

# Focus on cataracts



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A guide to  
cataract surgery

# What is a cataract?

The lens of the eye is like a transparent jelly surrounded by a bag or capsule. It focuses images onto the retina at the back of the eye, as a camera focuses images onto film.

A cataract is a disease and is detrimental to the health of the eye. It is a clouding or opacity of the lens which causes reduction or blocking of light to the retina. In the early stages this causes a blurring of vision, but can progress to total permanent blindness.

## What causes the cataract?

There are many causes of cataracts in animals. It is said that the majority of cataracts in dogs are the result of a genetic or inherited defect involving the lens. Many types of purebred dogs are predisposed to inherited cataracts, which may be present at birth or develop later in young, to middle age.

However, the majority of cataracts that we see are associated with advanced age, trauma, inflammation, retinal disorders and systemic diseases such as diabetes.

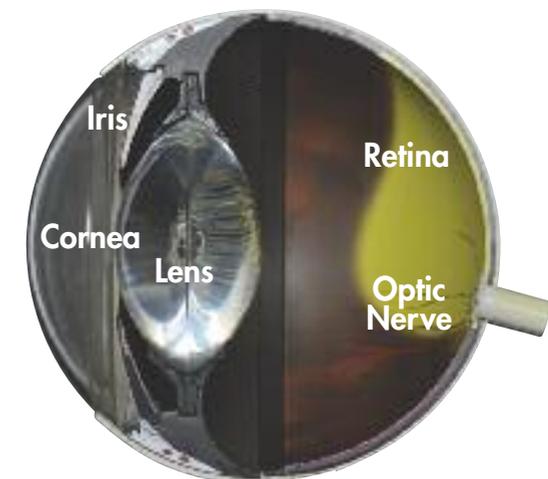
## What do cataracts do inside the eye?

Progressive cataracts do not remain inert inside the eye. Untreated, these can progress to complete blindness. They induce inflammation (lens-induced uveitis), which can then lead on to glaucoma (high pressure) and retinal detachment. These complications can cause irreversible blindness and can be painful to the animal.

