AMERICAN KENNEL CLUB

NAME
MILKY WAY II

BREED
GOLDEN RETRIEVER

COLOR
LIGHT GOLDEN

SIRE
STARRY GOLD ICE
SS02617701 12-19 (OFEL26 AKC DNA #V843283) (HUN)

DAM
SUGAR SPICE THE SECOND
SR94674810 10-19 (EYE43)

BREEDER
ARTHUR HESS

OWNER

ARTHUR HESS
2953 S HILL RD
MILFORD MI 48381-3415

NUMBER
SS34843409

SEX
FEMALE

DATE OF BIRTH
MAY 8, 2022

AMERICAN KENNEL CLUB®

CERTIFICATE ISSUED
JULY 26, 2022

This certificate invalidates all previous certificates issued.

If a date appears after the name and number of the sire and dam, it indicates the issue of the Stud Book Register in which the sire or dam is published.

For Transfer Instructions, see back of Certificate.

This Certificate issued with the right to correct or revoke by the American Kennel Club.

REGISTRATION CERTIFICATE

Owner's Copy

PennHIP Report

Referring Veterinarian: Dr Katherine Donahue
Email: joe.schultzvet@gmail.com

Clinic Name: Schultz Veterinary Clinic
Clinic Address: 2770 Bennett Road
Okemos, MI 48864
Phone: (517) 337-4800
Fax:(517) 337-1874

Patient Information

Client: Hess, Arthur
Patient Name: Milky Way
Reg. Name: Milky Way II
PennHIP Num: 182282
Species: Canine
Date of Birth: 08 May 2022
Sex: Female
Date of Study: 22 Nov 2022
Date of Report: 06 Dec 2022

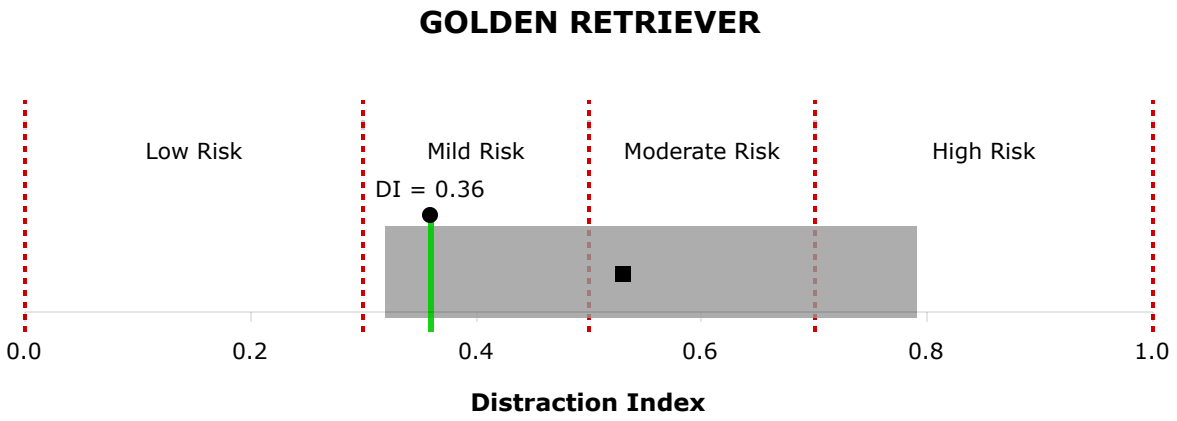
Tattoo Num:
Patient ID: 48544
Registration Num: SS34843409
Microchip Num: 985113006055804
Breed: GOLDEN RETRIEVER
Age: 6 months
Weight: 38.9 lbs/17.6 kgs
Date Submitted: 02 Dec 2022

Findings

Distraction Index (DI): Right DI = 0.36, Left DI = 0.28.
Osteoarthritis (OA): **No radiographic evidence of OA for either hip.**
Cavitation/Other Findings: No cavitation present.

Interpretation

Distraction Index (DI): The laxity ranking is based on the hip with the greater laxity (larger DI). In this case the DI used is 0.36.
OA Risk Category: The DI is between 0.31 and 0.49. This patient is at mild risk for hip OA.
Distraction Index Chart:



BREED STATISTICS: This interpretation is based on a cross-section of 25074 canine patients of the GOLDEN RETRIEVER breed in the AIS PennHIP database. The gray strip represents the central 90% range of DIs (0.32 - 0.79) for the breed. The breed average DI is 0.53 (solid square). The patient DI is the solid circle (0.36).

