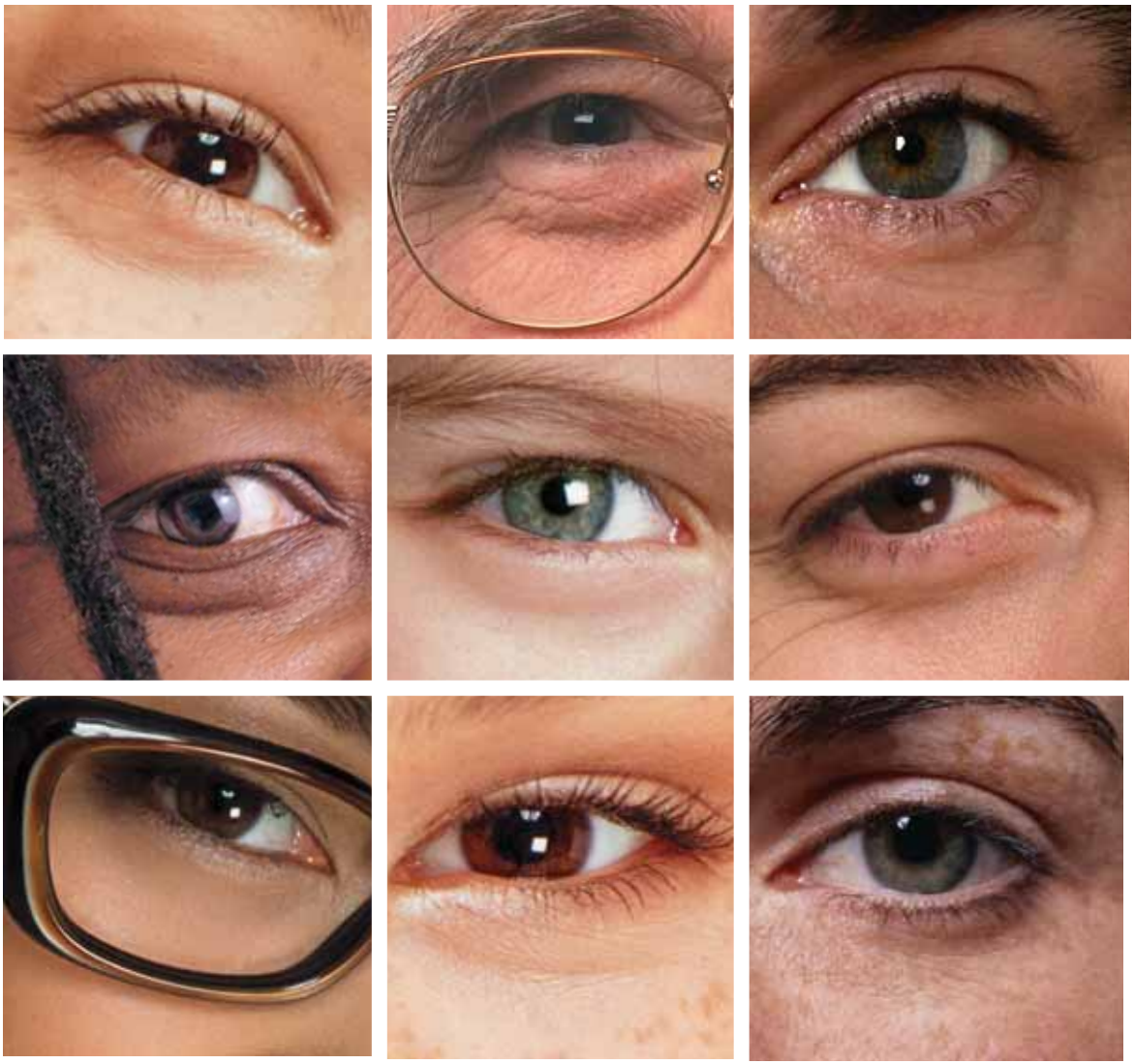
Diabetes UK

Your eyes and diabetes



Contents

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Introduction

Diabetic retinopathy (simply called ‘retinopathy’ in this booklet) is damage to the retina (the ‘seeing’ part at the back of the eye) and is a complication that can affect anyone who has diabetes.

Retinopathy is the most common cause of blindness among people of working age in the UK. It is important to understand what it is, how it is treated, what can be done to reduce the risk of developing it and what positive actions you can take.