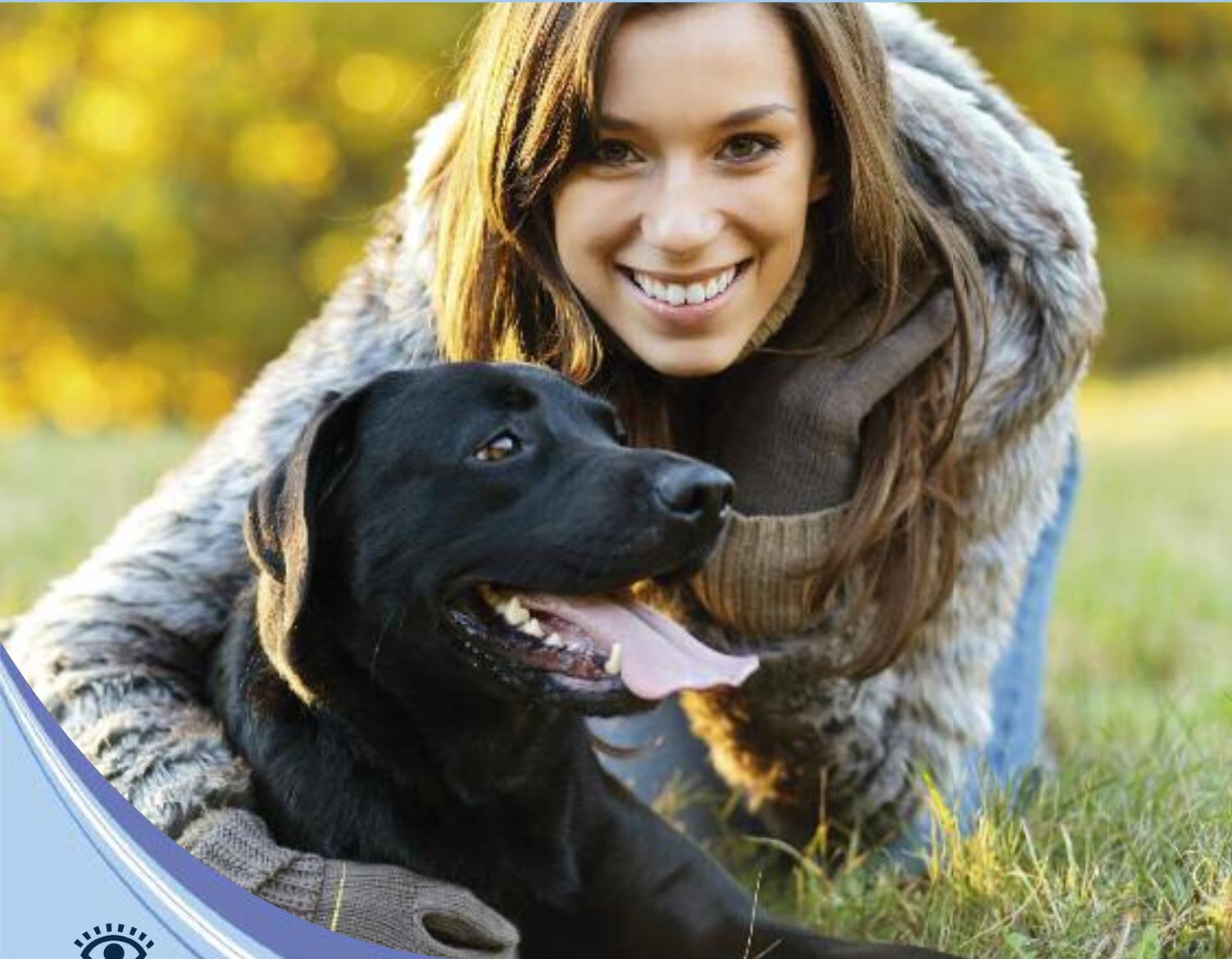
Inflammation is a reaction of the body to disease or foreign material. In the eye the inflammation caused when the lens becomes diseased and cataractous is due to the fact that in the womb the lens is formed and sealed in its capsule before the immune system is developed. The lens is therefore foreign to the eye. Provided the lens capsule is intact, the body does not know the lens is there but when the lens becomes diseased material can escape through the capsule and initiate inflammation, with sometimes disastrous consequences.



In diabetic patients the excess glucose actually causes the lens to die and become opaque. The body then tries to dilute this glucose and pumps water into the lens, which makes it swell. This swelling can cause the lens capsule to rupture resulting in massive inflammation disastrous to the eye. Unless the risks of anaesthesia are too great for surgery it is always recommended that diabetic cataracts are removed. In these cases it is advised that both cataracts are removed at the same time as the lens swelling can be quite rapid.



# How are cataracts treated?



Many drops and pills have been marketed over the years to treat cataracts, the most popular of these contain N-acetyl carnasine. This is an antioxidant. As cataracts can be formed by a process of oxidation, in theory this medication should help. However, by the time the lens material has become opaque, the lens proteins have already become denatured. This process cannot be reversed. The jellylike material in the lens capsule may be likened to the white of an egg (the albumen). When this dies as the egg is cooked, the clear albumin becomes white. There is no way that this cooked egg-white can become clear again. In the same way, neither can the white denatured lens protein of a cataract, become clear again.

So currently, the only effective treatment for cataracts is through surgical removal of the defective lens in order to restore vision. The surgery is designed to remove the cataract, thereby allowing light to reach the retina and allowing the animal to see again. Surgery is generally recommended when the cataracts cause reduced vision or in cases of progressive cataracts, where vision loss is anticipated. The surgical success rates for cataracts in the early stage, are higher than for advanced cataracts that have been present for months to years. The more advanced cataract, the more inflammation is present in the eye pre-operatively.

