

# Diabetic Eye Disease

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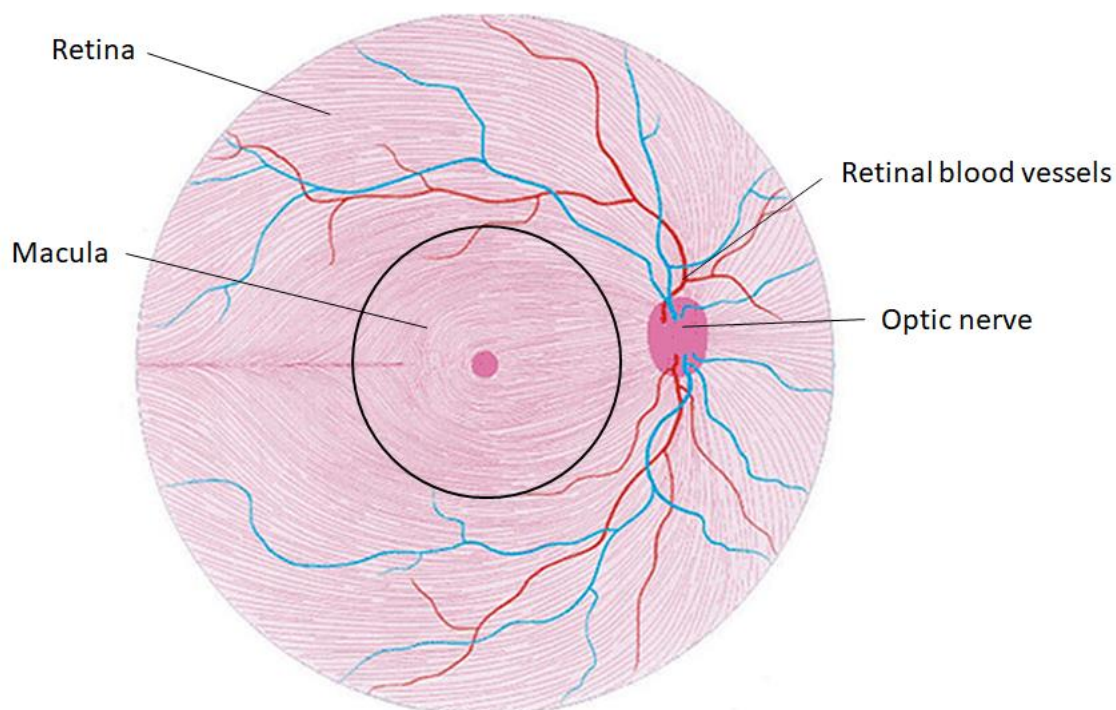
## What is diabetic eye disease?

Diabetic eye disease describes 2 conditions which affect the eye (see Fig 1):

1. Diabetic Retinopathy
2. Diabetic Maculopathy

## 1. Diabetic Retinopathy

Diabetes causes blood sugar levels to be raised. High blood sugar levels damage the blood vessels in your body. The retina is the innermost light-sensitive layer of tissue in your eye which helps us to see (see Fig 1). Diabetic retinopathy is where blood vessels in the retina are damaged because of high sugar levels. This process happens over years and the early stages often do not cause any symptoms. It is important to be examined in a screening programme or Eye Clinic, because if changes are detected you may require treatment to reduce the risk of visual loss. If diabetic retinopathy is left to progress untreated, bleeding inside the eye and retinal detachment can occur. These conditions may cause irreversible sight loss: 1% of blindness worldwide is caused by diabetic retinopathy. Most diabetic eye disease is managed by making sure your diabetes is well controlled by diet or with tablets or insulin injections. Regular examinations mean any changes can be recognised and treated early.



**Fig 1.** The retina: the retina is the light sensitive layer which covers the back of the eye. The macula is the central part of the retina which helps us to see fine detail and colours.