This booklet aims to provide you with information on diabetes and how having the condition can affect your eyes and vision.

It is important to know that signs of retinopathy tend to show only once the condition is quite advanced. Annual retinal screening will detect retinopathy early and therefore increase the chances of minimal and more effective treatment.

Retinopathy at a glance

Condition	Signs	Treatment	Side effects	Page
Background retinopathy	None. Identified through annual screening.	Needed as appropriate if develops to more serious retinopathy.	Not applicable.	p13
Maculopathy	Blurred vision.	Laser.	Temporary worsening of vision. If had many sessions, may lose quality of sight and sometimes peripheral vision may be reduced.	p13
Maculopathy	Blurred vision.	Anti-VEGF medications (intra-ocular injection).	Can stabilise and improve vision. Raised eye pressure for few hours. See floating medicine for few weeks.	p13
Proliferative retinopathy	Loss of areas of sight.	Laser.	Temporary worsening of vision. If had many sessions, may lose quality of sight and sometimes peripheral vision may be reduced.	p14

Condition	Signs	Treatment	Side effects	Page
Detached retina Haemorrhages	Loss of vision.	Vitrectomy.	Blurred vision for several weeks. Sensitive, swollen or red eyes following the operation.	p14

The information above is only a summary of different types of retinopathy and treatment options. It is important to also read about how you can reduce your risk of developing retinopathy (see page 9).

Diabetes and how it causes eye problems

Diabetes is a common life-long condition where the amount of glucose in the blood is too high as the body cannot use it properly. This is because the pancreas does not produce any or not enough insulin or the insulin that is produced doesn't work properly (known as insulin resistance). Insulin helps glucose enter the body's cells, where it is used for energy.

Glucose comes from digesting carbohydrate from various kinds of food and drink, including starchy foods such as breads, rice and potatoes, fruit, some dairy products, sugar and other sweet foods. Glucose is also produced by the liver.

There are two main types of diabetes – **Type 1** and **Type 2:**

Type 1 diabetes develops when the insulin-producing cells have been destroyed and the body is unable to produce any insulin. Usually it appears before the age of 40, and especially in childhood. It is treated with insulin either by injection or pump, a healthy diet and regular physical activity.

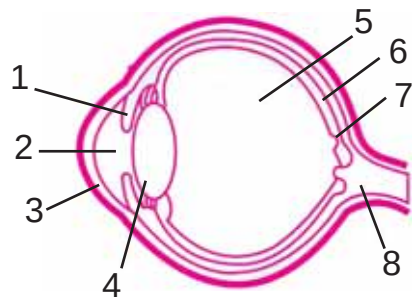
Type 2 diabetes develops when the body doesn't produce enough insulin or the insulin that is produced doesn't work properly. Usually it appears in people aged over 40, though in South Asian and Black people it can appear from the age of 25. It is becoming more common in children and young people of all ethnicities. Type 2 diabetes is treated with a healthy diet and regular physical activity, but medication and/or insulin is often required.

Persistent high levels of glucose can lead to damage in your eyes. To reduce the risk of eye problems blood glucose, blood pressure and blood fats need to be kept within a target range, which should be agreed by you and your healthcare team. The aim of your diabetes treatment, together with a healthy lifestyle, is to achieve these agreed targets.

Smoking also plays a major part in eye damage so, if you do smoke, stopping will be extremely helpful.

What is retinopathy?

The eye



1. Iris (coloured part)
2. Pupil (black centre)
3. Cornea (front of eye)
4. Lens (focuses what we see)
5. Vitreous (inside of eye)
6. Retina (seeing part of eye)
7. Macula (centre of vision)
8. Optic nerve (tells the brain what we see)

To see, light must be able to pass through from the front of the eye to the retina, being focused by the lens. The retina converts the light into electrical signals that travel along the optic nerve to the brain. The brain interprets these signals to 'see' the world around us. A delicate network of blood vessels supplies the retina with blood, and retinopathy happens when those blood vessels become blocked, leaky or grow haphazardly. This damages the retina and prevents it working properly.

As retinopathy frequently has no symptoms until it is well advanced, you may not be aware of changes to the retina until your vision has been impaired. This is why you must have your eyes screened every year.

It is important to remember that retinopathy will damage your vision if left untreated.

