

R N I B

See differently

Understanding

Glaucoma



The ROYAL COLLEGE of
OPHTHALMOLOGISTS

Contact us

We're here to answer any questions you have about your eye condition or treatment. If you need further information about glaucoma or on coping with changes in your vision, then our Helpline is there for you.

Just give us a call on **0303 123 9999** or email us at **helpline@rnib.org.uk** and we'll be happy to speak with you.

RNIB's Understanding series

The Understanding series is designed to help you, your friends and family understand a little bit more about your eye condition.

The series covers a range of eye conditions, and is available in audio, print and braille formats.

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What is glaucoma?

Glaucoma is an eye condition where your optic nerve is damaged by the pressure of the fluid inside your eye.

This may be because your eye pressure is higher than normal, or because of a weakness to your optic nerve.



What parts of the eye does glaucoma affect?

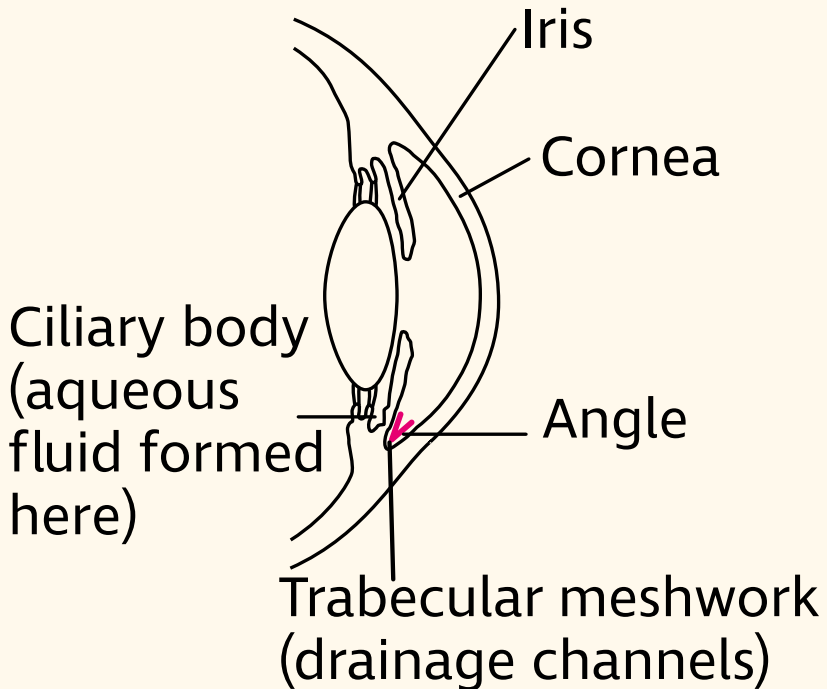
The anterior chamber of your eye (the inside of the front of your eye) is filled with a watery fluid called the aqueous humour. This fluid creates a pressure in your eye, which keeps it healthy and in the right shape. Your eye pressure is known as your intraocular pressure (IOP) and it isn't connected to your blood pressure in any way. The aqueous fluid, which is inside your eye, is different from your tears.

Aqueous fluid is produced in a ring of tissue, called the ciliary body, behind the coloured part of your eye, the iris. It flows through the pupil and drains away through a spongy network of holes called the trabecular meshwork. This sits in the angle where your iris and cornea, the clear front surface of your eye, meet.

Usually, aqueous fluid drains away at the same rate as it's produced to keep your eye at the correct pressure. The normal range of eye pressure is roughly around 10 to 21mmHg (mmHg stands for millimetres of mercury and is the measurement used for eye pressure).

If the fluid cannot leave your eye as quickly as it's produced, your eye pressure will build up. This pressure can cause damage to your optic nerve at the point where it leaves the back of your eye. This damage is called glaucoma.

Your optic nerve is important for sight because it's the pathway for the signals from your retina, the light sensitive cells at the back of your eye, to your brain. This pathway allows you to "see" the world around you.



What are the types of glaucoma?

The main types of glaucoma are:

- **Primary open angle glaucoma** where damage to the optic nerve occurs slowly over a long period of time due to your eye pressure increasing to more than 21mmHg.
- **Closed angle glaucoma** where damage to the optic nerve can happen very quickly due to a sudden rise in eye pressure.
- **Normal tension glaucoma** when an eye pressure of less than 21mmHg still causes damage to the optic nerve.
- **Secondary glaucoma** which occurs as a result of another eye condition, an injury to the eye or due to medication.
- **Congenital glaucoma**, when a baby is born with glaucoma.

