Canine Genetics Centre
at the University of Cambridge

Relieving the pressure of inherited glaucoma in dogs

The Canine Genetics Centre is excited to be resuming its research into primary glaucoma in dogs and to be able to include the Dandie Dinmont Terrier in our investigations. This article explains what glaucoma is, and what we are doing to resume our investigations of this painful and blinding canine disease.

What is glaucoma?

Glaucoma is a painful and blinding disease associated with high pressure within the eye that damages the retina & optic nerve resulting in blindness.

In dogs glaucoma is exceedingly difficult to treat, and most affected dogs ultimately require removal of their eyes on welfare grounds, to relieve the excruciating pain that is caused by this disease.

Glaucoma can be *secondary* to other eye conditions, such as primary lens luxation, inflammation or injury, but If glaucoma occurs in the absence of any preceding eye conditions it is described as *primary* and is presumed to be inherited.

Primary glaucoma is believed to affect >40 breeds, with an estimated 1500 dogs developing glaucoma in the UK each year.

Dogs suffer from two distinct types of glaucoma – primary open angle glaucoma (**POAG**) and primary closed angle glaucoma (**PCAG**).

In dogs affected with POAG, the drainage angle of the eye (known as the iridocorneal angle or ICA) appears normal, and we know that POAG is usually inherited as a single gene, recessive disease.

In dogs affected with PCAG, the ICA is abnormal. Pectinate ligament abnormality (PLA) is the term given to this abnormality, which can only be detected by a veterinary ophthalmologist, using a technique called gonioscopy. In most breeds investigated to date, PCAG has a complex mode of inheritance, meaning it is not the result of a mutation in a single gene.

Previous research

The Canine Genetics Centre (CGC) has a longstanding interest in inherited eye diseases, including primary glaucoma, and has identified the mutations responsible for POAG in several different breeds, including the Petit Basset Griffon Vendeen [1], the Basset Hound and Basset Fauve de Bretagne [2] and the Shar Pei [3].

Around 2014 the CGC initiated research to investigate the genetics of the more complex form of canine glaucoma, PCAG, in collaboration with the veterinary ophthalmologist James Oliver, who is currently Head of Ophthalmology at DWR veterinary specialists. James was so committed to developing a better understanding of the genetics of this disease that he made it the subject of his PhD thesis, putting endless hours into examining the eyes of hundreds of dogs and collecting their DNA.

This initial work enabled us to estimate the prevalence of PLA in multiple breeds of dog [4-6], and led to some initial genetic findings in the Basset Hound [7].

The CGC's research into PCAG had to be put on hold following the closure of the AHT in 2020, the CGC's subsequent move to the University of Cambridge in 2021 and the funding challenges that the CGC was faced with in 2024.

However, that situation has recently changed, thanks in very large part to a large grant that was awarded to the CGC by the trustees of the Jean Lanning Foundation. The grant will fund staff to continue the CGC's Inherited Eye Disease research, enabling research into PCAG to resume.

We will continue to investigate PCAG in the Basset Hound, a breed for which we have a lot of DNA sequence data already and we will also be resuming our investigations of the Welsh Spinger Spaniel and the Dandie Dinmont Terrier.

For both the Welsh Springers and the Dandie Dinmonts, we will sequence the entire genomes of PCAG-affected and PLA-affected dogs, alongside dogs with healthy eyes, and we will proceed undertake a large-scale analysis to compare the genomes of the three groups of dogs and, hopefully, identify genetic variants that underpin the development of PLA and PCAG in both these lovely breeds.

Over the years we have collected DNA from a lot of PCAG-affected dogs of both breeds, and these samples will play a crucial role in our new analyses.

The new investigations will start in the Autumn we hope to be able to report the results of our preliminary analyses by the second quarter of 2026.

Funding

The Canine Genetics Centre is able to include the Dandie Dinmont in their new analyses thanks to recent donations we have received from individual donors, specifically for this purpose. The funds we have received will enable us to sequence the genomes of 8 Dandie Dinmonts, which is a very good starting point. However, additional donations would enable us to sequence the genomes more dogs, thus increasing the likelihood that we will find mutations associated with this horrible disease.

How to Donate

The best way for you to help support the Canine Genetics Centre is to become a Friend of the CGC, by making a regular donation and allowing us to claim Gift Aid, if you are eligible. Regular donations make an enormous difference to our ability to plan our research projects, all of which are aimed at improving the health and welfare of dogs. Could you spare £5 a month and become a Friend of the Canine Genetics Centre?

If you are unable to commit to regular giving, please consider making a one-off donation, which we can use specifically to help fund our Dandie Dinmont glaucoma research if you would like us to. Simply type **Dandie Dinmont research** into the box that asks *'What prompted your gift today?*

References

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