Innovative Animal Health
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Fact Sheet for Breeders: Chondrodystrophy (CDDY and IVDD) and Chondrodysplasia (CDPA) Overview

Chondrodystrophy (CDDY) is characterized by shortened legs, early intervertebral disc degeneration (IVDD), and a higher risk of disc herniation. This is seen in many breeds including Beagles, French Bulldogs, and Cavalier King Charles Spaniels.

Chondrodysplasia (CDPA) is a separate short-legged mutation seen in many breeds including Cairn Terriers, Scottish Terriers, Maltese, and Shih Tzu.

Some breeds frequently have both Chondrodystrophy and Chondrodysplasia, such as Basset Hounds, Dachshunds, Pekingese, and Pembroke Welsh Corgis.

Mode of Inheritance:

Chondrodystrophy (CDDY) – Autosomal Dominant for intervertebral disc disease (IVDD) and semi-dominant in its effect on leg length

Chondrodysplasia (CDPA) – Autosomal Dominant

Genetic Testing:

Chondrodystrophy (CDDY) testing

- **Two Mutated Copies (P/P)**: Leg shortening with early intervertebral disc degeneration (IVDD) and a higher risk of disc herniation.
- **One Mutated Copy (P/N)**: Semi-leg shortening with early intervertebral disc degeneration (IVDD) and a higher risk of disc herniation.
- **No Mutated Copies (N/N)**: No chondrodystrophy variant and therefore no increased risk of intervertebral disc degeneration.

Chondrodysplasia (CDPA) testing

- **Two Mutated Copies (P/P)**: Leg shortening.
- **One Mutated Copy (P/N)**: Leg shortening.
- **No Mutated Copies (N/N)**: No chondrodysplasia variant.

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Breeding recommendations

Genetic testing for CDDY is recommended for all breeds in which the variant has been detected. Results can assist in making informed breeding decisions and should be shared with the dog's veterinarian to support clinical care and management. When possible, dogs carrying the CDDY variant should be bred to clear dogs to reduce the risk of producing offspring with two copies of the mutation and to help lower the overall frequency of the variant in the breed.

Frequency:

A comprehensive study by Batcher et al. (2019) investigated the distribution of the CDDY (12-FGF4) and CDPA (18-FGF4) mutations across dog breeds (https://doi.org/10.3390/genes10060435). The table of these frequencies can be found below.

* "0" means zero copies of the mutation, "1"' is one copy,"2" is two copies. "Frequency" is the mutated allele frequency in each breed.

		12-*FGF4* RG				18-*FGF4* RG			
Breed	**Total**	**0**	**1**	**2**	**Frequency**	**0**	**1**	**2**	**Frequency**
Alaskan Malamute	21	21	0	0	0	21	0	0	0
Alpine Dachsbracke	174	25	93	56	0.59	1	112	61	0.67
Appenzeller Sennenhund	121	121	0	0	0	121	0	0	0
Australian Cattle Dog	11	11	0	0	0	5	0	0	0
Australian Shepherd	46	44	2	0	0.02	37	0	0	0
Basset Griffon Vendéen Petit	10	10	0	0	0	0	0	10	1.00
Basset Hound	32	3	18	11	0.63	1	4	27	0.91
Bavarian Mountain Hound	69	1	10	58	0.91	68	0	0	0
Beagle	12	0	0	12	1.00	5	0	0	0
Bernese Mountain Dog	11	11	0	0	0	5	0	0	0
Bichon Frise	71	49	19	3	0.18	1	2	5	0.75
Border Collie	5	5	0	0	0	5	0	0	0
Border Terrier	6	6	0	0	0	6	0	0	0
Boston Terrier	5	5	0	0	0	5	0	0	0