# Risks and complications



## Risks

Animals with cataracts are frequently old or have concurrent diseases such as diabetes, Cushing's disease or may have a heart condition. Despite these conditions it is often possible to perform successful cataract surgery. We will work with your veterinary surgeon to control conditions like diabetes in order that the risks of anaesthesia are reduced. This may require blood and urine tests.

At Eye Vet, cataract surgery involves a team comprising the surgeon, a qualified veterinary anaesthetist and trained veterinary ophthalmic nurses. The anaesthetist is in charge of the patient's health prior to and during the surgery. They will examine the animal and review the test results so that the risks of anaesthesia are kept to a minimum. Prior to, during and after surgery the patients are monitored using state-of-the-art monitoring equipment. An anaesthetist present throughout the surgery means that the surgeon can concentrate entirely on the operation.

## Complications

The success rate of cataract surgery is quoted at 95%, a figure which has increased greatly over the years due to improvements in equipment instrumentation and drugs. Surgical complications are few and with new techniques can often be overcome and result in successful surgery.

However, most of the complications occur in the post-operative phase. These are usually due to inflammation caused by the release of the diseased lens tissue. We attempt to control this inflammation both before and after surgery with the use of anti-inflammatory drops and tablets. We closely monitor the animal for any signs of excess inflammation and may need to adjust the treatment regime accordingly. Rarely this inflammation may be caused by trauma to the eye and a rejection somewhere else in the body such as diarrhoea or a bladder infection. Inflammation, as elsewhere in the body, causes redness, swelling and discharge. The eye is a precision instrument and swellings and sludgy discharge can block the delicate channels in the eye. When these are blocked, fluid cannot flow properly around the eye and the pressure

inside the eye rises (glaucoma). If this pressure becomes high then it can cause permanent blindness. It is not possible to predict the amount of inflammatory reaction each animal will have and this is why we monitor each animal closely after surgery.

Diabetics are particularly prone to increased inflammation and in fact there is always a mild inflammation after cataract surgery in diabetic patients. After surgery in these cases, treatment with eye drops is lifelong.

They can get other eye conditions such as dry eye, conjunctivitis (as the tears are full of sugar helping infections to grow), or on occasions, nerve paralysis, meaning the eye cannot blink. The prolonged anaesthesia can also upset the stability of the diabetic, which can lead to problems in the days after surgery. Despite all this, we find that diabetic patients benefit greatly from cataract surgery and as they can exercise better after surgery, often their diabetes becomes better controlled.

Some breeds have extra problems. The 'Bichon Frise' breed are prone to retinal detachment, whether or not they have cataracts. If they do develop cataracts,

then the inflammation from this disease can make detachment more likely. Therefore cataract surgery may be beneficial. However removing a lens, which makes up a large volume of the eye, can weaken the retina's attachment until the vitreous gel grows to fill this void. This is usually complete after six months post surgery and ideally in this time the animal should be deterred from head shaking or violent exercise (this is not always possible with the dog). The Jack Russell and other terriers, can have lenses which are unstable and can slip or luxate resulting in painful glaucoma. If a lens is cataractous, then it is heavier and so more likely to become unstable and luxate. Cataract surgery in this breed is therefore especially beneficial.

Whilst we try to anticipate complications, they are not always predictable. Conditions such as post-operative inflammation and glaucoma can be successfully treated, but extra treatments will incur additional costs.

**Whilst such cases that require additional treatment are infrequent, provision should be made so that these additional costs can be covered.**

# Assessment prior to surgery



Prior to booking a date for surgery, each cataract must be assessed individually and further tests are required to decide whether an eye is suitable for cataract surgery. The evaluation of your pet by a Veterinary Ophthalmologist includes a complete ocular examination. This involves examining the eyes to see whether the cataracts are suitable for surgery. It also involves assessing the patient, whether he or she needs to see again, and if she/he will allow the intensive medication required after the surgery to be administered.

