

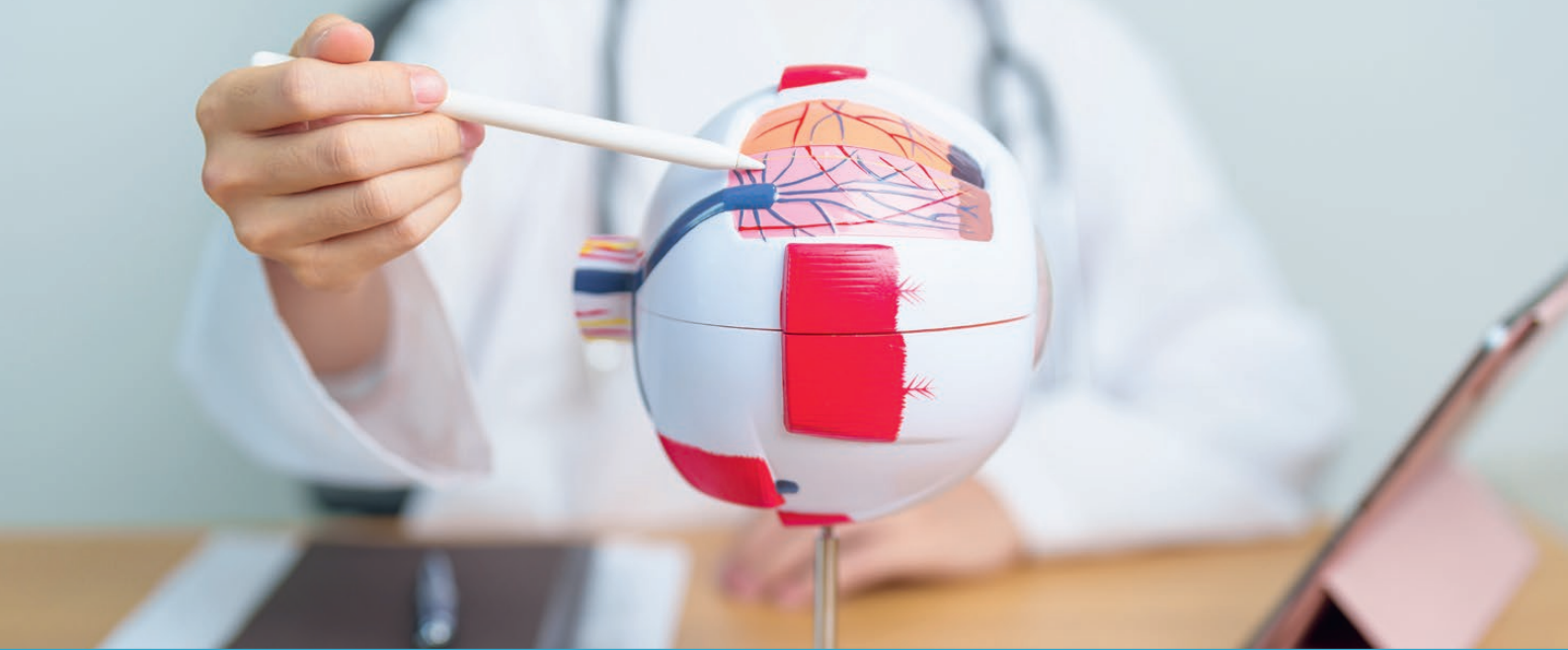
# Diabetes Research & Wellness Foundation

## Eye health and diabetes

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*Staying well until a cure is found...*



## What is diabetes-related retinopathy?

High blood glucose levels in diabetes can damage the blood vessels in the tissue at the back of your eye (retina), which is responsible for your vision. The blood vessels become weak and will leak fluid into the layers of the retina. The fluid can build, causing swelling. If the swelling is near the area responsible for your central vision (fovea), this is known as **diabetes-related maculopathy**.

As well as causing fluid to leak, high blood glucose can cause vessels to become blocked. This means less oxygen gets to the retina. This causes a growth hormone known as VEGF (vascular endothelial growth factor) to increase and abnormal blood vessels to grow on the retina (**proliferative diabetes-related retinopathy**). These new vessels grow into the gel in the middle of the eye and bleed.