How retinopathy affects your vision

The pictures below illustrate the effect on your vision if retinopathy is not treated:

1. Normal vision.

2. Dark patches increase as retinopathy spreads.

3. Blurring and loss of the centre of vision in maculopathy.

What causes retinopathy?

High blood glucose levels are the main cause of retinopathy, but high blood pressure and blood fats can also play a part.

Who develops retinopathy?

If you have Type 1 diabetes and have had it for less than five years, you are unlikely to have retinopathy. However, the longer people have Type 1 diabetes, the more likely they are to develop retinopathy. Annual screening will help

identify when retinopathy is beginning to develop, so it can be dealt with early on.

In people with Type 2 diabetes, 60 per cent of people have a significant degree of retinopathy when they are diagnosed. This is because they may have had diabetes for months or even years before diagnosis and blood glucose levels may have been higher than normal for some time.

How can I reduce the risk of developing retinopathy?

Retinopathy is a complication of diabetes. So the chances of retinopathy developing and progressing can be reduced by maintaining good blood glucose control and keeping blood fat levels and your blood pressure as near to normal as possible – see the box below:

Guideline diabetes control targets – remember your own target will be agreed between you and your doctor.

Blood glucose:	HbA1c of less than 48 mmol/mol or 58 mmol/mol if you are at risk of severe hypoglycaemia (low blood glucose)
Blood fats:	
Total cholesterol:	less than 4mmol/l
LDL cholesterol:	less than 2mmol/l
HDL cholesterol:	1mmol/l or above for men 1.2mmol/l or above for women
Triglycerides:	less than 1.7mmol/l
Blood pressure:	130/80 or 125/75 if you have kidney problems

How can I stop retinopathy from developing or getting worse?

- ✔ Have your eyes screened every year.
- ✔ Keep a note of when your appointment is due and contact your doctor if you don't receive an appointment.
- ✔ If you notice a change in your vision see your doctor straight away – don't wait until your next annual eye examination.
- ✔ If you are having trouble achieving your blood glucose, blood pressure or blood fats 'targets' then talk to your doctor or nurse.
- ✔ Take your medication as prescribed – don't skip doses.
- ✔ Try to lose weight if you are overweight/watch what you are eating and keep your diet high in fruit and vegetables and low in fat, sugar and salt.
- ✔ Increase your levels of physical activity.
- ✔ If you smoke, aim to give up.

If you already have proliferative retinopathy (see page 14) or maculopathy (see page 13), good blood glucose control and control of blood pressure and blood fats can slow down the progression of the condition, but cannot reverse it.

Eye screening

You should be offered an appointment for eye screening for retinopathy with a special digital camera when your diabetes is diagnosed and once a year after that. The sooner any retinopathy problems are detected and treated, the more successful treatment is likely to be. If you can't attend the appointment you are given then do make sure that you make another date.

People with diabetes are entitled to *free* annual screening to check for retinopathy.

Children with diabetes should start having their eyes screened from the age of 12, or after puberty begins, whichever is sooner. If you are a parent of a child younger than this and would like them to be screened, especially if they were diagnosed at a very young age, discuss this with your diabetes care team.

An annual eye examination could save your sight.

Retinal eye screening: what to expect
Screening for retinopathy is different from a general eye test that checks your vision, determines if you need glasses and assesses general eye health.

Your eye specialist will dilate your pupils (make them bigger) using special drops.

The drops used may sting for a short time and will temporarily blur your vision and make your eyes sensitive to bright light, preventing you from reading and driving for two to four hours. Despite this discomfort and possible inconvenience, it is important to make sure that the clearest view of your retina is obtained.

After the drops have been applied, a photograph of your retina will be taken using a special camera. This will show any changes that need to be monitored or treated and is a permanent record for your diabetes care team, who will use it to compare your results year on year.

✔ Take sunglasses with you to your eye screening and don't drive yourself home.

Tip: Keep a record of your eye screening appointments and results. See below for an example.

Date	Time	Left eye	Right eye
5 Aug 2010	11.45	No changes	No changes
5 Aug 2011	12.00		

Types of retinopathy

There are different types of retinopathy: background retinopathy, maculopathy and proliferative retinopathy as summarised on pages 3 and 4.

Background retinopathy (non-proliferative retinopathy). The earliest visible change to the retina is known as background retinopathy.