**If your pet is thought suitable for surgery then further tests may be performed.**

## Ocular ultrasound

When a cataract is mature (i.e. when the lens is completely opaque), it is not possible to see further into the back of the eye. Therefore, prior to surgery, an ultrasound machine is used to visualise the back of the eye. This enables us to detect conditions such as detached retinas and opacities in the vitreous gel behind the lens and, particularly important in diabetic patients, to determine the size of the cataractous lens. Using this test it is possible to anticipate certain surgical complications, to determine whether surgery is feasible and again in the case of diabetics, to plan the timing of the surgery.



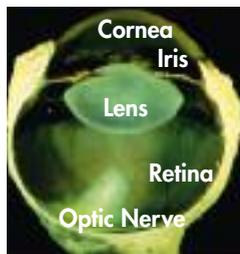
An ultrasound image of a dog with a normal eye



An ultrasound image of a dog eye with a cataract



An ultrasound image of a diabetic dog with a swollen lens



A photographic image of a normal dog eye cut in half

## Electroretinography

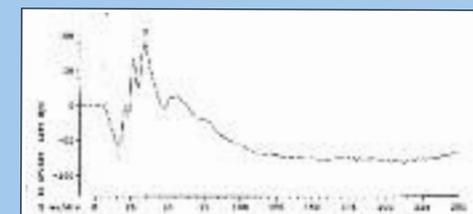
This is a special diagnostic test called an 'electroretinogram', which is performed under sedation. This measures how well the retina is working. Some animals have a hereditary condition, which causes the retina to slowly degenerate. When this occurs, chemicals leak from the retina and these can actually cause a cataract.

Unfortunately by the time the cataract has formed the retina is no longer functioning. In this case, surgery would not be indicated or beneficial to the animal.

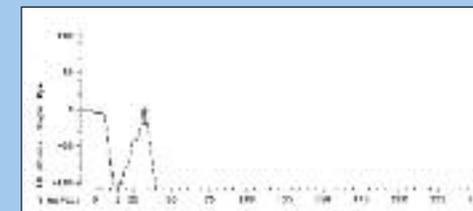
In other cases the retina may be functioning but the electroretinogram shows that it is inflamed and therefore requires treatment prior to surgery.

At the conclusion of these tests it should be possible to say whether surgery will be beneficial. These results, together with the results of the blood tests, give guidance on the suitability of the patient for anaesthesia. With this information, surgery may or may not be advised.

**Normal electroretinogram.** The measurements between 1 & 2 are above 100uV so the retina is considered to be working normally.



**Electroretinogram showing signs of inflammation in the retina, probably caused by the cataract.** Whereas the measurements between 1 & 2 are approx. 100 they are below the line and have a negative polarity.



**This retina is not responding to light.** Surgery will not restore the vision to this eye.



# Surgery

Surgical removal of a cataract is termed 'phacoemulsification'. This is performed using a microscope. A 3.2mm incision is made in the cornea (the 'window' in the front of the eye). This enables specialised equipment to be introduced, to use ultrasonic waves to fragment and then remove the diseased lens material.

On the day of surgery animals are admitted and then examined by the anaesthetist. A pre-medication is then administered. This relaxes the animal and reduces the amount of anaesthetic necessary. The animal will then be put on an intravenous drip.

Prior to surgery they are connected to numerous monitors so that the anaesthetist can evaluate them fully.

The animals eyes will be examined by the ophthalmologists, who may decide that it is necessary to repeat the tests such as the electroretinogram or ultrasound.

**Surgery takes 1 to 2 hours. When it is over and the animal is recovering from anaesthesia, the nurses will telephone the owner.**

After surgery there are a number of tests that are performed each hour for at least three hours. This is because in one in four eyes there may be a post op pressure spike.

If the pressure inside the eye does rise then we treat it. The patient is not allowed to go home until intraocular pressure is normal. All animals will go home the same day as surgery.

After the surgery, dogs do require a considerable amount of medication. This includes anti-inflammatory drops and tablets to suppress the inflammation mentioned previously and because there has been an incision into the eye, therefore a risk of infection, topical and oral antibiotics are prescribed.