Who is at risk of getting glaucoma?

Anyone can develop glaucoma but some factors can put you at more risk. These include:

- **Your age:** Glaucoma is more common as you get older. It occurs in two per cent of people over the age of 40, increasing to almost 10 per cent of people over the age of 75.
- **Your family history:** You're at a higher risk of developing glaucoma if you have a close blood relative (a parent, brother, sister or child) with glaucoma. If you've been diagnosed with glaucoma, let these close family members know. If they're over 40, they should see their optometrist (also known as an optician) every year, and they won't have to pay for their eye examinations.
- **Your race:** If you're from an African-Caribbean ethnic background, then you may be at a higher risk of developing open angle glaucoma. It's also more likely to develop earlier in life – before the age of 40, and there is a chance that it may develop more quickly. Being of East Asian origin can increase your risk for closed angle glaucoma.

- **Your eyesight prescription:** Being short-sighted can increase your risk of developing open angle glaucoma. Closed angle glaucoma is more common in people who are long-sighted.
- **Being diabetic** can increase your risk of developing glaucoma.
- If you have used **steroids** for a long period of time, you may develop glaucoma.



Primary open angle glaucoma

This is the most common type of glaucoma in the UK. It's also known as **chronic open angle glaucoma** which means the damage to your optic nerve and changes to your sight happen very slowly over time.

Will I have any symptoms?

You can't "feel" primary open angle glaucoma; it doesn't cause any symptoms and the eye pressure doesn't cause any pain. You may not notice any difference in your vision because glaucoma affects your peripheral vision (also known as your side vision) first. As your peripheral vision is not as sensitive as your central vision, it's difficult to notice any early changes to your vision – but your sight is being damaged.

Because you may not notice a problem until your glaucoma is more advanced, it's important to have regular eye tests as this is the only way to know if you have it. The earlier your glaucoma is picked up and treated, the more of your sight can be protected.

How can primary open angle glaucoma affect my sight?

If there is damage to your optic nerve, blind spots can begin to form in the outer edges of your vision. You may miss things in your peripheral vision.

Without treatment, sight loss can slowly progress so that your field of vision becomes very narrow and it can appear as if you're looking through a tunnel. Finally, if left untreated, your central vision may be affected too, causing blind spots to appear when you look straight ahead.

Unfortunately, once sight loss occurs, it can't be reversed as there are currently no treatments which can restore the damaged nerve. This means that it's really important that your glaucoma is picked up and treated early to prevent optic nerve damage in the first place and to avoid sight loss.

Primary open angle glaucoma usually affects both eyes, but one eye may be affected more than the other.

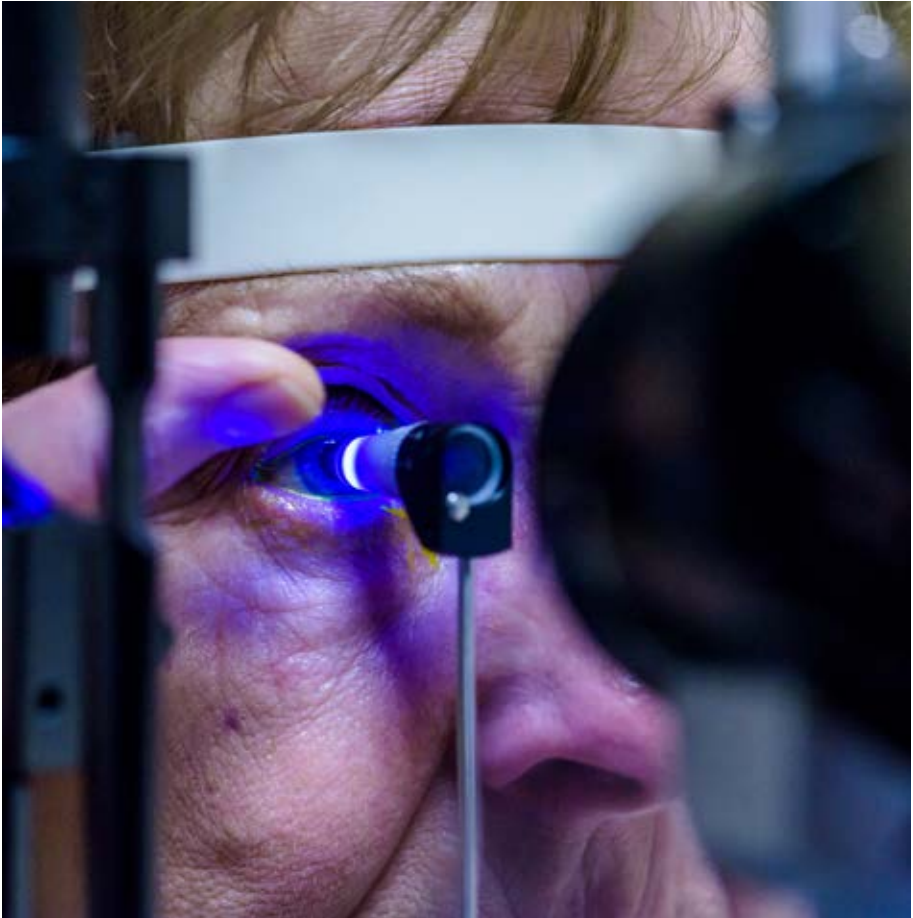
What are the tests for primary open angle glaucoma?