SUMMARY: The degree of laxity (DI = 0.36) falls within the central 90% range of DIs for the breed. This amount of hip laxity places the hip at a mild risk to develop hip OA. **No radiographic evidence of OA for either hip.**

ORTHOPEDIC FOUNDATION FOR ANIMALS, INC.

MILKY WAY II
registered name

GOLDEN RETRIEVER
breed

film/test/lab #

985113006055804
tattoo/microchip/DNA profile

2566927
application number

08/14/2024
date of report

SS34843409
registration no.

F
sex

05/08/2022
date of birth

26
age at evaluation in months

A Not-For-Profit Organization

GR-BCA10606/26F/P-VPI
O.F.A. NUMBER

This number issued with the right to correct or revoke by the Orthopedic Foundation for Animals.

RESULTS:

Normal cardiovascular examination via auscultation - No evidence of congenital or acquired heart disease was noted. Since acquired heart disease may develop later, these evaluation results remain valid for one year, and annual examinations are recommended to continue to monitor cardiac health.

NORMAL/CLEAR - PRACTITIONER

owner

ARTHUR HESS
2953 SOUTH HILL RD
MILFORD MI 48381

OFA eCert

Verify QR scan

G.G. KELLER, DVM, MS, DACVR
CHIEF OF VETERINARY SERVICES

www.ofa.org

ORTHOPEDIC FOUNDATION FOR ANIMALS, INC.

MILKY WAY II
registered name

GOLDEN RETRIEVER
breed

film/test/lab #

985113006055804
tattoo/microchip/DNA profile

2566927
application number

08/15/2024
date of report

SS34843409
registration no.

F
sex

05/08/2022
date of birth

26
age at evaluation in months

A Not-For-Profit Organization

GR-EL66569F26-C-VPI
O.F.A. NUMBER

This number issued with the right to correct or revoke by the Orthopedic Foundation for Animals.

RESULTS:

The elbows are normal. No radiographic evidence of elbow dysplasia is present.

NORMAL

owner
ARTHUR HESS
2953 SOUTH HILL RD
MILFORD MI 48381

OFA eCert

Verify QR scan

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CHIEF OF VETERINARY SERVICES

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ORTHOPEDIC FOUNDATION FOR ANIMALS, INC.

MILKY WAY II
registered name

GOLDEN RETRIEVER
breed

761790
film/test/lab #

985113006055804
tattoo/microchip/DNA profile

2566927
application number

08/14/2024
date of report

SS34843409
registration no.

F
sex

05/08/2022
date of birth

26
age at evaluation in months

A Not-For-Profit Organization

GR-EYE35218/26F-VPI
O.F.A. NUMBER

This number issued with the right to correct or revoke by the Orthopedic Foundation for Animals.

RESULTS:

Based upon the exam dated 07/22/2024, this dog has been found to be free of observable inherited eye disease and has been issued an Eye Certification Registry Number which is valid for one year from the time of the exam.

NORMAL

owner
ARTHUR HESS
2953 SOUTH HILL RD
MILFORD MI 48381

OFA eCert

Verify QR scan

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CHIEF OF VETERINARY SERVICES

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SUGAR 2022 YELLOW

Veterinary Report by Embark

embarkvet.com

Test Date: June 1st, 2022

Customer-supplied information

Owner Name: Arthur Hess
Dog Name: Sugar 2022 Yellow
Sex: Female
Date of birth: n/a

Breed type: N/A
Breed: Golden Retriever
Breed registration: N/A
Microchip: N/A

Genetic summary

Genetic breed identification:
Golden Retriever

Breed ancestry:

Golden Retriever: 100.0%

Predicted adult weight: **58 lbs**
Calculated from 17 size genes.

Genetic age: n/a (Date of birth unknown)
Human equivalent age based on size, date of birth provided, and other factors

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)

Sugar 2022 Yellow's baseline ALT level is likely to be Normal

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.

Health Report

How to interpret Sugar 2022 Yellow's genetic health results:
If Sugar 2022 Yellow 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 Sugar 2022 Yellow 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!
Sugar 2022 Yellow is not at increased risk for the genetic health conditions that Embark tests.