The capillaries (small blood vessels) in the retina become blocked, they may bulge slightly (microaneurysm) and may leak blood (haemorrhages) or fluid (exudates). This type of retinopathy will not affect your eyesight, but it needs to be carefully monitored by your GP, diabetologist or eye specialist. Your annual screening test will keep a close check on these early changes and make sure that any signs that there could be a progression to more serious stages of retinopathy are detected early, and treated appropriately.

Maculopathy

The macula is the most used area of the retina. It provides our central vision and is essential for clear, detailed vision.

If the background retinopathy (see above) is at or around the macula, the fluid leaking from the enlarged blood vessels builds up and causes swelling (oedema). This can lead to some loss of vision, particularly for reading and seeing fine details, and everything may appear blurred, as if you are looking through a layer of fluid not quite as clear as water.

Maculopathy is more common in people with Type 2 diabetes and if left untreated can cause blindness.

People who have advanced maculopathy or haemorrhages (see proliferative retinopathy below) may need to consider registering as blind or partially sighted. Your eye specialist and other professionals such as a social worker or rehabilitation officer will be able to help.

Proliferative (spreading) retinopathy

As background retinopathy develops, large areas of the retina are deprived of a proper blood supply because of blocked and damaged blood vessels. This stimulates the growth of new blood vessels to replace the blocked ones. These growing blood vessels are very delicate and bleed easily. The bleeding (haemorrhage) causes scar tissue that starts to shrink and pull on the retina leading to it becoming detached and causing blindness.

Only between 5 and 10 per cent of all people with diabetes develop proliferative retinopathy. It is more common in people with Type 1 diabetes. Sixty per cent of people with Type 1 diabetes show some signs of proliferative disease after having diabetes for 30 years.

How is retinopathy treated?

Because treatment for retinopathy is invasive, for it to succeed it is really important that your diabetes is well managed. This may mean a change of medication or lifestyle, so that you can achieve the targets agreed by you and your healthcare team.

Recommended blood glucose targets			
	Type 1 adults	Type 1 children	Type 2
Before meals	4-7mmol/l	4-8mmol/l	4-7mmol/l
2 hours after eating	less than 9mmol/l	less than 10mmol/l	less than 8.5mmol/l

Recommended blood pressure targets
130/80
125/75 if you have kidney problems

Recommended blood lipid (fats) targets	
Total cholesterol:	less than 4mmol/l
LDL cholesterol:	less than 2mmol/l
HDL cholesterol:	1mmol/l or above for men 1.2mmol/l or above for women
Triglycerides:	less than 1.7mmol/l

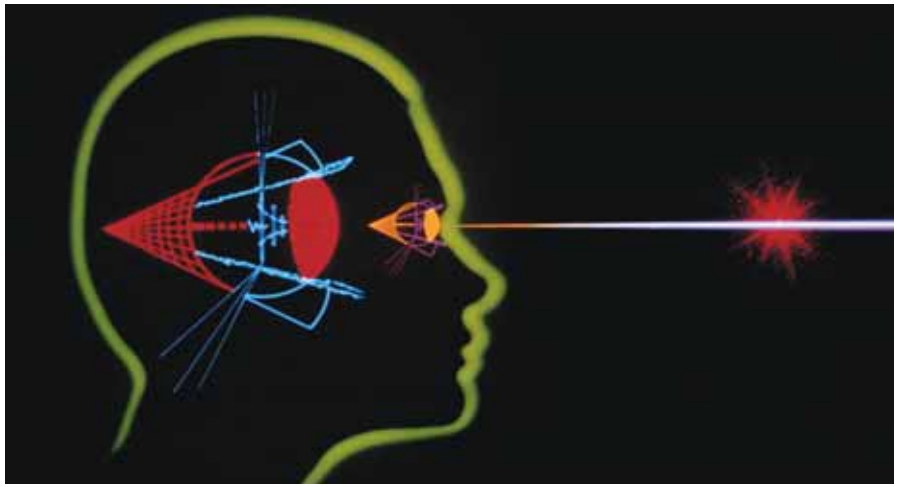
Laser treatment

Many people having laser treatment have very little visual impairment. Others who may have early or moderate maculopathy and proliferative retinopathy will also benefit from laser treatment.

