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Share Your Story

I thought the best way to portray my project was through a website! I have attached the link for the website itself below.

https://wolinsk3.wixsite.com/website

I am also providing screenshots for ease of access.

Ocular biometry and retinoscopy of ADAMTS-10-mutant dogs

Overview of Our Research

Ocular biometry and retinoscopy of ADAMTS-10-mutant beagles

Our study hypothesises that if a dogs has an ADAMTS-10-mutation, than they have an increased likelihood of developing myopia otherwise known as nearsightedness.

It is also hypothesised that, as the myopia starts prior to the onset of open-angle glaucoma and therefore the increased intraocular pressure, which would increase the axial length and cause myopia, it is hypothesised that it may be caused another mechanism, displacement of the lens.
**Why are we doing this?**

Beagles with a genetic mutation on the gene *ADAMTS-10* causes Open-angle glaucoma (OAG). The genetic mutation is also linked to abnormal microstructures in the eye and even displacement of the lens, both of which can cause affects that lead to myopia, more commonly referred to as nearsightedness (objects at a distance appear blurry).

The aim of this study is to measure the dimensions of the different parts of the eye, as well as the refractive error of the eye to detect any possible abnormalities between normal and affected dogs. Refractive error is the number most people are familiar with when they discuss their glasses prescription. It is the corrective power needed to allow things to appear more clear.
Translation to Human Medicine

In humans a mutation of the ADAMTS-10 causes a disorder known as Weill-Marchesani syndrome. Some of the notable features of this disorder are short stature, short fingers and toes, joint stiffness and eye abnormalities, most notably development of myopia (nearsightedness) and glaucoma. By performing this study we will be able to bridge gaps in knowledge and help increase our understanding of this disorder and possibly work on finding a way to treat it but possibly even a way to cure it and prevent any further effects.
How are we doing this?

To obtain a majority of our measurements a type of ultrasound machine called an A-scan ultrasound is used. The probe sends ultrasound waves through to the back of the eye and eventually bounce back to the probe to be read and interpreted into peaks on a screen. The distance between the different peaks represents the measurements of different segments of the eye including the anterior chamber depth, the lens thickness and the vitreal chamber depth. All of these combined make up the axial length or the total length of the eye.

If you would like to learn more about the methods of how measurements were taken please click the button below.
Methods of Measurement

Pachymetry

Measurements were obtained on animals while they were awake. To prevent discomfort, anaesthetic drops were used. We used a device called an Accutome PachPen which uses short ultrasound waves to measure the thickness of the cornea. An ophthalmic solution was applied to the eye in small amount to allow for better reading from the PachPen. The pachymeter was held as perpendicularly as possible to the central cornea, taking nine consecutive measurements and averaging them.

A-Scan Procedure

Using a portable A-scan device, A-scan videos were collected on 17 beagle dogs, 11 with a gene mutation and 6 without. A small anesthetic was used to avoid discomfort to the eye and a probe was pressed lightly against the cornea of the eye and moved in accordance with the speed of the noise emitted by the program. The more frequent the noise is emitted the more ultrasound waves are returning back to the probe, thus the more accurate the reading is. This was done on both eyes. Later single frame images were taken and measured separately and recorded.
Intraocular Pressure

Intraocular pressure was measured under two different conditions, pre-dilation and post-dilation. A pre-dilation pressure was taken from both eyes using the iCare TonoVet rebound tonometer, which takes six successive measurements and then takes the average. Once the pre-dilation pressure was measured two dilating solutions were dropped into the dog's eye to allow. After ~15-20 mins the dogs were taken back out and retinoscopy was performed, along with corneal diameter measurements. After all measurements were completed a post-dilation pressure was taken from each eye and in the dogs affected by open-angle glaucoma received eye drops to help bring elevated pressures down.

Corneal Diameter

Using a set of callipers the lower jaws were placed at the approximate centre of the eye and were opened until they met the junction where the pigment iris and white sclera meet. There was a topical anaesthetic present during this procedure as well.
Retinoscopy

Retinoscopy is the measurement of the refractive error of the eye. A retinoscope and luneau retinoscopy bars (pictured at the left) are used to peer through the dilated pupil and look for the direction of the light reflecting in the back of the eye. When there is a with motion (moves in the same direction that the retinoscope moved) that suggests that the refractive error must increase. When the light fills up the back of the eye completely the refractive error has been corrected. If the light moves with an against motion (opposite direction of the retinoscope). Once the light fills up the back of the eye the refractive error was calculated and recorded.