There are three main tests your optometrist will use to check for glaucoma:

- Looking at the health of your optic nerve at the back of your eye using a bright light to check for any changes. Some optometrists may also take a photograph of the optic nerve at the back of your eye.
- Measuring your eye pressure (tonometry). Most optometrists do this using the “puff of air” test, known as non-contact tonometry. Although this test may make you jump, it’s not painful and doesn’t harm your eye in any way. Some optometrists may measure your eye pressure in a slightly different way, using anaesthetic eye drops and a small instrument which gently touches your eye, known as contact tonometry.
- Measuring your field of vision. This is to check for any missing areas of vision or blind spots. During this test, you’ll be asked to focus on the centre of a screen and press a button each time you see a small flash of light in your side vision.

It's possible to have glaucoma even if you have normal eye pressure, so the results of all of these tests will be looked at together.

If your optometrist is concerned about the results of any of these tests, they may carry out further tests, or will refer you to another optometrist or an ophthalmologist (also known as a hospital eye doctor) for further tests.



Further tests the optometrist or ophthalmologist may want to do include:

- Measuring your eye pressure using contact tonometry. This is done by using anaesthetic and yellow eye drops, a blue light and an instrument which gently touches the front of your eye. The anaesthetic eye drops numb your eye beforehand so it's not painful. This method of measuring eye pressure tends to give a more accurate reading than the "puff of air" test.
- Measuring the thickness of your cornea, because this can help with the accuracy of your eye pressure readings.
- Examining the area, or angle, in your eye where the aqueous fluid drains out using a mirrored lens – a procedure called gonioscopy.
- Using OCT (ocular coherence tomography) to provide a detailed scan of the optic nerve. This can show up any damage to the cells of the optic nerve. OCT can also be used to examine the drainage angle of your eye.

What is the treatment for primary open angle glaucoma?

All treatment for glaucoma aims to lower your eye pressure to prevent damage to your optic nerve and your sight.

Damage to the optic nerve can occur at different eye pressures among different people. Even if your eye pressure is at a normal level to begin with, treatment will still be aimed at lowering this pressure to a level which is safe for you – your ophthalmologist may call this your “target eye pressure”.

Eye drops

Treatment to lower your eye pressure usually starts with eye drops, and for most people with glaucoma, this is all the treatment they will ever need. But, these drops will need to be used long term or for life.

The eye drops work by either reducing the amount of aqueous fluid that your eye produces, or by helping the aqueous fluid drain away more quickly. There are different types of eye drops that can be prescribed for glaucoma. Your ophthalmologist will decide on the type of eye drops to prescribe, depending on your medical history. They will

monitor your eye pressure at regular check-ups to make sure the drops are working.

It may take time to find the right drop or combination of drops to control your eye pressure. If you've just started using eye drops, or if you have recently changed your type of eye drops, your eye pressure would normally be checked within a few months of starting the new drops to find out how well they're working.

Taking the drops will not cause any change in your sight, so it can be difficult to understand why you need to put them in every day. Your drops are preventing any future damage to your sight so it's very important to keep using them. If you don't use your drops then your eye pressure will remain too high and damage your optic nerve, which will cause you to lose your sight.

Laser treatment

If it's not possible to control your eye pressure with eye drops alone, your ophthalmologist may suggest laser treatment. Your ophthalmologist is the best person to advise you whether this is likely to work in your eyes.