Laser treatment has revolutionised retinopathy treatment. Together with effective screening, good blood glucose control and good blood pressure, it can successfully maintain vision though it usually takes about three to four months before the results of treatment become apparent.

How does it work?
Tiny laser burns allow more oxygen and nutrients to reach the retina so improving the blood circulation. This signals that there is no need for 'new vessels' to be produced.

You may need more than one treatment as the vessels may start growing again.



What's the procedure?
- You have local anaesthetic and pupil dilating eye drops put in your eye.
- The laser beam is directed onto the abnormal parts of the retina.
- Small bursts of tiny beams of laser light then seal leaky blood vessels and destroy abnormal new blood vessels in the retina.

An eye specialist carries out laser treatment and nearly always as an outpatient procedure, allowing you to go

home afterwards. A session of treatment can vary in length from person to person. Ask your eye specialist how long your sessions will last and whether you will be expected to come back for more treatment.

Is it painful?
As a local anaesthetic is used, laser treatment is not painful for most people, although a few will experience some discomfort. Many people say that the first laser sessions are not painful, but treatment can become uncomfortable if many sessions are needed.

Before your laser sessions, speak to your eye specialist about using your usual methods of pain relief, should it be needed.

What should I do after treatment?

Some lasers operate with bright flashes of light during a session. In others, the beam is invisible to the patient. Whichever method is used, most people describe feeling slightly dazzled or say that their vision is affected for a while immediately after treatment. It is a good idea to ask a friend or family member to come home with you after a session, and to allow yourself time to rest quietly.

As your eyes will take time to return to normal after the treatment, remember:

- ✔ take sunglasses with you as your eyes may be more than usually sensitive to bright light for a while
- ✔ arrange for someone to drive you home, because the dilating drops will temporarily blur your vision.

Are there any side effects?
Some people develop macular oedema (gathering of fluid in the macula, causing swelling) after laser treatment. This may cause a temporary worsening of vision, but in most people this improves within a few weeks.

People who have had many sessions of laser treatment may notice some loss of quality in their sight. This is because laser treatment burns abnormal vessels in the retina but can also damage healthy parts of the retina.

Also if people have had many sessions sometimes the edges of vision, called the 'peripheral visual field', may be reduced. This means that driving would be unsafe in this instance, even if your central vision is quite good. People may have difficulty seeing in low light or at night, distinguishing colours, and may also see shimmering or flashing lights.

Anti-VEGF (intra-ocular) injection

An anti-VEGF injection is for the treatment for maculopathy and can stablise and help rapidly improve vision.

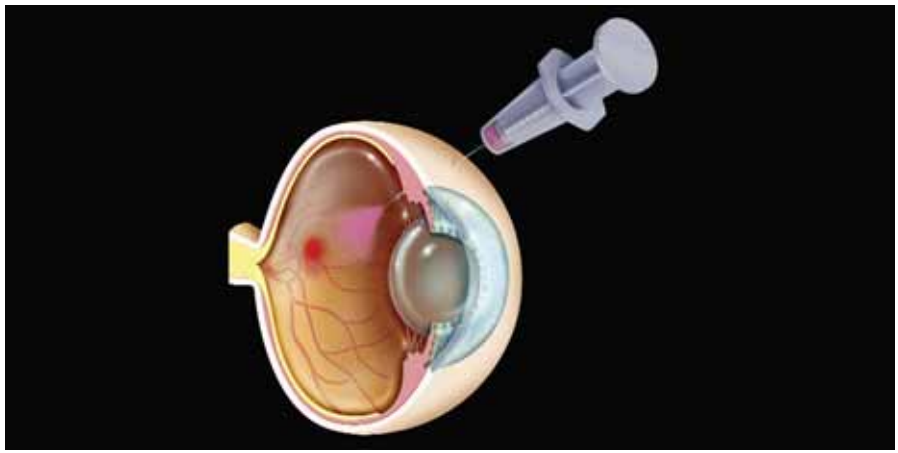
Vascular endothelial growth factor (VEGF) is a protein produced by the retina that stimulates the growth of new blood vessels. It is part of the system that restores the oxygen supply to tissues when blood circulation is inadequate. So it is activated when blood vessels are blocked due to high blood glucose levels.

In recent years new treatments, called anti-VEGFs, have been developed to bind to and inhibit VEGF.