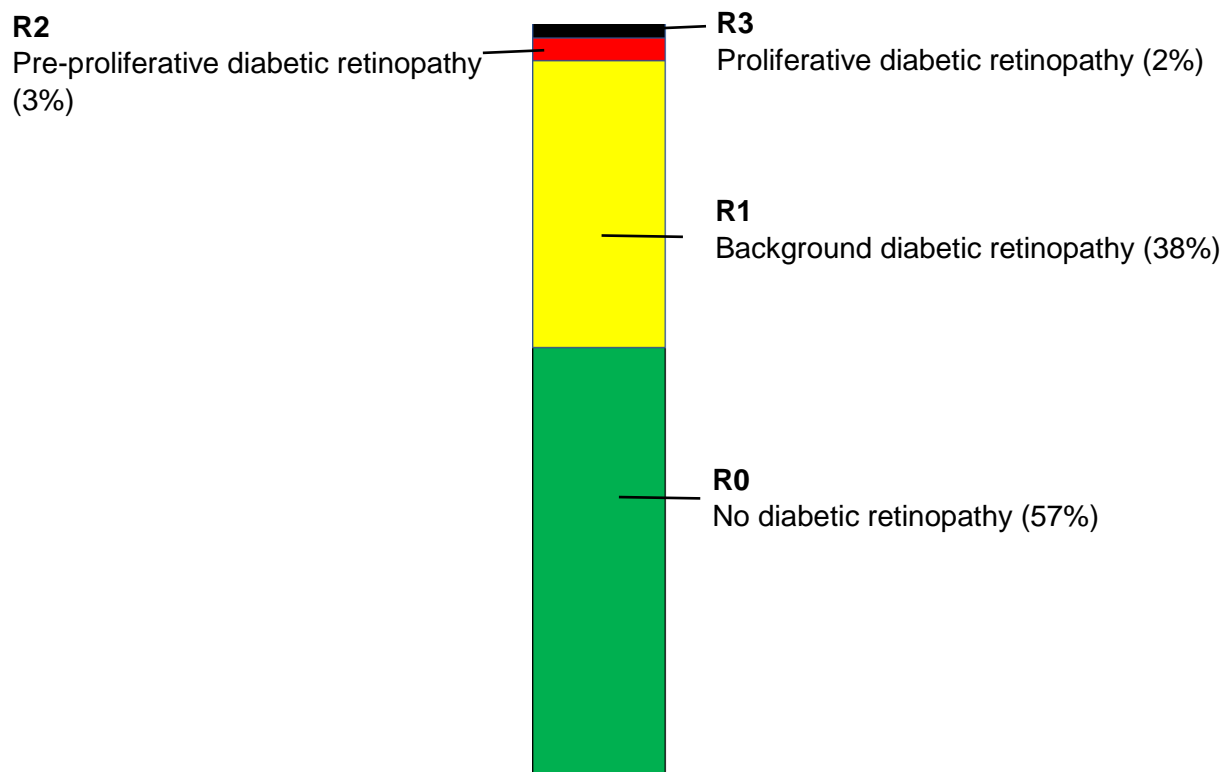
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## What are the symptoms of diabetic retinopathy?

The early stages of diabetic retinopathy often cause **no symptoms**. By the time visual loss has occurred it is often too late. This is why national screening programmes exist – so those who are progressing can have treatment before irreversible damage occurs.

## How severe is my retinopathy?

Your letter from your most recent appointment will state your grade of retinopathy as R (which stands for retinopathy) 0, 1, 2 or 3.



**Fig 2.** To scale figure of number of individuals with different grades of diabetic retinopathy in the North Yorkshire Diabetic population

**R0** means there is currently **no evidence of damage**. You sit alongside 57% of our diabetic population who have healthy retinas (see Fig 2).

The next level up is background retinopathy or **R1**, the first sign that diabetes is causing a problem in your retina. 38% of the North Yorkshire diabetic population have signs of background retinopathy. This is where long-term uncontrolled blood sugar levels cause damage to the walls of fine blood vessels in the retina. This causes outpouchings which are seen as tiny bleeds or “microaneurysms” throughout the retina.