The most common treatment is called a laser trabeculoplasty. The laser treatment is applied

to the trabecular meshwork, which helps it to work and drain fluid better, lowering your eye pressure.

Laser treatments are generally straightforward procedures usually done in the outpatient clinic under local anaesthetic, and most people recover very quickly.

Laser trabeculoplasty is very successful at helping to lower eye pressure in some patients, but you will normally still need to continue using eye drops after your treatment to keep your eye pressure stable.

Surgery

In a very small number of people with glaucoma, where eye drops haven't been successful in keeping the eye pressure stable, or where the glaucoma is advanced, surgery may be an option.

The most common surgery for glaucoma is called a trabeculectomy. This surgery creates a new permanent drainage channel in your eye for the aqueous fluid to drain away, lowering your eye pressure.

The new opening is made in the sclera (also known as the white of your eye). The aqueous fluid drains out through the opening and



forms a small reservoir, called a bleb, on the surface of your eye, which is hidden under your upper eyelid.

The fluid then gets reabsorbed back into your bloodstream. Anti-scarring medicine is used on the eye during the operation to prevent the opening from closing up.

You will normally be checked very frequently at the eye clinic in the weeks following your operation. During these visits, you may have further small procedures such as removing or adjusting stitches to fine-tune the eye pressure, or injections of anti-scarring medication.

After having a trabeculectomy, some people's eye pressures come down enough that eye drops may no longer be needed on the eye that has had the operation. Your ophthalmologist will be able to let you know if this is the case for you. You'll still be monitored regularly at the eye clinic whether you need continuing treatment or not.

There are other types of surgery for glaucoma, such as aqueous shunts or tube implants. Your ophthalmologist will be able to explain the different types of surgery with you and discuss what options are right for you.

Closed angle glaucoma

Acute closed angle glaucoma happens when your eye pressure rises very suddenly, which can cause damage to your optic nerve over a very short space of time. It happens when the outer edge of the iris is pushed forward by the aqueous fluid behind it. This causes the iris to come into contact with the cornea, closing the drainage angle. This stops the aqueous fluid from draining away altogether.

What are the symptoms of closed angle glaucoma?

In the early stages, some people may get a series of mild attacks. Your vision may seem misty, you may see rainbow-coloured rings around white lights, or your eyes may feel achy especially in the evenings. If you have any of these symptoms, it's important to have your eyes tested as soon as possible and let your optometrist know.

However, for most people, there's no warning. A sudden increase in eye pressure is very painful, your eye becomes red and your sight gets worse. You may even black out, feel nauseous or be sick. It usually affects only one eye at a time and it's rare for both eyes to have an attack at the same time.

Sometimes, during a routine eye test, your optometrist may notice your drainage angles are very narrow, which may be an early sign that you're at risk of closed angle glaucoma. Your optometrist may refer you to an ophthalmologist for further tests and treatment, even if you don't have any symptoms.

What is the treatment for closed angle glaucoma?

If you have an acute attack, you'll need to go to the hospital immediately to have treatment to lower your eye pressure quickly and prevent permanent sight loss. This treatment will be a combination of eye drops and a tablet or injection, which reduces your eye pressure quickly, and eases the pressure and pain. In most cases, if treatment is given quickly, your sight can recover almost completely.

Once your eye pressure is under control again, it's normal to need some further treatment to prevent you from having another acute attack. Usually, this is a laser treatment to make a small hole in your iris, a procedure known as a peripheral iridotomy.

The laser creates a channel for the aqueous to flow through, which prevents the iris being pushed forward and prevents the angle from closing. The treatment is normally carried out on both eyes to prevent the same problem occurring in either eye in the future. It's generally a straightforward procedure from which people recover quickly and the holes can't be noticed by other people.

A laser iridotomy may also be given to people whose drainage angles appear narrow during an eye test. This is to prevent them from having a possible closed angle attack in the first place.

What happens in the long term?

If an acute closed angle attack is treated quickly, it can usually be brought under control within a few hours. Your eye becomes more comfortable and your sight can recover almost completely.

Occasionally, following all the treatments, eye pressure can remain high. In these cases, you may need to use regular eye drops in the long term to keep your eye pressure controlled and prevent damage to your optic nerve.

Normal tension glaucoma

This type of glaucoma occurs when your eye pressure is within normal range, but causes damage to your optic nerve.