Lucentis, made by Novartis, is currently the only anti-VEGF ophthalmic treatment licensed for use in patients with maculopathy in the UK. The intra-ocular treatment is injected directly into the eye and helps to reduce the leakage of fluids into the macular.

Avastin, made by Roche, is another anti-VEGF but is approved as a treatment for colon and rectal cancer. Some opthalmologists use Avastin in the eye. However, it is not licensed for use in the eye and there have been no large-scale long-term trials of Avastin to officially determine its effectiveness to treat maculopathy.

What's the procedure?
The treatment is administered during an outpatient appointment by an eye specialist (ophthalmologist) and you will be able to go home afterwards. You will be given antibiotic eye drops to prevent infection, a few days before or just before your treatment.



Photography: Science Photo Library

Anti-VEGF drugs are given as an injection and this may be done in an operating theatre or a clean room. The eye and skin around it will be cleaned to prevent infection, and your face and the area around the eye will be covered by a drape to keep the area sterile. A small clip (a 'speculum') will be used to keep the eye open. Local anaesthetic eye drops will be used to ensure the injection is painless. The needle used is very sharp, small and short. The injection itself only takes a few seconds and feels like a tiny scratch.

Your eye pressure will be measured following treatment.

✔ You do not need to wear sunglasses after treatment, but don't drive yourself home as your vision may be blurred.

Are there any side-effects?
Your eye pressure may go up for a few hours and, if it remains high, treatment may be required. Your vision may be blurry for several hours afterwards due to the dilating eye drops but this should improve by the next day. You may also see the medicine floating around your eye for the next few weeks.

By one month after your first injection most people will notice some improvement in vision – however it is recommended that all patients receive further injections at one monthly intervals until there is no further improvement in vision seen for three consecutive months. When this happens, your treatment is stopped but it is important that your vision is regularly checked to see if further treatment is required.

Vitrectomy

This is an operation that may be done when a haemorrhage does not clear within several weeks, or when the person has advanced proliferative retinopathy (see page 14) or when the retina detaches or peels away from it's underlying tissue. This surgery may restore useful vision but it is a major procedure and you need to discuss how well it may work with your eye specialist.

What's the procedure?

During this operation the vitreous, which gives shape and support to the back of the eye, is surgically removed and replaced with a clear substance. This operation is usually done under general anaesthetic, requiring a stay in hospital. The outcome depends on a number of factors. The best person to advise you on your suitability for this or any other eye treatment is your eye specialist.

Are there any side effects?

You may find your vision is blurred for several weeks. It's quite common for your eyes to be sensitive, swollen or red following the operation.

Summary

Retinopathy treatment has advanced over the years and it can often be successful. However retinopathy can often be prevented or stopped from progressing by maintaining good blood glucose control and keeping blood pressure and blood fats levels as near to normal as possible. Going to your annual eye examination is also very important as this can identify retinopathy early on – being treated at the right time will often mean treatment is more successful than if treated later.

Your questions answered

Q. My vision wasn't clear when I was first diagnosed with diabetes, but soon cleared up when I started treating my diabetes. Why?

A. Blurred vision is a common symptom of diabetes but does not necessarily mean you have retinopathy. Your vision could be blurred because of the high levels of glucose in the blood before diagnosis. This can cause some swelling in the lens of the eye and therefore blurred vision. For your vision to return to normal, your blood glucose levels need to be stabilised, which may take some weeks. If your vision doesn't return to normal after your blood glucose levels have been stabilised, speak to your doctor.

Q. Will I be able to continue to drive?

A. Having retinopathy does not necessarily mean that you have to give up driving. It is important for you to find out what degree of retinopathy you have. If you have background retinopathy (see page 13) that is being monitored, you will probably still be able to drive.

If you have one of the more serious forms of retinopathy, such as proliferative or maculopathy (see pages 13 and 14), these conditions and their treatment may affect your visual field or night vision, and therefore your fitness to drive. Discuss these points with your diabetes healthcare team, who know your circumstances best.

You do not need to tell the DVLA if you have retinopathy or are receiving laser treatment in one eye. However you will be asked whether you have had laser treatment

when your license comes up for renewal. If you have had laser treatment in both eyes or if they are affected by retinopathy or other health problems you must tell the DVLA as soon as possible.

