarding their dog's health history. Combining DNA test results with health surveys helps researchers better understand inherited diseases.

Heterozygous

Having two different copies of a gene. For CDDY, this means **N/CDDY** (one normal copy and one copy of the mutation).

Homozygous

Having two identical copies of a gene.

For CDDY:

- **N/N** = Homozygous Normal
- **CDDY/CDDY** = Homozygous for the mutation

Inheritance

The process by which genes are passed from parents to their offspring.

Intervertebral Disc Disease (IVDD)

A condition in which the discs between the vertebrae of the spine degenerate or rupture, causing pain, weakness, or paralysis. Dogs with the CDDY mutation have an increased risk of developing IVDD.

Mutation

A change in DNA. In this document, "the mutation" refers to the FGF4 retrogene associated with CDDY.

N/N (Normal)

A dog with no copies of the CDDY mutation detected by DNA testing.

N/CDDY

A dog with one copy of the mutation. These dogs have an increased genetic risk for IVDD but may never develop the disease.

Penetrance

The percentage of dogs with a genetic mutation that actually develop the associated disease. One goal of the University of Missouri study is to determine the penetrance of CDDY in Bedlington Terriers.

Phenotype

The traits that can be seen or measured, such as leg length, height, coat type, or whether a dog develops IVDD.

Prevalence

How common a mutation or disease is within a population. The prevalence of CDDY in Bedlington Terriers is currently being studied.

Retrogene

A copy of a gene that has been inserted into a different location in the genome. The CDDY mutation is caused by an FGF4 retrogene on chromosome 12.

Risk

The chance that something may happen. A higher genetic risk does **not** mean a disease is certain to occur.

Spinal Disc

A cushion between the bones (vertebrae) of the spine that acts as a shock absorber and allows flexibility.

Trait

A characteristic that can be inherited, such as coat color, body size, or leg length.

University of Missouri Study

The ongoing supported research project collecting DNA test results and health information to determine how common the CDDY mutation is and how it affects Bedlington Terriers specifically.

Why Testing Matters

DNA testing does **not** tell us whether a dog will definitely develop IVDD. Instead, it tells us whether a dog carries the CDDY mutation so breeders can make informed decisions while preserving the long-term genetic health of the Bedlington Terrier.

As additional breed-specific research becomes available, our understanding of CDDY and IVDD will continue to improve, and recommendations may change based on scientific evidence.