It's not entirely known why some people's optic nerve becomes damaged even though their eye pressure is at a normal level. It's thought that perhaps some people's optic nerve may just be weaker or have a more fragile blood supply, and unable to cope with an eye pressure within the normal range.

Normal tension glaucoma is treated in the same way as open angle glaucoma – by lowering your eye pressure to a level which is right for you, to keep your sight safe.

Secondary glaucoma

Secondary glaucoma is caused by the effect of another eye condition, an injury to the eye, or certain treatments, medications or operations.

Some causes of secondary glaucoma include:

- Pigment dispersion syndrome and pseudoexfoliation which is where pigment or flakes get deposited in the trabecular meshwork. This can increase eye pressure and lead to glaucoma.
- Uveitis (inflammation inside the eye) can lead to high eye pressure and glaucoma.
- Steroid medication can sometimes cause eye pressure to rise and lead to glaucoma.
- Abnormal blood vessel growth at the iris in conditions such as diabetic retinopathy or retinal vein occlusion can cause glaucoma, known as neovascular glaucoma.

The treatment for these types of glaucoma is again aimed at reducing the eye pressure as well as treating the underlying cause or eye condition.

Congenital glaucoma

Congenital glaucoma is a rare form where a baby is born with glaucoma because their drainage system didn't develop properly before birth.

Congenital glaucoma is usually treated early on in life, usually with surgery, and is managed by specialist clinics.



Ocular hypertension (high eye pressure)

Some people naturally have eye pressure above the normal range, but this pressure doesn't cause any damage to their optic nerve. This is described as ocular hypertension rather than glaucoma.

Different people can have different optic nerve strengths, and some people's optic nerves stay healthy at higher than normal eye pressures.

Most people's eye pressures are in the range of 10 to 21mmHg. If you have an eye test and your eye pressure is higher than 24 mmHg, your optometrist may refer you to the eye clinic for more tests. These tests will check whether this higher eye pressure is likely to cause any problems to your optic nerve.

An ophthalmologist may diagnose you with ocular hypertension. This means that the pressure in your eye is high but that it is not causing any damage to your optic nerve. A high pressure may be completely normal for your eye.

If you have ocular hypertension, it can increase your risk of developing glaucoma so this needs to be monitored. Sometimes you may be prescribed

eye drops to help reduce your eye pressure and reduce your risk of developing glaucoma. If this is the case, you'll be followed up at the eye clinic regularly to monitor your eye pressure.

You may be discharged from the eye clinic if you don't require eye drops and tests show that there is no sign of glaucoma. However, it's important for you to visit your optometrist regularly for your eyes to be checked so that any future changes can be picked up. Your optometrist or ophthalmologist will be able to tell you how often you should have your eyes checked.

Managing your glaucoma

Having glaucoma may mean you need to make a few changes to your everyday life in order to prevent sight loss. For most people, this includes using eye drops daily and having to attend regular eye clinic visits.

Most people with glaucoma use eye drops for many years or for life. Using your drops regularly helps to keep your eye pressure under control and prevents damage to your sight. Not using your drops could, in the long term, make your glaucoma unstable and lead to permanent sight loss. Unfortunately, once sight loss due to glaucoma has occurred, it is not reversible.

It's important to tell your ophthalmologist if your eye drops are causing you any problems. Like all medications, some drops do have side effects, such as eye irritation, and some aren't suitable for people with certain underlying health conditions. Usually only a small number of people experience side effects. The risk of side effects is very small compared to the risk of losing your sight if you don't use the drops.

If you're having a problem with a particular type of eye drop, it may be possible for your ophthalmologist to suggest an alternative drop. Preservative-free eye drops may be an option if you're sensitive to any of the preservatives added to the drops.

It's also very important to attend all your appointments at the eye clinic to make sure your eye pressure stays stable. This is because changes in eye pressure have no symptoms, and without regular checks you won't be able to tell that your treatment is working. It also gives you a good opportunity to ask your ophthalmologist any questions you may have about your glaucoma treatment. How often you need to be seen at the eye clinic will depend on how well your treatment is working.

You'll usually have a regular visual field test done at your eye clinic visits, which helps your ophthalmologist monitor how your glaucoma is affecting your sight. It's easy to lose concentration as the test can take 10 minutes per eye, but it's important to get an accurate result as it allows your ophthalmologist to make the right decisions about your treatment.

Can I still drive when I have glaucoma?