Breed-Relevant Genetic Conditions	**10 variants not detected**
Additional Genetic Conditions	**209 variants not detected**

Breed-Relevant Conditions Tested

Sugar 2022 Yellow did not have the variants that we tested for, that are relevant to her breed:

- **Progressive Retinal Atrophy, prcd (PRCD Exon 1)**
- **Golden Retriever Progressive Retinal Atrophy 1, GR-PRA1 (SLC4A3)**
- **Golden Retriever Progressive Retinal Atrophy 2, GR-PRA2 (TTC8)**
- **Neuronal Ceroid Lipofuscinosis 5, NCL 5 (CLN5 Exon 4 Deletion, Golden Retriever Variant)**
- **Degenerative Myelopathy, DM (SOD1A)**
- **Muscular Dystrophy (DMD, Golden Retriever Variant)**
- **Congenital Myasthenic Syndrome, CMS (COLQ, Golden Retriever Variant)**
- **Dystrophic Epidermolysis Bullosa (COL7A1, Golden Retriever Variant)**
- **Ichthyosis, ICH1 (PNPLA1, Golden Retriever Variant)**
- **Osteogenesis Imperfecta, Brittle Bone Disease (COL1A1, Golden Retriever Variant)**

Additional Conditions Tested

Sugar 2022 Yellow did not have the variants that we tested for, in the following conditions that the potential effect on dogs with Sugar 2022 Yellow'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 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)**
- **Canine Elliptocytosis (SPTB Exon 30)**
- **Glanzmann's Thrombasthenia Type I (ITGA2B Exon 13, Great Pyrenees Variant)**

Additional Conditions Tested

- Glanzmann's Thrombasthenia Type I (ITGA2B Exon 12, Otterhound Variant)
- May-Hegglin Anomaly (MYH9)
- Prekallikrein Deficiency (KLKB1 Exon 8)
- Pyruvate Kinase Deficiency (PKLR Exon 5, Basenji Variant)
- Pyruvate Kinase Deficiency (PKLR Exon 7, Labrador Retriever Variant)
- Pyruvate Kinase Deficiency (PKLR Exon 7, Pug Variant)
- 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 (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)

Additional Conditions Tested

- 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)
- Progressive Retinal Atrophy, crd1 (PDE6B, American Staffordshire Terrier Variant)
- Progressive Retinal Atrophy, crd4/cord1 (RPGRIP1)
- X-Linked Progressive Retinal Atrophy 1, XL-PRA1 (RPGR)
- Progressive Retinal Atrophy, PRA3 (FAM161A)
- 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)
- Achromatopsia (CNGA3 Exon 7, Labrador Retriever 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)

Additional Conditions Tested

- **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)**
- **Macular Corneal Dystrophy, MCD (CHST6)**
- **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)**
- **Hyperuricosuria and Hyperuricemia or Urolithiasis, HUU (SLC2A9)**
- **Polycystic Kidney Disease, PKD (PKD1)**
- **Primary Hyperoxaluria (AGXT)**
- **Protein Losing Nephropathy, PLN (NPHS1)**
- **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)**

Additional Conditions Tested

- 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)

Additional Conditions Tested

- 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)
- 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 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)
- Shar-Pei Autoinflammatory Disease, SPAID, Shar-Pei Fever (MTBP)
- Neonatal Interstitial Lung Disease (LAMP3)

Additional Conditions Tested

- **Recurrent Inflammatory Pulmonary Disease, RIPD (AKNA, Rough Collie Variant)**
- **Alaskan Husky Encephalopathy, Subacute Necrotizing Encephalomyelopathy (SLC19A3)**
- **Alexander Disease (GFAP)**
- **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)**
- **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)**
- **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 Intron 6, Labrador Retriever Variant)**

Additional Conditions Tested

- 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)
- Dilated Cardiomyopathy, DCM1 (PDK4, Doberman Pinscher Variant 1)
- Dilated Cardiomyopathy, DCM2 (TTN, Doberman Pinscher Variant 2)
- Long QT Syndrome (KCNQ1)
- Cardiomyopathy and Juvenile Mortality (YARS2)
- Muscular Dystrophy (DMD, Cavalier King Charles Spaniel Variant 1)
- Limb Girdle Muscular Dystrophy (SGCD, Boston Terrier Variant)
- Ullrich-like Congenital Muscular Dystrophy (COL6A3 Exon 10, Labrador Retriever Variant)
- Centronuclear Myopathy, CNM (PTPLA)
- Exercise-Induced Collapse, EIC (DNM1)