Removal of the grey/white cataract material by vacuum and ultrasonic power.



Once all the cataract is removed there is a clear view of the retina.



The soft acrylic lens is folded and injected into the old lens capsular bag. It then unfurls and is positioned.



Photograph of an acrylic lens implanted, taken three years after the cataract surgery.

# Surgery

## How successful is cataract surgery?

Cataract surgery aims to restore vision and most animals gain guidance vision so that they can lead a normal life. It may take some time before the animal shows improvement in vision after the surgery.

**The success rate of uncomplicated cataract surgery with artificial intraocular lens implantation in dogs is approximately 95%. The outcome will vary depending on the overall health of the eye patient before the surgery.**

After examination and testing, the ophthalmologist will assess the risks and benefits of surgery with the owner to help determine the best decision for the animal.

A small number of patients do not see following surgery. This can be due to retinal disease, which was undetected prior to surgery, uncontrolled inflammation following surgery, retinal detachments, glaucoma, or posterior capsular opacification. Some of these

complications can be treated but some may result in permanent blindness. Most of these may be managed medically, although infrequently a surgical option may be offered.

## What to expect after the surgery

The patient is discharged the same day of the surgery wearing a special collar for 2 weeks. It is essential that the animal does not rub his eyes and is kept as quiet as possible. For dogs, this means restricted lead exercise with a harness (no rough play, no going up and downstairs, no agility classes nor excessive activity) for 4 weeks following surgery. Cats must be kept indoors with a litter tray.

After the surgery, topical eye drops 4 times daily (usually 2 to 3 different types of drops) and oral tablets (antibiotics and anti-inflammatories) are required for several weeks.

Long-term drops once to twice daily may be required on the operated eye. Diabetic patients in particular, may need eye drops for the rest of their lives.

Cataract surgery is a team effort and it is very important that the patient receives all medications and is rested.

Re-evaluation by the ophthalmologist is required at 2 – day, 1 – week, 2 – week, 1 – month, 3 – month and 6 – month intervals after surgery to monitor progress of the patient and attempt to correct or prevent any complications. These check-ups cannot be performed by your

veterinary surgeon as specialist knowledge and equipment is required. Intervals of further appointments depend on the progression of the case.

## The cataract surgery is successful but the animal still has no vision

**Very very rarely after cataract surgery the animal still cannot see, despite the surgery being successful. This is because the problem is in the brain sometimes called central blindness. Whilst we can rigorously test the eyes we have no way of testing whether the brain can interpret what the eyes see. This may be temporary as seen in dogs with long-standing cataracts where the brain has switched off visual interpretation. These animals appear confused as they can see something but cannot interpret what it means. In other cases the brain may be damaged before the surgery, as in a brain tumour or even this damage may be caused by the same thing that caused the cataract (Infection etc).**



# Can cataracts return?

The answer is no but yes to some degree. To explain, the cataract material is surrounded by a capsule, at surgery all of the cataract material is removed leaving the original capsule or bag. This bag is useful to hold in an acrylic lens and so if possible will be retained. The problem is as old as the eye and with all living tissues, prone to scar after surgery. This scarring, which we attempt to reduce to a minimum by anti-inflammatory treatment, is what is termed 'after cataract' occurs to some degree in all animals, including humans, after cataract surgery. However, it rarely occurs in the centre of the lens, particularly if a new lens is implanted and therefore does not affect the animals vision.



After cataract

Although the scarring is densely white where the original hole was made in the bag, again the central area is clear. This should not affect vision.



After cataract

Whilst there is scarring of the capsular bag – the centre visual axis is clear.



Implanted acrylic lens showing little scarring.

# The surgeons



**Peter McElroy**  
BVSc Cert V Ophthal MRCVS

## Principal of Eye Vet

Has over 20 years experience of cataract surgery. Has attended numerous courses in cataract surgery both Veterinary and Medical. Spent time at Ohio State University training with Prof David Wilkie.



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