If left untreated, both maculopathy and proliferative retinopathy can cause vision loss and blindness.



## What causes diabetes-related retinopathy and maculopathy?

High blood glucose levels and high blood pressure are the main risk factors for the development of retinopathy and maculopathy. For every 1% (11mol/mol) reduction in HbA<sub>1c</sub> levels the risk of developing retinopathy reduces by 40% and developing sight-threatening retinopathy by 25%. For every 10mmHg decrease in blood pressure the risk of developing sight-threatening retinopathy reduces by 35%.

While lowering blood glucose and blood pressure levels reduces the risk of developing diabetic retinopathy it does not eliminate the risk. This is because there are other things involved such as genetics which we do not know enough about.

**Caution** – if HbA<sub>1c</sub> is high and you have retinopathy or maculopathy, reducing the HbA<sub>1c</sub> too quickly can cause retinopathy and maculopathy to get worse.

## Who is at risk?

Anyone with diabetes is at risk of developing retinopathy or maculopathy – both type 1 and type 2 diabetes as well as other forms such as maturity-onset diabetes of the young (MODY), latent autoimmune diabetes in adults (LADA) and type 3c diabetes (caused by other medical conditions affecting the pancreas) but not gestational diabetes. The longer you have diabetes the higher the risk of developing retinopathy or maculopathy. However, most people who develop retinopathy will develop the mild non-sight-threatening forms. For those who do develop the sight-threatening levels of retinopathy or maculopathy there is treatment available. Therefore, developing retinopathy does not mean you will lose your vision. Sight loss due to diabetes is preventable and the best way to protect yourself is through **self-care** and attending **healthcare appointments**.

## Self-care

Maintaining a healthy balanced **diet** and taking regular **exercise** can help regulate blood glucose levels and maintain a healthy weight. In addition, **taking your medications** as prescribed can help manage **blood glucose** and **blood pressure** levels, all of which help to reduce your risk of developing complications such as retinopathy.

**Peer support** in diabetes can be valuable for managing the day-to-day challenges of living with diabetes. It can provide a unique and empathetic environment promoting a sense of community, understanding and empowerment, decreasing the sense of loneliness and isolation from living with a long-term condition.

**Healthcare** – in addition to self-care, attending regular appointments to check on the health of your eyes is vital.

**Opticians** are there to monitor the overall health of your eyes and vision. Diabetes means you have a greater chance of developing other eye conditions such as cataracts and glaucoma. These conditions as well as many others and your vision are all monitored by your optician. Therefore, you should make sure you attend your optician on a regular basis. Opticians can also help if you develop a sudden change in your vision that you are concerned about.



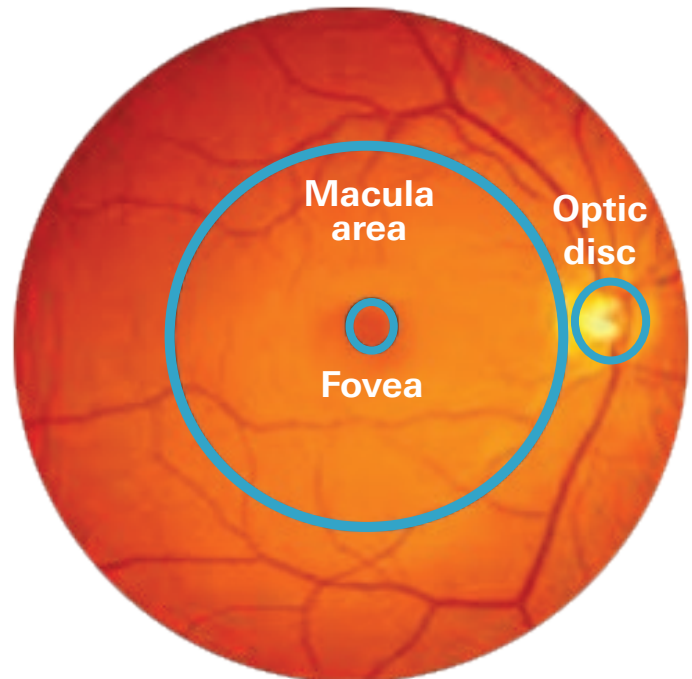
**Diabetic eye screening** monitors the health of the back of your eye (retina). It is important to attend diabetic eye-screening appointments as studies have shown that treatment for proliferative retinopathy is more effective before visual symptoms occur. Diabetic eye screening can detect the early changes, allowing you to make changes to your self-care routine to prevent retinopathy worsening and to get treatment as soon as it is needed.



