

R N I B

See differently



Fundus Photo, Right Eye (OD)

Myopia and pathological myopia

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What is myopia and pathological myopia

Myopia, also known as “being short sighted”, causes your vision to be blurry in the distance but clearer when looking at things up close. It’s a very common focusing problem, and for most people it can easily be corrected using glasses or contact lenses, making vision clear and crisp. Most people with myopia have healthy eyes.

Pathological myopia is different from simply being short sighted. Pathological myopia means that you are very short sighted and that this has caused degenerative changes to the back of your eye. Pathological myopia can cause a reduction in your sight that cannot be corrected with glasses or contact lenses.

How does the eye focus light?

Light rays enter the front of our eye through the clear cornea and lens which bend the light, focusing it on the retina at the back of the eye. This gives us a clear, sharp image.

The retina is a delicate tissue that lines the inside of your eye and is made up of light sensitive cells. Your retina converts the light into electrical signals that travel along the optic nerve to our brain. The brain interprets these signals so we can “see” the world around us.

The retina is supplied with blood by a delicate network of blood vessels on its surface and by a layer of blood vessels (the choroid) underneath the retina. The central part of the retina is called the macula and is very important for seeing detail, colour and things we look at directly.

What is myopia?

For vision to be clear, light entering your eye needs to be focused accurately on your retina. Light entering your eye is first focused by the cornea and then finely focused by the lens. This focusing system of your eye makes sure that when light enters your eye, it is sharply in focus as it hits the retina. This means that we see everything in focus without any blurriness. However, if someone has a focusing or “refractive error”, light is not focused correctly onto the back of the eye and vision is not clear.

There are three main types of refractive errors where the eye is unable to correctly focus light onto the retina:

- Myopia (short-sightedness) which causes your vision to be blurry in the distance and clearer when looking at things close up.
- Hypermetropia (long-sightedness) which means that your eye focuses better in the distance than when looking at things close up.
- Astigmatism can cause blurry vision at all distances, and is caused by the focusing of the eye not being quite spherical (rounded). Astigmatism is very common and many people who wear glasses have some degree of astigmatism.

In people with myopia the light entering the eye comes to a focus point before it reaches your retina. This makes vision blurry and is caused by the eyeball being too long or the cornea (the clear window at the front of the eye) being more steeply curved.

Short sighted

Light is focused in front of the retina, which makes the image appear blurred.

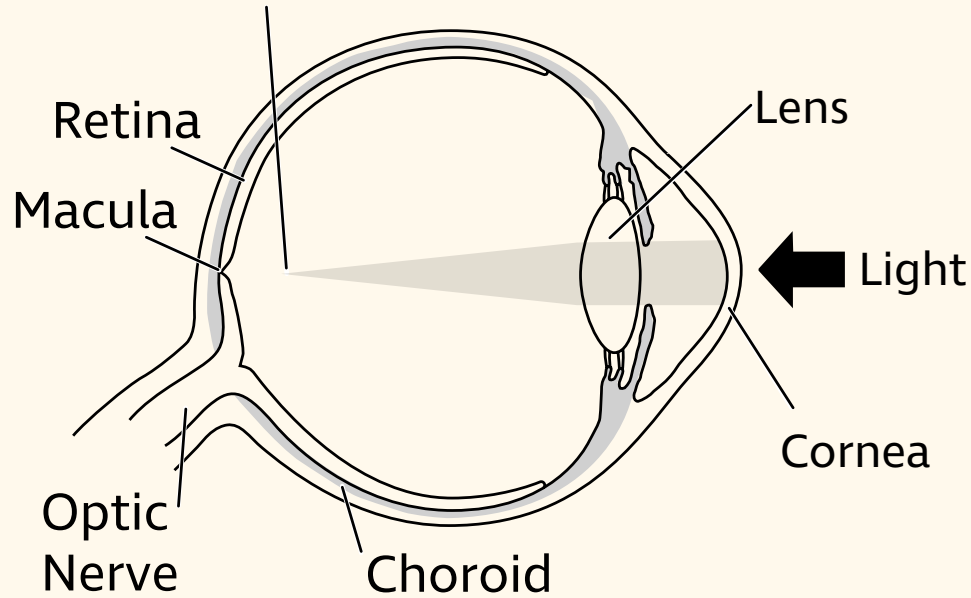


Diagram of cross section of the eye (labels: cornea, lens, macula, retina, choroid, optic nerve). Diagram shows light entering the eye through the cornea and the lens, and coming to a focus point in front of the retina.