Additional Conditions Tested

- **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)**
- **Myotubular Myopathy 1, X-linked Myotubular Myopathy, XL-MTM (MTM1, Labrador Retriever 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 (COLQ, Labrador Retriever Variant)**
- **Congenital Myasthenic Syndrome, CMS (CHRNE, Jack Russell Terrier Variant)**
- **Myasthenia Gravis-Like Syndrome (CHRNE, Heideterrier Variant)**
- **Episodic Falling Syndrome (BCAN)**
- **Paroxysmal Dyskinesia, PxD (PIGN)**

Additional Conditions Tested

- Demyelinating Polyneuropathy (SBF2/MTRM13)
- Laryngeal Paralysis (RAPGEF6, Miniature Bull Terrier 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 (SLC27A4, Great Dane Variant)
- Ichthyosis (NIPAL4, American Bulldog 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)
- Hereditary Nasal Parakeratosis, HNPK (SUV39H2)
- Musladin-Lueke Syndrome, MLS (ADAMTSL2)
- Oculocutaneous Albinism, OCA (SLC45A2, Small Breed 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)
- Osteogenesis Imperfecta, Brittle Bone Disease (COL1A2, Beagle Variant)

Additional Conditions Tested

- **Osteogenesis Imperfecta, Brittle Bone Disease (SERPINH1, Dachshund Variant)**
- **Osteochondrodysplasia, Skeletal Dwarfism (SLC13A1, Poodle Variant)**
- **Skeletal Dysplasia 2, SD2 (COL11A2, Labrador Retriever 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)**
- **Mucopolysaccharidosis IIIB, Sanfilippo Syndrome Type B, MPS IIIB (NAGLU, Schipperke Variant)**
- **Early Onset Adult Deafness, EOAD (EPS8L2 Deletion, Rhodesian Ridgeback Variant)**

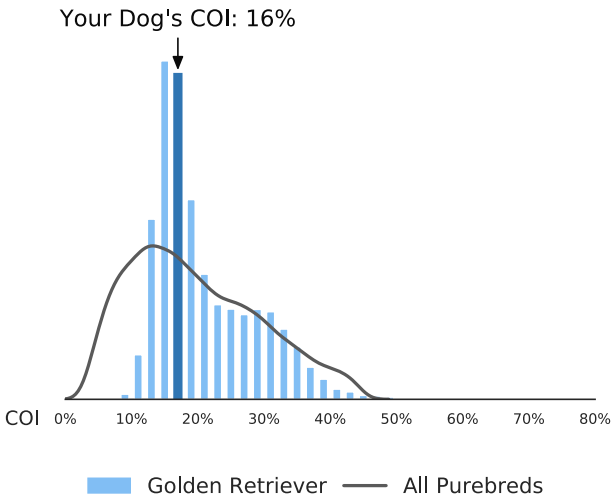
Genetic Diversity and Inbreeding

Coefficient of Inbreeding (COI)

Genetic Result: 16%

Our genetic COI measures the proportion of your dog's genome (her genes) where the genes on the mother's side are identical by descent to those on the father's side. The higher your dog's coefficient of inbreeding (the percentage), the more inbred your dog is.

Your Dog's COI



This graph represents where your dog's inbreeding levels fall on a scale compared to both dogs with a similar breed makeup to her (the blue bars) and all purebred dogs (the grey line).

Genetic Diversity and Inbreeding

More on the Science

Embark scientists, along with our research partners at Cornell University, have shown the impact of inbreeding on longevity and fertility and developed a state-of-the-art, peer-reviewed method for accurately measuring COI and predicting average COI in litters.

Citations

Sams & Boyko 2019 "Fine-Scale Resolution of Runs of Homozygosity Reveal Patterns of Inbreeding and Substantial Overlap with Recessive Disease Genotypes in Domestic Dogs" (https://www.ncbi.nlm.nih.gov/pubmed/30429214)

Chu et al 2019 "Inbreeding depression causes reduced fecundity in Golden Retrievers" (https://link.springer.com/article/10.1007/s00335-019-09805-4)

Yordy et al 2019 "Body size, inbreeding, and lifespan in domestic dogs" (https://www.semanticscholar.org/paper/Body-size%2C-inbreeding%2C-and-lifespan-in-domestic-Yordy-Kraus/61d0fa7a71afb26f547f0fb7ff71e23a14d19d2c)

About Embark

Embark Veterinary is a canine genetics company offering research-grade genetic tests to pet owners and breeders. Every Embark test examines over 200,000 genetic markers, and provides results for over 220 genetic health conditions, breed identification, clinical tools, and more.

