# Diabetic Retinopathy

A closer look at diabetic retinopathy, affecting more than 100 million people globally

a Novartis company

Diabetic retinopathy is a disease that affects individuals suffering from diabetes, and causes changes to the blood vessels found within the retina, resulting in decreased vision and blindness.[2] The retina is light-sensitive layer at the back of the eye that senses light and transmits images to the brain.[1]

According to Vision 2020, diabetic retinopathy is a significant cause of blindness.[4] Globally, of diabetic patients who have had the disease for more than 15 years, 2% become blind and approximately 10% develop severe visual impairment.[4]

*Vision loss during advanced stages of diabetic retinopathy*

## Four Stages of Diabetic Retinopathy

Often occurring without noticeable symptoms, diabetic retinopathy damages the blood vessels of the retina in four stages:

- **Stage 1: Mild Non-proliferative retinopathy** - At this earliest stage, micro-aneurysms occur, which are small areas of balloon-like swelling within the retina's tiny blood vessels.[2]
- **Stage 2: Moderate Non-proliferative retinopathy** - As the disease progresses, some of the blood vessels that nourish the retina become blocked.[2]
- **Stage 3: Severe Non-proliferative retinopathy** - In severe cases, many more blood vessels are blocked, depriving several areas of the retina of blood supply.[2] These areas of the eye then send signals to the body to grow new blood vessels in order to provide critical nourishment for the retina.[2]
- **Stage 4: Proliferative retinopathy** - At this advanced stage, a lack of oxygen causes fragile blood vessels to grow along the retina and within the vitreous gel that fills the inside of the eye.[2] Without timely treatment, these new blood vessels can bleed, cloud vision and destroy the retina.[2]

At any stage, fluid can leak into the center of the macula, the part of the retina responsible for sharp, straight-ahead vision.[2] This fluid causes the macula to swell and blur vision, a condition called macular edema.[2] About half of people with proliferative retinopathy also develop macular edema.[2]

## Global Impact

**Diabetic retinopathy has widespread impact across the globe, and is more prevalent in developed countries.**

## Global Occurrence Rates of Diabetic Retinopathy

| Current | 2030 Projection |
|---|---|
| 101 million[3] | 155 million[3] |
| 21 million have the proliferative form[3] | 32 million[3] |
| 33 million have a vision-threatening form[3] | 51 million[3] |

## Blindness Due to Diabetic Retinopathy

| Geographic Location | Proportion |
|---|---|
| Africa[4] | Nearly 0%[4] |
| Southeast Asia and Western Pacific[4] | 3-7%[4] |
| Americas, Europe and Western Pacific Wealthier Regions[4] | 15-17%[4] |

- Diabetic retinopathy is the main source of new blindness cases among adults aged 20-74 years[6]
- Between 40-45% of American adults with diabetes have some form of diabetic retinopathy[2]
- After 20 years, more than 75% of diabetic patients will have some form of diabetic retinopathy[4]

## Causes and Risk Factors

All people with diabetes - both type 1 and type 2 - are at risk of diabetic retinopathy.[2] The longer someone has diabetes, the more likely they are to develop diabetic retinopathy.[2] Patients who have better control of their blood sugar can slow the onset and progression of the disease.[2]

Prolonged, high blood sugar levels in diabetics can cause damage or swelling to the small blood vessels in the retina.[2] This blood vessel damage can lead to vision loss:

- Abnormal blood vessels can leak fluid into the macula, the area of the retina responsible for clear central vision.[5] The macula is small, but it allows us to see colors and fine detail. Blurred vision results when fluid causes the macula to swell.[5]
- To improve the retina's circulation, the eye may create new blood vessels on the surface of the retina.[5] These weak, fragile blood vessels can leak blood into the back of the eye and block vision.[5]

In addition to diabetes, other risk factors include high blood pressure, high cholesterol and pregnancy.[2] In addition, studies have shown that patients with diabetes who are of Hispanic or African descent are at an increased risk of developing diabetic retinopathy.[5]

## Symptoms

Typically, diabetic retinopathy does not cause noticeable symptoms until significant damage has occurred and complications have developed, which include:[2]

- Blurred or distorted vision, or difficulty reading
- Floaters, which are dark objects that "float" across the field of vision
- Partial or total loss of vision, or a shadow or veil across the field of vision
- Pain within the eye

## Diagnosis

Diabetic retinopathy and macular edema are detected during a comprehensive eye exam that includes:

- Visual acuity test: measures how well the eye sees at various distances.[2]

- Dilated eye exam: drops are placed in the eyes to widen, or dilate, the pupils, and a special magnifying lens is used to examine the retina and optic nerve for signs of damage.[2]
- Optical coherence tomography (OCT): pictures are taken of the retinal layers using an optical scan.[8]
- Tonometry: an instrument that measures pressure inside the eye; numbing drops may be applied.[2]

An ECP will also check the retina for early signs of the disease, including:

- Leaking blood vessels[2]
- Retinal swelling (macular edema)[2]
- Pale, fatty deposits on the retina indicating leaking blood vessels[2]
- Damaged nerve tissue[2]
- Changes to the blood vessels[2]

## Treatment

There is no cure for diabetic retinopathy; however, treatment is often effective in preventing, delaying or reducing vision loss.[1] Laser treatment (photocoagulation) and surgical removal of the vitreous gel (vitrectomy) can be successful if done before the retina is severely damaged.[5] While laser treatment can provide stabilization of vision in most patients, it generally does not restore sight.[9] More recently, novel treatments (called anti-VEGF drugs) have shown to improve vision in patients with macular edema.[7] People who have been treated for diabetic retinopathy should be monitored frequently by an ECP, as the condition often becomes worse with time and often requires multiple treatments.[5]

## Prevention

People with diabetes should receive a comprehensive, dilated eye exam at least once a year.[2] Those who already have diabetic retinopathy may need an eye exam more often.[2] People with proliferative retinopathy can reduce their risk of blindness by 95% through timely treatment and appropriate follow-up care.[2]

Diabetic retinopathy can be a problem for pregnant women who have diabetes.[2] To protect vision, women at risk should have a comprehensive dilated eye exam upon confirmation of pregnancy, as well as additional exams during pregnancy as recommended by a doctor.[2]

Most likely, a doctor will recommend that diabetic patients make dietary changes to help control their blood sugar (glucose) levels.[2] Controlling blood sugar levels can also slow the onset and progression of diabetic retinopathy, and reduce the need for sight-saving laser surgery.[2]

Blood sugar control may not be best for everyone, including some elderly patients, children under age 13 or people with heart disease.[2] Patients should ask their doctor if such a control program is right for them.[2]

Other studies have shown controlling elevated blood pressure and cholesterol can also reduce the risk of vision loss and improve overall health.[2]

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