People with myopia need a glasses prescription with a minus lens to correct their vision. This lens reduces the bending of the light by the eye, focusing light onto the retina, rather than before it, to produce a sharp clear image.

Development of myopia

You can develop myopia at any age, but it's common for it to develop and worsen in childhood or teenage years. Myopia usually becomes more stable in adulthood but there can be periods when myopia continues to increase. These episodes can happen at any age and are more common if you have higher levels of myopia. In general the younger you are when myopia begins to develop, the higher the level of myopia you will reach. For some people their myopia reaches a certain level and stays the same for many years.

What causes myopia?

It's not known what causes myopia and research suggests there could be a number of different reasons why you may become short sighted.

Myopia often runs in families so is thought to be partly genetic. Children who have one parent with myopia have a higher chance of developing it. This chance increases if both parents have myopia.

Some environmental causes of myopia in children have also been studied. Factors that are thought to increase the risk of myopia are too little time spent outdoors and excessive close work. The general advice around these is that although children should be encouraged to read, they should also spend some time each day doing outdoor activities.

Myopia which develops in older adults can be because of other conditions. If you have diabetes you may experience temporary myopia when your blood sugar level is not well controlled. Glasses alone may not be the best way to correct this change in your vision. Good control of your blood

sugar levels will help stabilise your vision and your diabetic nurse and GP will be able to help you to achieve this.

Some types of cataracts can also cause myopia to develop. The myopic changes caused by early cataracts can be corrected by glasses. When cataracts continue to develop, glasses may no longer be helpful and surgery to remove the cataracts would then be required to improve your vision.

How is myopia graded?

Optometrists (also known as opticians) measure the focusing power of your eye in dioptres. This is a technical term for how strong a lens would have to be to correct the focusing of your eye and give you clear vision.

Generally speaking this is written like; – 3.00 dioptres (D). On your glasses or contact lens prescription a minus sign is used to show that the lens you need corrects for myopia. The higher the number the more short sighted you are.

- Mild myopia includes powers up to – 3.00 dioptres (D)
- Moderate myopia, values of – 3.00D to – 6.00D
- High myopia is usually myopia over – 6.00D

Most people with myopia of less than – 6.00D don't develop any further problems. This is sometimes known as simple myopia, meaning that your eyes are healthy and that the blurriness that your myopia causes is easily corrected for with glasses or contact lenses.

High myopia

If you have myopia higher than – 6.00D then you may be at greater risk of developing certain other eye conditions. However, not everyone with myopia above – 6.00D will develop other eye conditions, and for most people their eyes will be healthy.

High myopia can increase the risk of developing the following eye conditions:

Posterior vitreous detachment (PVD)

A PVD occurs because of natural changes to the gel (the vitreous) in your eye as we get older, commonly when we are in our 50s. However, it can develop earlier if you have high myopia. A PVD doesn't cause sight loss, but you may have symptoms such as seeing floaters (small dark spots or shapes) and flashing lights.

It's important if you notice an onset of floaters or flashing lights that you have your eyes checked straight away (within 24 hours) by an optometrist or at your local A&E so that an accurate diagnosis can be made. This is because symptoms of a PVD are similar to those of a different eye condition called retinal detachment, which needs prompt treatment to prevent sight loss in the affected eye.

You can find more information about PVD on our website [rnib.org.uk/eyehealth](https://www.rnib.org.uk/eyehealth) or by calling our Helpline on 0303 123 9999.

Retinal detachment

If you have high myopia then there is a higher chance of you developing a retinal detachment. This is where a hole or tear can develop in your retina. If a hole or tear develops, fluid in your eye can leak through this gap and behind your retina, which can cause your retina to detach from the back of your eye. A retinal detachment can lead to sight loss in that eye if it's not treated quickly.