Embark is a research partner of the Cornell University College of Veterinary Medicine and collaborates with scientists and registries to accelerate genetic research in canine health. We make it easy for customers and vets to understand, share and make use of their dog's unique genetic profile to improve canine health and happiness.

Learn more at embarkvet.com

Veterinarians and hospitals can send inquiries to veterinarians@embarkvet.com.

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DNA Test Report

Dog Information

Sugar 2022 Yellow NAME	Female SEX
Golden Retriever BREED ANCESTRY	-- DATE OF BIRTH
n/a REGISTRATION	n/a MICROCHIP

Arthur Hess
OWNER NAME

Canine Genetic Health Screen
TEST

June 1st, 2022
TEST DATE

BREED HEALTH TESTS

DISEASE	GENE	GENOTYPE	RESULT	TESTING RECOMMENDED BY
Degenerative Myelopathy, DM	SOD1(A)	GG	Clear	
Golden Retriever Progressive Retinal Atrophy 1, GR-PRA1	SLC4A3 Exon 16	NN	Clear	
Golden Retriever Progressive Retinal Atrophy 2, GR-PRA2	TTC8 Exon 8	NN	Clear	
Ichthyosis, ICH1	PNPLA1 (Exon 8)	AAC/AAC	Clear	
Muscular Dystrophy	DMD	AA	Clear	
Progressive Retinal Atrophy, prcd	PRCD Exon 1	GG	Clear	
Congenital Myasthenic Syndrome, CMS	COLQ	GG	Clear	
Dystrophic Epidermolysis Bullosa	COL7A1 (Exon 68)	GG	Clear	
Neuronal Ceroid Lipofuscinosis 5, NCL 5	CLN5 (Exon 4 Deletion)	NN	Clear	
Osteogenesis Imperfecta, Brittle Bone Disease	COL1A1 (Exon 18)	GG	Clear	

DNA Test Report

Dog Information

Sugar 2022 Yellow
NAME

INBREEDING AND DIVERSITY

Genetic Diversity	RESULT	GENETIC RESULT
Coefficient Of Inbreeding		16%
MHC Class II - DLA DRB1		No Diversity
MHC Class II - DLA DQA1 and DQB1		No Diversity

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DNA Test Report

Dog Information

Sugar 2022 Yellow
NAME

TRAIT TESTS (1/2)

Coat Color	RESULT	GENETIC RESULT
E Locus (MC1R)	No dark hairs anywhere	ee
K Locus (CBD103)	Not expressed	K^BK^B
Intensity Loci LINKAGE	Any pigmented hair likely yellow or tan	Intermediate Red Pigmentation
A Locus (ASIP)	Not expressed	a^ta
D Locus (MLPH)	Not expressed	DD
Cocoa (HPS3)	No co alleles, not expressed	NN
B Locus (TYRP1)	Likely black colored nose/feet	BB
Saddle Tan (RALY)	Not expressed	NN
S Locus (MITF)	Likely to have little to no white in coat	SS
M Locus (PMEL)	No merle alleles	mm
R Locus (USH2A) LINKAGE	Likely no impact on coat pattern	rr
H Locus (Harlequin)	No harlequin alleles	hh

Other Coat Traits	RESULT	GENETIC RESULT
Furnishings (RSPO2) LINKAGE	Likely unfurnished (no mustache, beard, and/or eyebrows)	II

DNA Test Report

Dog Information

Sugar 2022 Yellow
NAME

TRAIT TESTS (2/2)

Body Size	RESULT	GENETIC RESULT
Body Size (IGF1)	Larger	NN
Body Size (IGFR1)	Larger	GG
Body Size (STC2)	Larger	TT
Body Size (GHR - E191K)	Intermediate	GA
Body Size (GHR - P177L)	Larger	CC

Performance	RESULT	GENETIC RESULT
Altitude Adaptation (EPAS1)	Normal altitude tolerance	GG
Appetite (POMC) LINKAGE	Normal food motivation	NN