

Cerebellar Abiotrophy in Lagotto Romagnolo

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Progressive Cerebellar Abiotrophy (CA) has been identified in several different species, including in a variety of dog breeds. In certain dog breeds, several different forms of the condition have been identified. This disorder is the result of a loss of neurons in the cortex of the cerebellum. It is a degenerative disease that causes affected dogs to have difficulty keeping balance and controlling their movements, which affects the dog's and owner's quality of life, requiring increasing levels of care and management. Dogs with CA have a much shorter life expectancy, with euthanasia being a compassionate choice made by most families.



Why are we seeing it now?

This is not a new condition in the Lagotto, with cases reported and research ongoing at least since 2007. It has been an underreported condition which has delayed progress on research in the identification of genetic determinants. There can be many reasons for the lack of reported cases and participation in the ongoing research. There is a lack of education & recognition of CA on the part of breeders and enthusiasts worldwide, pet owners have no awareness their new puppy isn't simply clumsy, and there are very few within the veterinary profession who have knowledge of the breed or conditions common to the breed. There is also an emotional toll on both the families who find themselves with an affected puppy, and on the part of breeders, who have unintentionally sent an unhealthy puppy to a home.

Today, the Lagotto Romagnolo breed has identified genetic health conditions for which there are commercial tests available to breeders for making informed choices when pairing dogs to breed. There was a time when tests for Benign Familial Juvenile Epilepsy and Lysosomal Storage Disease were not available. Once commercial genetic tests became available, and through education in the breeder community, the prevalence of these conditions decreased dramatically while retaining the excellent qualities of the Lagotto, its vitality, and longevity. Currently, CA genetic determinants are invisible; breeding a pair that produces an affected puppy may be inevitable without more scientific research. CA is the next neurological disease that breed mentors need to be focused upon so that a commercial test can be made available to everyone, and producing a CA affected puppy is no longer a concern.

What we know:

The visible signs of the condition are often noticed in juveniles between 12 – 16 weeks of age, several weeks after a puppy has been placed in a new home. This age is when families see the puppy exhibit 'clumsy' gait, tremors, wobbling, head bobbing, involuntary horizontal eye movement, and other body movements that present differently than a typical puppy of that age. Though not as frequent, there seems to be an adult onset in some dogs, beginning within the first year or later.

A full veterinary examination will help to rule out other suspected causes of the symptoms, and a referral to a neurologist may be generally recommended. Once other causes are ruled out, and CA is suspected, it is up to the owner's discretion, in consultation with their veterinarian, but it may not be necessary to complete a costly MRI. If the owner is considering euthanasia, the definitive diagnosis needed for an affected dog's inclusion as a CA case in research is best obtained by histopathology on post-mortem examination. While an MRI can show changes in the cerebellum (i.e., smaller size, wider sulci), it does not change the outcome for the dog, the people or provide the definitive diagnosis needed for CA research.

At this stage, if CA is suspected, there are only a couple of options available for the puppy. Since this is a degenerative disease with no cure, those options are to euthanize the puppy or to raise & manage the puppy for as long as some quality of life and care are possible. Neither is a simple choice, and both are difficult to make.

What about research?

There has been ongoing research at both the University of Bern, Switzerland, and the University of Helsinki, Finland, in past years. Currently, the lead of the study on identification of genetic determinants for CA in Lagotti is Dr. Tosso Leeb in Bern with partnership of Dr. Hannas Lohi's group in Finland. This partnership brings together two accomplished researchers and expert canine geneticists with long term interest and success in teasing out disease causing variants in the genetics of all breeds, including Lagotti; in 2015, having identified the LSD genes (ATG₄D variant) currently available in commercial tests. These successful researchers have state of the art laboratories, staff, and knowledgeable graduate students to support this work. [Supporting this strong collaboration toward one goal for the breed worldwide focuses resources and our ability to educate & promote participation.]