The symptoms of a retinal detachment are:

- flashing lights
- a recent onset, increase or change in your floaters
- curtain effect coming down, up or across your vision.

It's important if you notice any of these symptoms or any new symptoms that you have your eyes checked immediately (within 24 hours) by an optometrist or at your local A&E or eye casualty so that an accurate diagnosis can be made.

Retinal detachment can be treated by surgery to re-attach the retina to the back of the eye. The sooner surgery is carried out the better the results are likely to be. If you have symptoms of a retinal detachment, it's important that you are seen by an eye specialist immediately. They would be able to assess the detachment and decide which type of surgery would be best for you.

You can find more information about retinal detachment on our website [nib.org.uk/eyehealth](https://www.nib.org.uk/eyehealth) or by calling our Helpline on **0303 123 9999**

Glaucoma

Being short sighted can mean that you are at a higher risk of developing glaucoma. Glaucoma is a where the optic nerve, which carries electrical signals from your retina to your brain, is damaged by the pressure of the fluid inside your eye. Treatment for glaucoma is given to lower your eye pressure and prevent damage to your optic nerve and your sight. If you have been diagnosed with glaucoma then you will be prescribed eye drops to help control your eye pressure. It's very important that you use your eye drops as advised by your eye specialist as this will prevent you from experiencing any future sight loss due to glaucoma. It's also important to attend any hospital eye appointments regularly to monitor your glaucoma.

You can find more information about glaucoma on our website [nib.org.uk/eyehealth](https://www.nib.org.uk/eyehealth) or by calling our Helpline **0303 123 9999**

Cataract

You may develop cataracts at an earlier age if you are short sighted. A cataract is when the lens inside your eye becomes cloudy which can cause symptoms such as blurred or misty vision, colours appearing dull, or problems seeing clearly at night. Cataracts can take some time to develop before they affect your vision. When your daily activities are being affected by your cataracts, they can be treated using surgery to remove the lens and replace it with a clear artificial one.

You can find more information about cataracts on our website [nib.org.uk/eyehealth](https://www.nib.org.uk/eyehealth) or by calling our Helpline **0303 123 9999**

Looking after your eyes

Because you are at higher risk of developing these eye conditions when you have a high level of myopia, it's important to have regular eye examinations with your optometrist, who will be able to check for any changes to your eye health.

Your optometrist will let you know how often they would like to see you for a regular eye examination, but if you have any new symptoms or concerns, you should have your eyes examined straight away.

Pathological myopia

If you've been diagnosed with "pathological" or "degenerative" myopia you have very high myopia and your eye also shows degenerative changes affecting the back of the eye (the retina).

High myopia usually means that your eyeball is longer than normal. This lengthening of your eye causes your retina to become thinner and stretched. This stretching can lead to changes to the retina that can cause a reduction in your sight. Sight problems caused by pathological myopia cannot be corrected with glasses or contact lenses.

However, not everyone with high myopia will develop pathological changes and their eyes may remain healthy. The higher your level of your myopia, the higher your risk is of developing pathological changes. But even if you do develop pathological myopia, this may not always cause problems with your sight.

For some people, the changes due to pathological myopia can get worse with time. However, how this

may progress can vary person to person, and will depend on which changes have actually developed.

In some people, these changes may remain stable for many years and may not affect their sight too much. However, if the central part of your retina (the macula) is affected, then you may have significant vision problems.

If your optometrist detects any pathological changes during an eye examination, you may be referred to the hospital eye clinic to be seen by an ophthalmologist (hospital eye doctor).

How does pathological myopia affect the retina?

Retinal atrophy

As you become more myopic, your eyeball becomes longer. This causes your retina to stretch and become thinner. This can cause areas of atrophy, areas where your retina has become very thin and is no longer working.