		12-*FGF4* RG				18-*FGF4* RG			
Breed	**Total**	**0**	**1**	**2**	**Frequency**	**0**	**1**	**2**	**Frequency**
Brittany	17	17	0	0	0	6	0	0	0
Bull Terrier	5	5	0	0	0	5	0	0	0
Bulldog, English	13	13	0	0	0	5	0	0	0
Bulldog, French	106	0	7	99	0.97	12	1	0	0.04
Cairn Terrier	10	10	0	0	0	0	1	9	0.95
Cavalier King Charles Spaniel	21	0	0	21	1.00	5	0	0	0
Chesapeake Bay Retriever	40	34	6	0	0.08	9	0	0	0
Chihuahua	199	163	34	2	0.10	2	4	31	0.89
Chinese Crested	9	5	4	0	0.22	8	1	0	0.06
Clumber Spaniel	5	0	0	5	1.00	5	0	0	0
Cocker Spaniel, American	9	0	1	8	0.94	5	0	0	0
Cocker Spaniel, English	14	0	1	13	0.96	14	0	0	0
Coton de Tulear	12	2	6	4	0.58	0	1	11	0.96
Dachshund (Swiss)	136	0	16	120	0.94	0	5	131	0.98
Dachshund (US/UK)	257	0	10	247	0.98	1	2	240	0.99
Dandie Dinmont Terrier	27	1	4	22	0.89	0	0	27	1.00
Danish Swedish Farmdog	29	23	6	0	0.10	12	0	0	0
Doberman Pinscher	14	14	0	0	0	5	0	0	0
Entlebucher Mountain Dog	8	0	5	3	0.69	8	0	0	0
Fox Terrier	11	11	0	0	0	6	0	1	0.14
German Hound	16	1	9	6	0.66	16	0	0	0
German Shepherd Dog	15	15	0	0	0	5	0	0	0
Glen of Imaal Terrier	8	8	0	0	0	0	0	8	1.00
Golden Retriever	14	14	0	0	0	6	0	0	0
Great Dane	12	12	0	0	0	5	0	0	0
Irish Setter	8	8	0	0	0	5	0	0	0
Jack Russel Terrier	12	10	2	0	0.08	3	0	0	0

		12-*FGF4* RG				18-*FGF4* RG			
Breed	**Total**	**0**	**1**	**2**	**Frequency**	**0**	**1**	**2**	**Frequency**
Labrador Retriever	21	21	0	0	0	11	0	0	0
Lagotto Romagnolo	53	53	0	0	0	53	0	0	0
Maltese	87	83	3	1	0.03	0	0	18	1.00
Mixed Breed	572	474	81	17	0.10	466	73	33	0.12
Newfoundland	13	13	0	0	0	5	0	0	0
Norwich Terrier	19	19	0	0	0	3	0	16	0.84
Nova Scotia Duck Tolling Retriever	172	69	87	16	0.35	7	0	0	0
Pekingese	28	5	11	12	0.63	1	0	19	0.95
Pinscher, Miniature	9	8	1	0	0.06	9	0	0	0
Podengo Pequeno	7	7	0	0	0	0	1	6	0.93
Poodle, Miniature and Toy	114	28	43	43	0.57	37	7	4	0.16
Poodle, Standard	55	55	0	0	0	30	0	1	0.03
Portuguese Water Dog	12	9	3	0	0.13	5	0	0	0
Pug	7	7	0	0	0	7	0	0	0
Rottweiler	10	10	0	0	0	5	0	0	0
Russell Terrier	10	10	0	0	0	0	4	6	0.80
Russian Tsvetnaya Bolonka	6	4	2	0	0.17	0	2	4	0.83
Schnauzer, Miniature	8	8	0	0	0	8	0	0	0
Schweizer Laufhund	65	51	14	0	0.11	65	0	0	0
Schweizerischer Niederlaufhund	46	12	21	13	0.51	16	17	13	0.47
Scottish Terrier	12	11	1	0	0.04	0	1	6	0.93
Shetland Sheepdog	13	13	0	0	0	5	0	0	0
Shih Tzu	110	64	36	10	0.25	0	0	5	1.00
Siberian Husky	11	11	0	0	0	5	0	0	0
Skye Terrier	13	2	2	9	0.77	0	0	9	1.00
Springer Spaniel, English	22	9	8	5	0.41	12	0	0	0
St. Bernard	10	10	0	0	0	5	0	0	0

		12-*FGF4* RG				18-*FGF4* RG			
Breed	**Total**	**0**	**1**	**2**	**Frequency**	**0**	**1**	**2**	**Frequency**
Weimaraner	13	13	0	0	0	5	0	0	0
Welsh Corgi, Cardigan	6	1	1	4	0.75	0	1	4	0.90
Welsh Corgi, Pembroke	51	3	13	35	0.81	0	2	49	0.98
West Highland White Terrier	10	10	0	0	0	0	0	8	1.00
Whippet	5	5	0	0	0	5	0	0	0
Yorkshire Terrier	12	11	1	0	0.04	0	0	5	1.00
TOTAL	3223	1787	581	855	0.36	1175	240	766	0.41

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