## Results from screening can be confusing

Here we explain what they mean in more detail:

- **Fovea** – responsible for central vision and fine detail for things like reading.
- **Macula area** – a circular area around the fovea where changes due to diabetes could threaten the central vision.
- **Optic disc** – also known as the blind spot where all the blood vessels enter and exit the eye.



*Figure 1: Illustration of the back of an eye (retina) with the main features highlighted.*

Your eyes will be given a combination of retinopathy (R) and maculopathy (M) grades during screening. These are described in more detail below.

### **No diabetic retinopathy (R0)**

No changes in the eye due to diabetes. People with no retinopathy are at low risk of developing any sight-threatening changes and will be recalled for screening in one to two years. Screening intervals are changing in this group because the evidence shows there is very little risk of sight-threatening retinopathy developing. Therefore current 12-month screening will extend to two years and allow those at greater risk to be screened more often. For more information visit: [www.gov.uk/government/publications/diabetic-retinopathy-description-in-brief/your-guide-to-diabetic-retinopathy](http://www.gov.uk/government/publications/diabetic-retinopathy-description-in-brief/your-guide-to-diabetic-retinopathy).

### **Background diabetic retinopathy (R1) (mild non proliferative retinopathy)**

Vessels become blocked or leaky causing blood and other fluid to become visible on the retina. These changes are not sight-threatening and will not affect your vision but improvements in self-care may help to reduce the risk of retinopathy getting worse. People with background retinopathy will be recalled in one year for screening.



### **Pre-proliferative diabetic retinopathy (R2) (moderate/severe non proliferative retinopathy)**

More changes due to diabetes are visible on the back of the eye. This could be more bleeds, as well as signs of a lack of oxygen and changes in the shape of blood vessels themselves. The risk of sight-threatening changes developing have increased. Therefore, you could be screened more often, every three to six months or would be referred to a specialist for more testing and closer monitoring (see **Additional healthcare**). These changes will not affect your vision but improvements in self-care may help to reduce the risk of retinopathy getting worse.

### **Proliferative diabetic retinopathy (R3)**

At this stage the growth hormone known as VEGF is increased and abnormal blood vessels grow on the retina. These new vessels grow into the gel in the middle of the eye and bleed. Once they bleed, they will begin to affect sight causing black spots in your vision or an increase in floaters. You will be referred to a specialist for testing (see **Additional healthcare**) and possibly need **treatment** to stop the new vessels from growing.

### **Proliferative retinopathy can be active (R3a) or stable (R3s)**

The active form of proliferative diabetic retinopathy is when the vessels are growing and may be bleeding. The stable form is when the retina has had treatment, and no new vessels are growing or bleeding.

### **No maculopathy (M0)**

No changes due to diabetes within the macular area (see Figure 1). If the retinopathy level is R0 or R1, screening recall would be based on the retinopathy level.

### **Maculopathy (M1)**

Changes due to diabetes can be seen within the macular area. Vessels in or around the macula area become blocked or leaky. When blood and fluid leaks into the macular it can cause swelling called oedema. Because the fovea is responsible for our central vision and being able to read, swelling in this area has a higher risk of threatening sight. However, not all screening programmes have the test available (known as ocular surface temperature, or OCT imaging) to check for swelling and therefore this level would be referred to a specialist for further tests and monitoring (see **Additional healthcare**). If swelling is detected, then **treatment** would be needed to reduce the swelling and limit the effect on vision.