When an optometrist or ophthalmologist looks into your eye, areas of atrophy look very pale and blood vessels that are behind the retina can be seen through them. If you have areas of atrophy on your retina, your vision at these areas may be reduced or you may even have blank patches in your vision. Retinal atrophy can occur anywhere on the retina. If retinal atrophy occurs at the macula, your detailed central vision in that eye can be affected.

Lattice degeneration

At the far edges of your retina your optometrist or ophthalmologist may be able to see a type of retinal

thinning known as lattice degeneration. Lattice degeneration doesn't cause any symptoms and is commonly detected during a routine eye test. It would normally be regularly monitored by an ophthalmologist and usually causes no problems. However, the presence of lattice degeneration can increase your risk of developing a retinal detachment. If your ophthalmologist feels you are at risk of a retinal detachment, they may suggest laser treatment or cryotherapy (freezing treatment) to prevent a retinal detachment from developing. Most people with lattice degeneration do not need treatment.

Lacquer cracks

As the eye stretches it can cause breaks to appear on the retina, which your optometrist or ophthalmologist can see as fine lines. These are known as lacquer cracks and are breaks that occur in the membrane (Bruch's membrane) between the retina and its underlying blood supply (the choroid layer). There isn't any treatment for lacquer cracks and they don't affect your vision directly. However they can be the first signs of possible further problems which can develop and cause changes to your vision. If you have lacquer cracks, your ophthalmologist will monitor your eyes closely for any further problems.

New blood vessels (neovascularisation)

In some people new blood vessels can grow from the blood supply underneath the retina (from the choroid layer), through lacquer cracks or areas of atrophy onto the retina. This is known as choroidal neovascularisation (CNV). These new blood vessels can bleed very easily as they are very weak and fragile, causing damage

and swelling to the retina. The damage to the retina caused by new blood vessels causes scarring, which can permanently affect your vision. Neovascularisation can occur anywhere on the retina, including at the macula, where it can significantly affect your vision.

Myopic macular degeneration

If any of these degenerative changes develop at the macula, it's known as "myopic macular degeneration" or "myopic maculopathy". This can affect your central detailed vision. Changes to your central vision can make it difficult to read and see people's faces clearly. You may also find that your colour vision is affected and straight lines look bent or distorted.

Myopic macular degeneration may be referred to as "dry" or "wet". "Dry" myopic macular degeneration is when there is retinal atrophy, thinning of the retina, or scarring at the macula. Unfortunately there isn't any treatment for these changes.

"Wet" myopic macular degeneration is where there is growth of new blood vessels at the macula. This is often referred to as myopic choroidal neovascularisation (myopic CNV).

Myopic CNV can develop quite quickly and symptoms can include:

- things looking distorted, and straight lines appearing wavy, curved or bent
- things look very blurry
- a blind or grey spot in the centre of your vision
- colours look dull or different than usual.

If you suddenly notice any of these symptoms, it's important to have your eyes checked straight away by your optometrist, or at your local A&E or eye casualty.

About five to ten per cent of people with pathological myopia develop myopic CNV. It can affect the other eye in about a third of people within eight years. This means that most people with pathological myopia won't develop myopic CNV in either eye.

Foster Fuchs spot

Myopic CNV can lead to scarring at the macula, known as a Foster Fuchs spot. This is a circular area of pigment an optometrist or ophthalmologist can see that develops after the new blood vessels and bleeding has gone. This scarring can cause a blank or missing patch in your central vision. Unfortunately, there is no treatment for retinal scarring.

Other changes

Pathological myopia can also cause other changes to the eye such as myopic traction maculopathy (foveoschisis). The retina is made up of several layers of different cells. Myopic foveoschisis is where there is splitting of the layers of the retina at the macula because an area of the back of the eye develops an extra bulge backwards. This bulging is called a posterior staphyloma.

Myopic foveoschisis generally develops slowly and at first may not cause any changes to your vision. As it progresses, it can cause your central vision to be blurred or distorted. In more advanced stages, it can cause a macular hole or retinal detachment to develop, which requires treatment with surgery.

What treatments are there for pathological myopia?