**R2** or “**pre-proliferative retinopathy**” is where even more damage has occurred. The damaged vessels show more signs of bleeding and start to let protein and fat leak out where it shouldn’t. The damaged blood vessels are not supplying the retina with the amount of

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oxygen it requires. Only around 3% of all the diabetic patients we look after in Yorkshire have this severity of eye disease (see Fig 2).

When the retina is starved of oxygen it starts to grow new blood vessels. This is termed “**proliferative diabetic retinopathy**” or **R3**. These new blood vessels are disorganised, prone to bleeding and grow forwards away from the retina instead of remaining flat. If left untreated the process can cause repeated bleeds and retinal detachment which cause significant visual loss. Treatment with laser is usually given at this stage. Laser kills off areas of retina which means the blood vessels have less retina to supply with oxygen and it turns off the process of new vessel growth. Once the condition has stabilised it is termed level 3s or “stable treated proliferative retinopathy”. Only around 2% of all the diabetic patients we look after in Yorkshire have this severity of eye disease (see Fig 2).

## What is my risk of progression and sight loss?

Your risk of progression depends on your retinopathy grade.

**5-10%** of patients with **no retinopathy, R0**, will progress to develop signs of background retinopathy within the course of a year.

Similarly **5-10%** of those with **background retinopathy, R1**, will progress to more severe disease over the course of a year.

The rates of progression at **R2** become more worrying - disease progression at this stage is common. On average, over a period of 4 years 15% of patients with pre-proliferative retinopathy will progress to proliferative retinopathy requiring treatment. In those with severe R2, the risk of progressing over one year is as high as 50%. This is increased to 75% with very severe disease.

Once your retinopathy is R3 or proliferative retinopathy, if left untreated, the 5 year risk of severe visual loss can be as high as 35%. Adequate treatment dramatically reduces this risk.

## 2. Diabetic Maculopathy

The macula is a small central part of the retina at the back of the eye (see Fig 1). The macula is made of millions of delicate nerve cells which work together to generate central vision. It is the part of the eye that sees very fine detail and colours. Conditions which cause problems with the macula may cause loss of central vision. High blood sugar from diabetes damages the blood vessels in the macula. These damaged blood vessels start to become leaky. Fluid and proteins leak out of the damaged blood vessels and collect in the macula. This is called **diabetic maculopathy**. This disrupts the delicate structure of the macula and causes your central vision to be affected.

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## What are the symptoms of diabetic maculopathy?

You would typically notice worsening of your central vision. There may start to be patches, smudges or blobs in your central vision. You may start to have increasing trouble with fine detail such as reading or recognising people's faces

## How severe is my diabetic maculopathy?

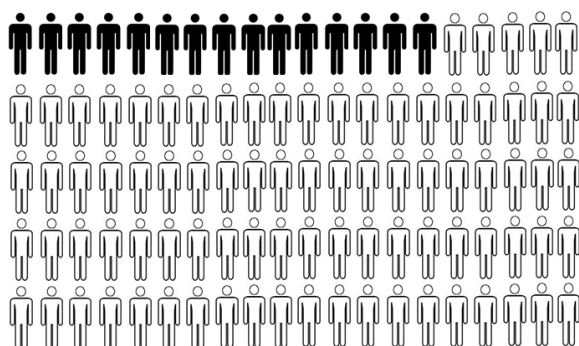
You receive appointments for your eye condition to be reviewed in the virtual service as there are early signs of change. This is termed "Maculopathy 0" or M0. It means treatment is not currently indicated, but ongoing monitoring is required.

M1 means maculopathy is present. You may have symptoms such as blurring of vision or missing patches. Your doctor will monitor you to determine whether you would benefit from treatment such as laser or injections into the eye. Any treatment always comes with risk and prevention is better than cure (see What can I do to reduce my risk? ).

