Glaucoma

What is glaucoma?

Glaucoma is defined as an elevation of the pressure inside the eye, (known as intraocular pressure or IOP) beyond a point at which the light sensitive cells and nerve cells in the retina first cease to function normally and eventually die. Glaucoma causes blindness and is also frequently painful.

The front of the eye contains a watery fluid called aqueous humour which is produced by structures just behind the iris called the ciliary processes (see anatomy of the eye information sheet). This then flows forward through the pupil and drains from the eye through a sieve-like structure called the trabecular meshwork (also known as the drainage angle) where the iris attaches to the inside of the eye. Production and outflow of fluid are balanced, resulting in a stable pressure inside the eye of 10 to 25 mmHg (millimetres of mercury).

Glaucoma occurs as a consequence of inadequate fluid outflow and a subsequent build up of pressure inside the eye. The resulting high pressure first causes pain and inflammation and then damages the retinal cells resulting in blindness. Severe glaucoma is an emergency situation because a delay of as little as 24 hours in diagnosis and treatment can lead to avoidable and irreversible vision loss.

Are all glaucomas the same?

Two main types of glaucoma, with different causes, are recognised: primary glaucoma and secondary glaucoma. Primary glaucoma is known to occur in certain purebred breeds of dogs and is thought to be inherited. There are various types of primary glaucoma, some but not all of which, are associated with demonstrable anatomical abnormalities of the drainage angle. Secondary glaucoma is the result of some other ocular condition that interferes with the natural flow of fluid.

Diseases that commonly cause secondary glaucoma include inflammation of the structures inside the eye, cataract, displacement of the lens, bleeding inside the eye, trauma of the eye, and tumours inside the eye. Since primary glaucoma causes secondary inflammation and vice versa, exact diagnosis and treatment planning can be complex in these cases.

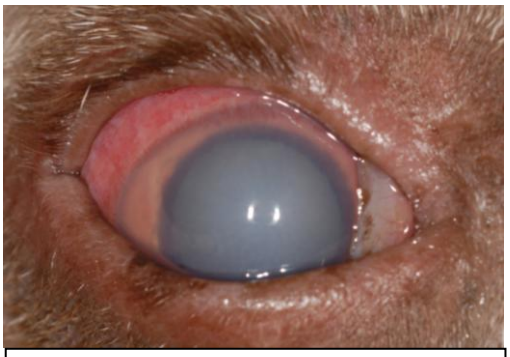
Is my pet at risk of developing glaucoma?

The main breeds of dog predisposed to glaucoma are summarised in the table opposite.
Primary glaucoma is comparatively rare in cats but has been identified in the Siamese, Burmese and Persian breeds.

In addition any pet suffering from one of the conditions causing secondary glaucoma is also at risk (see above paragraph).

What are the effects of glaucoma?

Acute (sudden onset) glaucoma is very painful and can cause blindness. If the pressure is not significantly decreased within 24-48 hours, it is very likely that the eye will remain blind. With long standing elevations of pressure, the eye becomes stretched and enlarged. By this stage it is permanently blind and painful. The aim of therapy at this point is to keep the patient pain-free. Because the eye is stretched, some pets are not able to completely close



Chronic glaucoma in a Weimaraner

their eyelids and therefore cannot protect the eye from damage or drying out. These patients are then likely to develop painful corneal ulcers. Frequently it is best to remove the eye, because this is the most effective way to control the pain.

How do I know if my pet has glaucoma?

The diagnosis of glaucoma is based on the characteristic symptoms and confirmed with specialised diagnostic tests called tonometry and gonioscopy.

Clinical signs of glaucoma include some or all of the following: excessive tearing, a green or yellow discharge, a red, sore looking eye, a cornea that suddenly looks blue or cloudy, an eye with a large pupil that does not respond to light, a pet who sleeps a lot, who hides under the bed or who suddenly becomes frightened or irritable or loses appetite. People with glaucoma often report a constant headache that medication will not help. Bulging of the eye and pain when gently pressing on the eye are more likely to be due to a tumour, inflammation or infection behind the eye.