The type of treatment you may need will depend upon the degenerative change that has developed. Unfortunately, not all the changes that happen in pathological myopia, such as retinal atrophy and lacquer cracks can be treated.

It's important that these changes are monitored by your optometrist or ophthalmologist. If you notice any changes to your vision you should have your eyes checked straight away.

Myopic choroidal neovascularisation (myopic CNV)

If you start to develop new blood vessels at the macula, this can be treated with anti-vascular endothelial growth factor (anti-VEGF) treatment. Anti-VEGF treatments work by reducing the growth of new, leaky blood vessels and the oedema (swelling) they may cause. This treatment can reduce the risk of scarring and damage to the retina caused by these new vessels, which in turn can help to avoid further deterioration in sight.

If you are diagnosed with myopic CNV, it's important that it is treated quickly, before the new blood vessels have caused too much damage to the macula. The main aim of the treatment is to stop any further new blood vessels from growing which will prevent further deterioration in your sight, but treatment may also help to improve vision in some people.

Generally, myopic CNV responds well and quickly to treatment with anti-VEGF.

Anti-VEGF medicines are injected into the vitreous gel. This is called an intravitreal injection. The injection is

given in a clean sterile room or an operating theatre to reduce the risk of infection. Before the injection, you'll be given anaesthetic eye drops to make your eye numb, so the injection is not painful.

You can find more information about anti-VEGF treatment on our website rnib.org.uk/eyehealth, or by calling our Helpline on 0303 123 9999.

After your first injection, you will normally be monitored at the eye clinic every month for the first couple of months. You may be given further injections at these visits if your ophthalmologist thinks they are needed. If your condition becomes stable, then you may not need further injections but you'll still be monitored closely, normally around every three months for the first year. However, you should go straight back to the eye clinic if you feel your vision is deteriorating or you start to notice any distortion in your vision.

Very occasionally, new blood vessels that may develop can be treated with a type of laser, known as photodynamic therapy (PDT). Before the laser is used, a light sensitive drug called Verteporfin is injected into your arm. Verteporfin travels to your eye through your blood vessels and fills the new blood vessels that are growing. Your ophthalmologist will be able to see these new vessels clearly and apply the laser to them. The laser causes a reaction with the drug which seals off any new blood vessels that may be growing. This treatment needs to be given at the early stages of the blood vessel growth so that it can prevent the new blood vessels causing damage.

Lattice degeneration

Most people with lattice degeneration don't need any treatment. This is because lattice degeneration itself doesn't cause any problems with your sight. Your optometrist or ophthalmologist will monitor you for changes associated with your lattice degeneration.

In some cases lattice degeneration may be associated with a retinal tear, in which case it may be treated with laser treatment (known as laser retinopexy) or cryotherapy (freezing treatment) to seal the tear and prevent it from developing into a retinal detachment.

If you have lattice degeneration, it's important to be aware of any new or changing symptoms of floaters and flashing lights. If you do experience any new symptoms, you should have your eyes examined straight away by your optometrist, at your local A&E or eye casualty.

How can I see better?

The majority of people who have myopia don't have any complications and will only ever need glasses or contact lenses to make their vision sharper. If your prescription is over -10.00D, then you would be entitled to a NHS complex lens voucher to use towards the cost of your glasses or contact lenses. Your optician would be able to tell you how much this voucher is worth and if your prescription would entitle you to a NHS complex lens voucher.

The higher your level of myopia is, the higher the risk of developing eye conditions associated with myopia and pathological myopia. If your retina has been damaged then your vision may need more than glasses to help you see well.

A low vision clinic, which is usually located in the eye hospital, can be very helpful. A low vision specialist can prescribe low vision aids, such as magnifiers, to help you make the most of your vision by making things bigger and easier to see. They can also provide practical help and advice on how to use your remaining vision. Your optometrist, ophthalmologist or GP would be able to refer you to the low vision clinic for an assessment.

Can I stop myopia from getting worse?

Myopia has a tendency to get worse in children and teenagers as they grow. In general, the younger you are when you start becoming myopic, the faster it can develop and the higher it will be when you reach adulthood. Myopia usually stops getting worse at around the age of 20 years of age.