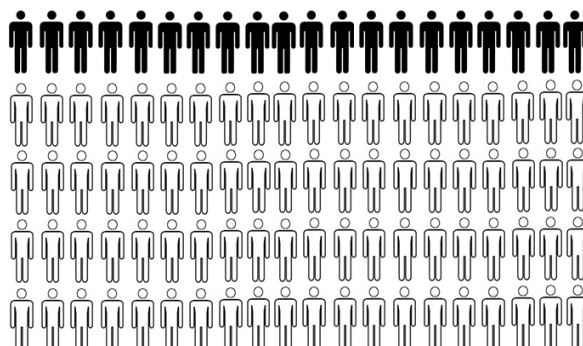
## How common is diabetic maculopathy?

How likely you are to develop diabetic maculopathy largely depends **how well your diabetes is controlled**. Other risk factors include age, duration of diabetes, blood pressure, cholesterol levels and your ethnicity. If you have diabetic retinopathy you are more likely to develop diabetic maculopathy. Studies suggest that diabetic maculopathy is slightly more common in people with type 2 diabetes. The proportion of people affected with diabetic maculopathy is approximately:

- 3 in 20 or 15% of people with type 1 diabetes
- 1 in 5 or 20% of people with type 2 diabetes (see Fig 1)



1A Average number of people affected by diabetic maculopathy with type 1 diabetes per 100 people



1B Average number of people affected by diabetic maculopathy with type 2 diabetes per 100 people

## What can I do to reduce the risk to my sight from diabetic eye disease?

Good blood sugar, blood pressure and cholesterol control are important. If all 3 are poorly controlled, your risk of progression of both diabetic retinopathy and diabetic maculopathy increases dramatically.

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**Good blood sugar control** is vital – it can cause the early stages of retinopathy to reverse and also prevents progression. Good blood sugar control as soon as possible after diagnosis of diabetes improves your long-term outcome.



## What should I aim for?

A **target HbA1c** (long-term blood sugar level) of **less than 53 mmol/mol (7.0%)** is recommended. This may be relaxed to 64mmol/mol (8%) in more elderly people, those with other significant medical conditions or those at risk of suffering low blood sugar.

## Blood pressure control

Good blood pressure control has been shown to reduce signs of diabetic retinopathy and reduce the proportion of patients who require laser treatment.



## What should I aim for?

Recommendations are to aim for a **systolic blood pressure (the top reading)** of **below 140mmHg**. This target can be relaxed for more elderly individuals or those who have problems with feeling faint or falling.

## Cholesterol control

- **Statin medication** to control your cholesterol may reduce your risk of progressing to a severity of disease which requires laser treatment

## Stop smoking

Although there is no clear evidence for smoking being a risk factor for retinopathy specifically, we know diabetes increases the risk of conditions including heart attacks and stroke. Smoking further increases this risk and is known to be toxic to your general eye health. Ask your GP about their smoking cessation support.

## Where can I find further information?

Further information for **diabetic retinopathy** is available at:

Diabetes.uk <https://www.diabetes.org.uk/guide-to-diabetes/complications/retinopathy>

NHS Online: Diabetic Retinopathy <https://www.nhs.uk/conditions/diabetic-retinopathy/>

Diabetes.co.uk The Global Diabetes Community: Diabetic Retinopathy  
<https://www.diabetes.co.uk/diabetes-complications/diabetic-retinopathy.html>

Sight Savers: What is diabetic retinopathy? <https://www.sightsavers.org/protecting-sight/diabetic-retinopathy>

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Fight for Sight: Diabetic Retinopathy <http://www.fightforsight.org.uk/about-the-eye/a-z-eye-conditions/diabetic-retinopathy/>

Further useful information is available for **diabetic maculopathy** at:

Diabetes.co.uk the global diabetes community: <https://www.diabetes.co.uk/diabetes-complications/diabetic-maculopathy.html>

The Macular Society Website: <https://www.macularsociety.org/diabetic-macular-oedema>

RNIB Website - Eye Conditions related to diabetes: <https://www.rnib.org.uk/eye-health/eye-conditions/diabetes-related-eye-conditions>