# Diabetes and eye health

## The journey to preventing sight loss

### Self-management

- Diet
- Exercise
- Taking medications as prescribed
- Checking blood glucose levels

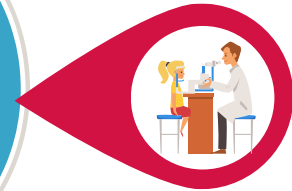
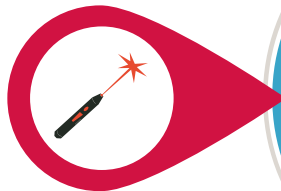


### Healthcare

- Diabetic eye screening every 2 years or 1 yearly
- Results
- Opticians

### Additional healthcare

- More frequent eye screening 3-6 months
- Referral to ophthalmology for further tests/monitoring



### Treatment

- Laser
- Anti-VEGF (anti-vascular endothelial growth factor)
- Steroid implants
- Eye surgery

### Support services

- Charities (DRWF, Macular Society, Royal National Institute of Blind People, etc)
- Eye Care Liaison Officers (ECLOs)
- Vision aids



### Key

Things can go wrong in healthcare systems and can easily get off track. If you do not receive your expected appointment, please contact your healthcare professional to check



### Protect your eyes

- Self-management prevents and delays diabetes affecting your eyes
- Attend diabetic eye screening and opticians appointments to pick up any changes as early as possible

## Additional healthcare

### Treatment

There are four different treatment options for diabetic retinopathy and diabetic macular oedema.

**Laser**, also known as photocoagulation (pan retinal and focal), is a medical procedure that uses a focused beam of light that is applied to the retina to treat the affected area. The laser encourages abnormal new vessels to shrink and scar and prevents new ones from growing. The aim of laser treatment is to stabilise the changes in your eyes caused by diabetes. Laser treatment does not generally improve your sight, although in some cases it might. If the changes are not treated, it is likely that some, or all, of your sight may be lost. It is likely that treatment will need to be repeated at intervals during a person's lifetime.

**Anti-VEGF** is injected into the eye following numbing with anaesthetic drops. They work by blocking the activity of VEGF and VEGF promotes the growth of new vessels and leakage. Anti-VEGF injections therefore work by blocking the growth of new vessels and reducing leakage from existing vessels. This helps to stabilise and sometimes improve vision. Anti-VEGF injections are normally used to treat diabetic maculopathy or diabetic macular oedema and sometimes proliferative diabetic retinopathy. They are usually given monthly for several months and then as needed after the condition is stabilised. However, regular monitoring is vital.

**Steroid implants** can be placed inside the eye and release small amounts of steroids over an extended period. The steroids help to manage inflammation and swelling in the retina. The implants are designed to gradually dissolve over time releasing controlled amounts of steroid as they break down, reducing the need for frequent injections. Steroid implants can last between three and six months. However, they can cause cataracts and glaucoma.

**Vitrectomy** is a surgery where the vitreous gel (a thick clear gel that fills the centre of the eye between the lens and retina) is removed. This is performed under local or general anaesthetic. This is a treatment option that is considered after laser and anti-VEGF have been tried; however there is still a threat to vision.

### Signs and symptoms of visual problems

The early stages of diabetic retinopathy have no signs or symptoms, which is why screening is needed. In the late stages the signs of visual problems that require immediate investigation include:

- **Blurred vision**
- **Sudden reduction in vision**
- **Spider web-type appearance in vision**
- **Sudden increase in floaters**
- **Flashing lights**
- **A dark curtain over vision**

These may appear in one or both eyes. These need to be checked by an eye health specialist such as an optician or ophthalmologist immediately. Your optician can check the back of your eye and refer you to an ophthalmologist for further assessment, or you can attend eye casualty where you will be seen by an ophthalmologist.

## More information

To find out more about eye health and diabetes visit:

NHS diabetic retinopathy overview [www.nhs.uk/conditions/diabetic-retinopathy/](http://www.nhs.uk/conditions/diabetic-retinopathy/)

Royal National Institute of Blind People [www.rnib.org.uk](http://www.rnib.org.uk)

Macular Society [www.macularsociety.org](http://www.macularsociety.org)



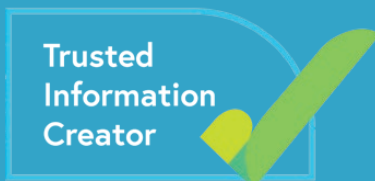
The Diabetes Research & Wellness Foundation works towards educating, informing and reminding you of the best and healthiest choices to make.

If you would like to become part of our Diabetes Wellness community, visit our website for more details.

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