Q. My vision hasn't changed, but my eye specialist has told me I need laser treatment. Is this correct?
A. Retinopathy frequently has no symptoms until it is well advanced. Your eye specialist has probably caught your retinopathy at an early stage (before you will have noticed any visual changes) and recommended laser treatment.

Q. I have had several sessions of laser treatment. How many more will I need?
A. Only your eye specialist can answer this question because it depends very much on your individual eye condition. However, even after successful laser treatment, regular eye examinations are still needed as any further changes in your eye may need more treatment. Ask your eye specialist about this.

Q. Is anti-VEGF or laser treatment better for treating maculopathy?
A. Your eye specialist will be able to recommend the most suitable treatment option for you. Laser treatment can be effective in terms of reducing the risk of significant vision loss, however it generally does not improve vision. Anti-VEGF treatments have been shown to offer stabilisation of vision loss but can also lead to improvements in vision.

Q. Are contact lenses safe for people with diabetes?
A. It is safe for people with diabetes to wear contact lenses as long as they are removed at any hint of discomfort. And if so, you should not put your lenses back in until your eyes have been completely comfortable for at least 24 hours.

There is some evidence that if you have diabetes and your cornea (front of your eye) becomes scratched by wearing contact lenses, you may not feel it. Ask your healthcare team if you are concerned.

Q. Am I more likely to get cataracts if I have diabetes?
A. A cataract is the hardening and cloudiness of the lens of the eye. Although anyone can get cataracts, people with diabetes get these eye problems at an earlier age than most and the condition progresses more rapidly than in people without diabetes.

Cataracts only need treating if they affect your eyesight to the point where you are unable to do the things you want to do because of sight loss. Treatment is an operation that involves removing the lens, followed by putting in a lens implant, with glasses or contact lenses as needed to further correct vision.

Q. I have glaucoma. Should I have the dilating drops at my eye examination?
A. Glaucoma is damage to the optic nerve (this tells the brain what we see). There are different types of glaucoma and your eye specialist needs to know your type before giving you dilating drops. These drops are essential for a full view of your retina, but you should discuss your individual concerns with your eye specialist.

Q. Can people with diabetes have corrective surgery to improve distance vision?
A. Laser refractive surgery, often known as corrective surgery, enables the shape of the cornea to be modified. If you have diabetes and are interested in having this surgery, discuss your suitability with an eye specialist.

Some leading eye hospitals have refractive units and your initial consultation may be free of charge. Do remember though, it's generally accepted that the best way to correct distance vision with minimum risk to your eyes, is by wearing glasses.

Sources of support and information

Diabetes UK Careline is staffed by trained counsellors, who can provide support and information about living with diabetes.

Telephone 0845 120 2960*
Email careline@diabetes.org.uk

*Depending on your phone package, calls to 0845 numbers may be free. Please check with your phone provider. Alternatively, call 020 7424 1000 and ask Reception to transfer your call to the Careline.

NHS Direct 24-hour health telephone service.
Telephone 0845 4647

NHS24 (Scotland) Confidential telephone health advice and information service for people in Scotland.
Telephone 0845 424 24 24

We welcome any feedback you may have on this or any of our information. Please email **infofeedback@diabetes.org.uk**

Diabetes UK resources

Publications in different formats

We produce a number of our publications in large print, on tape, CD or in Braille. Diabetes UK members can also receive their copy of *Balance* magazine on tape or CD. For further information please contact:

Diabetes UK Supporter Services
Telephone 0845 123 2399
Email supporterservice@diabetes.org.uk

Recommended further reading

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Driving and Diabetes (Free. Order code: 9044)
Diabetes Care and You (Free. Order code: 8010)
Understanding Diabetes (Free. Order code: 8002)

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Different languages

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Visit the Diabetes UK website: **www.diabetes.org.uk**

Diabetes UK has been certified as a producer of reliable healthcare information

Diabetes UK is the charity for people with diabetes, their family, friends, carers and healthcare professionals. Our mission is to improve the lives of people with the condition and work towards a future without diabetes.

There are 2.8 million people in the UK diagnosed with diabetes. We campaign for better standards of diabetes care, fund diabetes research and provide support and information to help people manage their diabetes.

Diabetes UK receives no government funding. We rely on donations to fund our work. To support us, please call 0845 123 2399 during office hours, or visit www.diabetes.org.uk

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