Many people with glaucoma are able to carry on driving, depending on how much of their peripheral vision has been affected. You are required by law to report a condition which may affect your sight to the Driver and Vehicle Licensing Authority (DVLA), including if you have glaucoma in both eyes, but not ocular hypertension.

The DVLA will need to assess your peripheral vision to see whether your sight meets their standards. The DVLA may also ask you to have these tests regularly to assess if it's safe for you to continue to drive.

Coping

It's completely natural to be upset when you've been diagnosed with glaucoma and it's normal to find yourself worrying about the future and how you will manage with a change in your vision.

It can sometimes be helpful to talk about these feelings with someone outside of your circle of friends or family. At RNIB, we can help with our telephone Helpline and our Sight Loss Counselling team. Your GP or social worker may also find a counsellor for you if you feel this might help.

Your eye clinic may also have a sight loss adviser (also known as an Eye Clinic Liaison Officer or ECLO), who can be on hand to provide you with further practical and emotional support about your eye condition.



Further help and support

If glaucoma is picked up and treated early, you may not experience much of a change to your vision. You can carry on with everyday activities such as reading, watching television and using the computer – these things will not make your glaucoma worse.

If you do have some sight loss, there are a lot of things you can do to make the most of your remaining vision. This may mean making things bigger, using brighter lighting or using colour to make things easier to see. We have a series of leaflets with helpful information on living with sight loss, including how to make the most of your sight. You can find out more about our range of titles by calling our Helpline.

You should ask your ophthalmologist, optometrist or GP about low vision aids and getting a low vision assessment. During this assessment with an optometrist, you'll be able to discuss the use of magnifiers and aids to help you to see things more clearly.

You should also ask your ophthalmologist whether you're eligible to register as sight impaired (partially sighted) or severely sight impaired (blind). Registration can act as your passport to expert help and sometimes to financial concessions. Even if you aren't registered, a lot of this support is still available to you.

Local social services should be able to give you information on staying safe in your home and getting out and about safely. They should also be able to offer you some practical mobility training to give you more confidence when you are out.

If you have questions about anything you've read in this publication, please get in touch with us.

Our Helpline is your direct line to the support, advice and services you need. Whether you want to know more about your eye condition, buy a product from our shop, join our library, find out about possible benefit entitlements, or be put in touch with a trained counsellor, we're only a call away.

It's also a way for you to join RNIB Connect, our community for anyone affected by sight loss. RNIB Connect is free to join and you'll have the chance to meet other people with similar experiences in our helpful, welcoming and supportive community.

Give us a call today to find out how we can help you.

RNIB Helpline
0303 123 9999
helpline@rnib.org.uk

We're ready to answer your call Monday to Friday 8am to 8pm and Saturday 9am to 1pm.

You can also get in touch by post or by visiting our website:

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SightLine (IGA's helpline): **01233 64 81 70**
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www.glaucoma-association.com

Driver and Vehicle Licensing Authority (DVLA)

Drivers' Medical Enquiries
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We value your feedback

You can help us improve this publication by letting us know what you think about it. Please complete and return the form opposite to:

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WC1H 9NE

You can also email us at
eyehealth@rnib.org.uk

Please include your contact details if you're requesting information.



3. Is there any information you would have found helpful, that was missing?

4. Do you have any other comments about this publication or any aspect of your contact with RNIB?

Information sources

RNIB and The Royal College of Ophthalmologists do all we can to ensure that the information we supply is accurate, up to date and in line with the latest research and expertise.

This publication uses information from:

- The Royal College of Ophthalmologists' guidelines for treatment
- clinical research and studies obtained through literature reviews
- specific support groups for individual conditions
- medical text books
- RNIB publications and research.

For a full list of references and information sources used in the compilation of this publication, email **eyehealth@rnib.org.uk**.

About The Royal College of Ophthalmologists

The Royal College of Ophthalmologists champions excellence in the practice of ophthalmology and is the only professional membership body for medically qualified ophthalmologists.

The College is unable to offer direct advice to patients. If you're concerned about the health of your eyes, you should seek medical advice from your GP or ophthalmologist.

rcophth.ac.uk



If you or someone you know is living with sight loss, we're here to help.

RNIB Helpline

0303 123 9999

helpline@rnib.org.uk

The Sight Advice FAQ answers questions about living with sight loss, eye health or being newly diagnosed with a sight condition. It is produced by RNIB in partnership with a number of other sight loss organisations. sightadvicefaq.org.uk

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