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A second genetic variant for cerebellar dysfunction in the Belgian Shepherd has been identified

Dear Ladies and Gentlemen

We are pleased to inform you about research progress regarding cerebellar dysfunction in the Belgian Shepherd. After intensive research in an international consortium we were able to identify a second genetic defect in the Belgian Shepherd, especially in Malinois, Tervueren and Groenendeal dogs, which causes a severe neurological disease with monogenic autosomal recessive inheritance. The disease was termed "Spongy Degeneration with Cerebellar Ataxia Subtype 2" (SDCA2) and causes similar symptoms as SDCA1 but with a faster progression. In some cases of SDCA2, additional clinical signs including blindness, seizures and circling have been described.

Thanks to the results of our study, genetic testing for SDCA2 is now possible at specialized laboratories, which helps to avoid the non-intentional breeding of affected puppies. The genetic tests are provided by different laboratories, including LABOKLIN (https://shop.labogen.com) and FERAGEN (https://feragen.at). The Institute of Genetics of the University of Bern does not provide a genetic test for SDCA1 nor SDCA2.

It is important to note that the identified genetic defects (SDCA1 and SDCA2) cannot explain all forms of cerebellar dysfunction in the Belgian Shepherd. We are aware of clinically very similar, additional forms of cerebellar dysfunction in the Belgian Shepherd, which are caused by other currently unidentified genetic defects. We would like to identify these additional genetic defects in the future.

Explanation of the genetic test result:

There are two copies of each gene in the genome of a dog. One copy is inherited from the father and one from the mother. If a trait is inherited in an autosomal recessive manner, it means that an animal will only get the disease if it receives defective gene copies from both the father and the mother. Thus to produce an affected puppy, both parents (father and mother) must carry the defective gene. However, the carriers with only one copy of the defect will not be affected themselves.

Spongy Degeneration with Cerebellar Ataxia Subtype 2 (SDCA2) Autosomal recessive inheritance		
Genotype: **wt/wt** (clear)	Genotype: **wt/ins** (carrier)	Genotype: **ins/ins** (affected)
This animal does not carry the genetic defect and has no risk of developing SDCA2. The dog cannot pass the genetic defect to its offspring.	This animal carries one copy of the defective gene. The dog has no risk of developing SDCA2. However, this defect will be passed to its offspring with a probability of 50%. Such an animal should only be mated to a clear animal.	This animal carries two copies of the defective gene and is affected by SDCA2. Most SDCA2 affected dogs are euthanized by the 7th week of life because of severe neurological symptoms and poor quality of life.

Carriers have a 50% probability of passing the defective gene copy to their offspring. If two carriers are mated, there is a risk that 25% of the offspring will be affected by SDCA2. Therefore, the mating of two carriers should be strictly avoided (also legally forbidden in many countries). Carriers do not have to be categorically excluded from breeding. However, carriers should only be mated to clear dogs so that no homozygous affected puppies will be produced.

For the research on currently unknown genetic defects leading to further forms of cerebellar dyfunction in the Belgian Shepherd, we are looking for blood samples. Affected dogs, their siblings and their parents, as well as unaffected dogs of all ages are of great interest to us. Thank you for your support and your interest in our research.

Important: both genetic defects SDCA1 and SDCA2 are transmitted independently from each other.

Detailed information about our study can be found here:

- Link to the scientific publication on SDCA1:
  http://www.g3journal.org/content/early/2016/12/19/g3.116.038455.full.pdf+html
- Link to the scientific publication on SDCA2:
  http://www.g3journal.org/content/early/2017/06/15/g3.117.043018
- Link to our website for general information and for sending blood samples for future research:
  http://www.genetics.unibe.ch/research/documents_dogs/cerebellar_ataxia_in_the_belgian_shepherd/index_eng.html

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