There's currently no single treatment available that appears to stop the progression of myopia. Several studies have looked at treatments involving eye drops or special contact lenses in children.

Research has shown that a certain eye drop (which makes your pupil larger and relaxes the muscles in your eye) can slow the progression of myopia, but these can cause side effects at high strengths – such as difficulty with close up work and sensitivity to bright light. A lower strength version of this drop isn't available in the UK currently.

Corneal reshaping contact lenses (orthokeratology) and bifocal contact lenses may also slow down the progression of myopia in children. However, further studies are needed to find out how well the treatment works in the long term.


Is there anything I can do to prevent pathological myopia?

If you already have high myopia, there are no treatments available to stop your eye from developing the complications of high or pathological myopia. This is because it's not possible to control the growth of your eye. There's currently no evidence to suggest that diet, vitamins or supplements can affect your chances of developing pathological myopia or make it worse.

Currently treatment is aimed at improving your vision and to treat any complications if they happen. You will be monitored regularly by your optometrist or ophthalmologist who will check the health of your eyes. It's important to have your eyes checked by your optometrist or ophthalmologist as soon as possible if you notice any changes to your vision or any new symptoms.

Light sensitivity

Many people with pathological myopia find that they are sensitive to light, known as photophobia. You may find bright light uncomfortable or you find it difficult to adapt to changing levels of lighting. Using sunglasses, tinted lenses and sunshields can all help to reduce the discomfort and glare you may experience in everyday living.

 You can find more information about light sensitivity on our website [rnib.org.uk/eyehealth](https://www.rnib.org.uk/eyehealth) or by calling our Helpline on **0303 123 9999**.

Driving

If you have pathological myopia or an eye condition caused by high myopia, you may have sight problems which cannot be corrected with glasses or contact lenses. If this is the case, you are required by law to tell the Driver and Vehicle Licensing Authority (DVLA) if the changes are affecting both your eyes. You may be able to continue driving if your sight meets the DVLA visual standards. Your optometrist or ophthalmologist will be able to tell you if your vision meets the DVLA standard or if you need to tell the DVLA about your sight problems.

Coping

Most people who have myopia find their vision is clear and sharp when they wear their glasses or contact lenses. However, it's completely natural to be upset when you are diagnosed with an eye condition associated with high myopia or pathological myopia. It's normal to find yourself worrying about the future and how you will manage a change in your vision.

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

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 practical and emotional support about your eye condition.

Further help and support

Having pathological myopia can cause changes to your vision in the long term, but much can be done to help you make the most of your remaining vision and adapt to any changes.

There are lots of things that 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 0303 123 9999.

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

Local social services should also be able to offer you information on being 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 sight changes due to pathological myopia, you may be worried about finding work, or staying in your job. Our Employment Line can provide specialist support and advice about employment for people with sight loss. You can contact via our Helpline on **0303 123 9999**.

Sources of Support

If you have questions about anything you've read in this factsheet, or just want to speak to someone

about your eye condition, please get in touch with us. We're here to support you at every step.

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 9.30am to 1pm.

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



RNIB
105 Judd Street
London WC1H 9NE
rnib.org.uk

Other useful contacts

Unfortunately, we're not aware of a specific support group or charity for people with pathological myopia.

The Macular Society offer local support groups for people with macular eye conditions or central vision loss. They have working age groups as well as groups via Skype.

Macular Society

PO Box 1870
Andover
SP10 9AD
Tel: **0300 3030 111**
Web: **www.macularsociety.org**

Driver and Vehicle Licensing Agency (DVLA)

Drivers Medical Enquiries
DVLA
Swansea SA99 1TU
Tel: **0300 790 6806**
Web: **www.dvla.gov.uk**

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

We value your feedback

You can help us improve our information by letting us know what you think about it. Is this factsheet useful, easy to read and detailed enough – or could we improve it?

Send your comments to us by emailing us at **eyehealth@rnib.org.uk** or by writing to the Eye Health Information Service, RNIB, 105 Judd Street, London, WC1H 9NE.

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