LABOKLIN
LABOR FÜR KLINISCHE DIAGNOSTIK GMBH & CO. KG
NEWSLETTER 3/2010

Inherited Myopathies in Labrador Retriever Dogs – cnm or HMLR?

Since the year 2005, LABOKLIN offers a genetic test for inherited myopathy in Labrador Retriever Dogs. There exist several names for the disease in the literature: HMLR (hereditary myopathy), inherited myopathy and cnm (centronuclear myopathy). Most recent but unpublished studies based on biopsy samples from muscular tissue suggest that HMLR and cnm are two unrelated genetic forms of disease. We will provide you with the newest findings as soon as they are available. According to current knowledge, cnm and „type-II deficiency myopathy“ and HMLR 4 results from a single worldwide mutation in the PTPLA-gene with a founder effect (Tiret et al., St. Malo, 2008).

EIC – Exercise Induced Collapse

Exercise induced collapse (EIC) is a neuromuscular dysfunction known to occur in Labrador Retriever Dogs and related breeds. Affected dogs usually tolerate moderate exercise well.However, if such a dog is exercised intensively however, weakness or even collapse can occur. Usually the first signs preceeding an episode of EIC are unusual gait and weakness of the hindlegs. Most of the time the dogs remain conscious. About 25% of the affected dogs may appear disoriented or confused. The intensity of the episodes can vary considerably between dogs. Some dogs show signs each time they exercise intensively, other dogs appear to be affected only from time to time. The initiating events can be categorized into external (exercise) and internal (stress-tolerance).

The genetic test detects a mutation that is indicative for a high susceptibility to EIC. In addition to the mutation, an external factor such as stress is necessary to induce EIC. The highly variable clinical picture depends on the personality of the dog as well as the intensity of exercise the dog has to perform.

This is a significant difference to other genetic diseases that occur independently from external factors. James Mickelson and collegues at the University of Minnesota were able to show that 76,3% of 244 Labrador Retriever Dogs with a collapse history were homozygous for the mutation. The remaining dogs were either carrier dogs or did not carry the mutation. There were differences of the characteristics of the collapse between those dogs. Dogs being homozygous for the mutation usually showed symptoms affecting the hindlegs. Dogs that were only carriers or free of the mutation showed collapse symptoms varying widely concerning severity and location.

In summary: Not every dog with the genotype EIC/EIC will suffer from EIC, but every dog affected by EIC has this genotype. EIC is an inherited disease following an autosomal-recessive mode of inheritance. The penetration of EIC can vary greatly depending on additional internal and external factors.

LABOKLIN offers the genetic test for EIC since December 2008. We have tested about 2400 Labrador Retriever Dogs. 53% of those dogs did not carry the mutation, 36% were carrier dogs (heterozygous N/EIC) and 11% were affected (EIC/EIC).

The mutation and its association with EIC could also be detected in Chesepeake Bay Retriever, Curly Coated Retriever Dogs, Boykin Spaniel, Pembroke Welsh Corgi and German Wire Haired Pointer.

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DM – Degenerative Myelopathy of older Dogs

Degenerative myelopathy is a severe, progressive disease of the spinal cord, affecting older dogs (>8 years). The disease is characterized by a loss of the myelin sheaths and axons of the cervical and lumbal spinal cord, resulting in ataxia and paresis. Early clinical signs include uncoordinated movements (ataxia), altered reflex activity of the hindlegs and disturbed proprioception. The disease is chronic and progressive, resulting in complete paralysis.

Initially the disease was described affecting mainly German Shepherd Dogs. A high-risk factor correlating with the disease was first identified in Pembroke Welsh Corgi, Rhodesian Ridgeback, German Shepherd, Boxer und Chesepeake Bay Retriever Dogs. Additionally, many other dog breeds are affected. A causative correlation of the disease with the mutation has to be identified for every single dog breed. This is done by histopathological investigation of the spinal cord of dogs carrying the mutation. As a result of these investigations at the university of Missouri/Orthopedic Foundation for Animals a causative correlation between DM and the mutation of the SOD1-gene, a high-risk factor, could be identified in American Eskimo Dog, Bernese Mountain Dog, Cardigan Welsh Corgi, Golden Retriever, Great Pyrenees, Kerry Blue Terrier, Poodle, Pug, Shetland Sheepdog (Sheltie), Soft Coaten Wheaten Terrier and Wire Fox Terrier. The mutated gene can also be found in Saarloos, Czech Wolfhound, Barsoi, Hovawart, Collie and several Mountain and Shepherd Dogs. In these dog breeds, the causative association of DM and the mutation in the SOD1 gene still needs to be shown.

The mutation identified is a high-risk factor for developing the disease. Usually genetically unaffected dogs and carrier dogs (heterozygous for the mutation) will not get DM. However, genetically positive dogs are at great risk of developing DM as they get older. Every dog that is affected by degenerative myelopathy has the genotype DM/DM, but not every dog with this genotype will show signs of DM. The reason for this is the age of the dog and differences in their genomic background. Onset of the disease in most dogs is at an age of 8 years or older. In rare cases, dogs that are positive for the mutation (DM/DM) are still healthy at an age of 15 years. There is no reliable data available concerning number of genetically positive dogs that will develop DM. Currently there is research ongoing investigating this issue and additional risk-factors responsible for development of DM. The association of the disease and the mutation has to be investigated in every single dog breed, too.

LABOKLIN analyzed a total of 780 dogs of different breeds regarding the mutation in the SOD1-gene as high-risk factor for the development of DM. 51,1% of these dogs did not have the mutation, 34% of the dogs were carrier (N/DM) and 14.5% were genetically positive (DM/DM). Cave: The frequencies of the genotypes varied between different dog breeds.

In the next Newsletter:
Continue breeding with heterozygous (carrier) animals or take them out of the breeding program?

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