Clinical presentation, age at onset are crude tools but hint that there are likely multiple forms of CA in Lagotti and multiple genetic determinants responsible for this condition in the population of Lagotti worldwide. This creates a need for collection of sample sets from different 'family lines' of dogs that have produced CA affected puppies very important to the study. It is not as simple as collecting one or two samples and finding the answers across the breed. Along with blood samples of CA affected dogs, a sample set includes samples from the affected's parents and several full siblings, including littermates. Having a complete sample set provides the researcher more power in their analysis of the genomic data. To distinguish the small differences between a single variant allele of a carrier and a clear or an affected, there needs to be more than one sample of each variety. If, as is suspected, that there is more than one type of CA in Lagotti, then that creates a need for samples within affected family lines of dogs that have produced affected puppies very important to the study. It is not as simple as collecting one or two samples and assuming that is sufficient for finding the answers.

Lagotto Breed Organizations and Lagotto Health Groups should become familiar with CA and educate breeders on how to recognize it and how to prepare puppy buyers to recognize signs. Also, in coordinated outreach, these groups should provide support when a CA case is recognized. Support may include sharing information on best management practices, giving the puppy family emotional support, and helping the breeder to locate the puppy's parents and full siblings for sample collections. Building a non-judgmental culture of open discussion on concerns in the breed will help to encourage breeders and puppy families to come forward to participate. It is through outreach and education that people become more aware and can be prepared to support each other.

It is important to understand that this is not isolated to any particular lines of dogs but likely came down through the small genetic pool of Lagotti used to preserve the breed in the 1970's and 80's. With the worldwide popularity and growth in the population of Lagotti over the past 5 years the likelihood of producing affected puppies may increase until there is a test commercially available.

Frequently Asked Questions –

- **What can we do to avoid producing affected puppies?**

This is a condition affecting our breed, not just a particular pedigree of dogs. Until there is a genetic test available, there is no way to identify dogs that may be carriers other than when they produce a litter with affected puppies. Until testing is available, some strategies may include:

- Avoiding close linebreeding in selecting pairings.
- Build good relationships with trusted breed mentors and breeders with long history to learn of potential concerns when making breeding selections.

- What do I do if I have a litter with an affected puppy(ies)?
 - Understand that it can happen to anyone until a test is available to identify carriers.
 - Be prepared to be available for the puppy family (if the puppy is placed) and consider the options that will be best for them, the puppy, and you.
 - Reach out to your breed health group, the Lagotto Foundation, or directly to Dr. Leeb at the University of Bern to learn how you can participate.
 - It will be your decision how to go forward with breeding the pair that produced an affected puppy but repeating the same breeding is strongly discouraged unless solicited for research.
- What to do if I notice the symptoms in my puppy or adult dog?
 - It is important if there are any concerns that you seek veterinary advice and have a full physical to rule out other potential causes.
 - Reach out to your breeder to alert them to your concerns and let them know about any findings from the veterinarian.
 - If it is suspected to be CA, there will be some personal choices to make that you and your breeder should discuss. Choosing to participate in the study would be a very valuable contribution to the breed's future. Participation does not automatically mean an affected dog must be euthanized, blood samples are adequate for a presumptive case for the research.
 - If it would be helpful to your decision process, we would be able to connect you with others who have had the experience for you to ask questions.
- What happens when I participate in the study with an affected or non-affected dog?
 - The blood samples, pedigrees, and other information sent to the study is confidential.
 - A definitive CA case should have a post-mortem examination with histopathology of the brain tissue. A full sample set includes the suspect/definitive CA case (usually a blood sample is acquired first, upon death, the report of brain histopathology, and blood samples from the parents, and full siblings of the CA affected dog.
 - When the genetic determinant is identified, you will be notified by the research institution of your dog's genetic profile for that particular gene before a test is publicly available. If you are a breeder, this could be very helpful to future decisions in your breeding program.

More information available at:

<https://lagottofoundation.org/diseases/research/>

Sample Submission Information:

[Cerebellar Abiotrophy in Lagotto Romagnolo Dogs](#)

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