Tonometry is the measurement of pressure within the eye and is the only way to definitely diagnose, or indeed rule out a diagnosis of, glaucoma. People are mostly familiar with the technique used in humans which involves a puff of air being blown onto the surface of the eye. This technique is not suitable for pets because it requires the patient to hold the eye open and still. Veterinary ophthalmologists either use an instrument called a Tonopen which when pressed gently against the cornea measures very accurately the force required to flatten a small section of cornea (this requires local anaesthetic drops to be applied to the eye first) or a Tonovet which bounces a very light probe off the cornea and by measuring the speed at which it bounces back, calculates the pressure inside the eye.

Gonioscopy is the technique used to evaluate the drainage angle. It involves placing a dome-shaped contact lens on the front of the eye, which bends the light enough to allow the examiner to see "around the corner" and into the drainage angle. This occasionally requires sedation but in most pets can be performed with just local anaesthetic eye drops. In cases of one-sided glaucoma this technique is essential to evaluate the unaffected eye for risk of a future attack of glaucoma. In cases where an underlying anatomical defect is identified, preventative treatment of the "normal" eye may delay or prevent development of glaucoma proper.

Akita	Lakeland Terrier
Alaskan Malamute	Maltese
Basset Hound	Miniature Pinscher
Beagle	Miniature Schnauzer
Border Collie	Norfolk Terrier
Boston Terrier	Norwegian Elkhound
Bouvier des Flandres	Norwich Terrier
Brittany Spaniel	Poodle (Toy/Miniature)
Cairn Terrier	Samoyed
Cardigan Welsh Corgi	Scottish Terrier
Chihuahua	Sealyham Terrier
American Cocker Spaniel	Shih Tzu
Dachshund	Siberian Husky
Dalmatian	Skye Terrier
English Cocker Spaniel	Smooth Fox Terrier
English Springer Spaniel	Tibetan Terrier
German Shepherd	Welsh Springer Spaniel
Giant Schnauzer	Welsh Terrier
Greyhound	West Highland White Terrier
Irish Setter Italian Greyhound	Wire Fox Terrier

Main canine breeds predisposed to primary glaucoma.

What are the treatments for glaucoma?

For the severe, sudden-onset glaucoma case hospitalisation is required, so that intensive treatment can be instituted and the response to it closely monitored. The pressure may need to be measured hourly over a 24 hour period because a normal pressure at 6 pm may falsely indicate adequate control and then be followed by a very high pressure at 3 am. A combination of techniques is used to reduce the pressure and control the pain as soon as possible. They include:

- high doses of pressure lowering eye drops
- administration of intravenous drugs that draw fluid out of the eye
- administration of anti-inflammatory drugs (eye drops, injection or tablets) to control the pain and inflammation
- physical removal of a small quantity of fluid from the eye with a syringe and needle (aqueocentesis)

Once the acute pressure lowering phase is complete, longer term maintenance will involve various combinations of eye drops which either reduce fluid formation or increase its' outflow. Regular check ups will be required as will on-going treatment for the life of the animal.

For medically non responsive glaucoma various types of glaucoma shunt surgery are available, in which fluid is diverted out of the eye via a small tube. These techniques have a high failure rate due to the fluid clotting in the tube causing a blockage, but can be useful in some cases. Alternatively techniques to destroy parts of the fluid-producing organ by freezing it, burning it with a laser or placing injections of toxic substances near it can be used. The latter are generally too destructive to be of value in preserving sight, but can be an alternative to surgical removal for the painfully blind eye. Another alternative to removal of the eye (see enucleation information sheet) is the placement of a prosthesis inside the outer shell of the affected eye after removal of the internal eye structures. Obviously, this technique does not bring the vision back but can be a more cosmetically acceptable alternative to enucleation.

A more recent development is the selective application of laser energy directly to the fluid producing tissue using a small endoscopic probe, a technique that can reliably reduce fluid formation with much less intra-ocular inflammation due to "collateral damage".

How do I care for my pet following the diagnosis of glaucoma?

It is very important that you follow the instructions and perform the treatments prescribed by your veterinarian. If treatment is stopped, the pressure will climb again and your pet will probably loose his /her sight and even his / her eye. It is also very important to bring your pet back on a regular basis for re-assessment of his / her intraocular pressures and if necessary adjustment of the treatment. Finally, it is very important that you contact a veterinarian as soon as you notice any change, however mild, in the appearance of your pet's eye (cloudiness, redness, discharge, squinting, intense blinking) or if there is a sudden loss of vision.

If you have any further questions do not hesitate to contact the Ophthalmology department at Rutland House Referrals on 01744 853510.