

Diabetic retinopathy

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Definition

Diabetic retinopathy is a common complication of diabetes affecting the blood vessels supplying the retina. It occurs when high blood glucose, the hallmark of diabetes, has damaged the small vessels that provide oxygen and nutrients to the retina.

Reminder:

The retina is the nerve layer that lines the back of the eye, senses light, and creates impulses that travel through the optic nerve to the brain. It is composed of two parts: the macula in the centre of the retina and the peripheral retina surrounding the macula. The macula is the small yellowish central portion of the retina, measuring about 1mm in diameter. The macula provides the sharp central vision we need for reading and seeing fine details. The surrounding peripheral retina, which makes up more than 95% of the retina, is needed for peripheral vision.

Diabetes is a chronic medical condition characterised by insufficient insulin production (type 1 diabetes) or by a reduction of insulin's effects on peripheral tissues (type 2 diabetes). Insulin stimulates cell glucose uptake, leading to a decrease in its blood concentration. In the case of insulin insufficiency, blood glucose levels rise. Diabetes is a serious disease that should not be taken lightly, as it may lead to numerous complications, notably affecting the eyes, heart, the kidneys, the nerves, etc. In order to prevent these complications, careful adherence to your doctor's instructions is important.

Epidemiology

Diabetes is a common disease. Worldwide, approximately 150 million subjects are affected—a number likely to double by 2025.¹ Type 2 diabetes is much more common than type 1 diabetes, representing 90% of all cases worldwide.¹ The risk of diabetic retinopathy is higher in patients with type 1 diabetes.²

In the United States, more than 2.5% of the population older than 18 years of age suffer from diabetic retinopathy.³ In France, 35% to 40% of diabetic patients, 800,000 in total suffer from retinopathy.⁴ Developing countries are also seriously affected, primarily because there are not enough ophthalmologists to facilitate annual screenings.⁵

Worldwide, diabetic eye disease is a leading cause of poor vision and blindness. Approximately 10% of patients diagnosed with diabetes have vision problems.⁶ However, according to clinical trial results, early detection and prompt treatment may prevent more than 95% of the vision reductions that are observed in diabetic patients.⁷ If you suffer from diabetes, regular eye examinations will allow you to obtain proper therapy before it is too late.

• Risk factors

Several factors may cause or aggravate diabetic retinopathy:

- Duration of diabetes⁸: The longer you have diabetes, the more likely you are to develop diabetic retinopathy. Approximately 15 years after the initial diagnosis, more than 80% of patients have some degree of diabetic retinopathy.⁹
 - Poor glycemic control: Several studies have demonstrated that poor glycemic control correlated with the presence of diabetic retinopathy or its progression.¹⁰ Strict control of blood sugar is always beneficial, so even if you have a history of poor blood sugar control, you should attend carefully to your blood sugar levels.¹⁰
 - Other factors: High blood pressure, smoking and high cholesterol levels are other risk factors that may provoke or aggravate diabetic retinopathy.¹¹
 - Pregnancy: Diabetic women may experience an aggravation of their diabetic retinopathy during pregnancy.¹² This may be due to the pregnancy itself, the duration of diabetes, poor blood sugar control, or arterial hypertension, conditions that frequently occur during pregnancy.¹²
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• Symptoms

Initially, as diabetic retinopathy begins without any noticeable change in vision, symptoms may not be noticed. As the disease progresses, macular oedema, a condition characterized by the collection of fluid in the central portion of the eye, may occur, resulting in a decrease in vision.¹³

At a later stage, patients may experience other symptoms such as difficulty reading, blurred vision, seeing rings around lights or dark spots, or flashing lights. Vision loss is most often gradual and slow. However, in the case of bleeding inside the eye or retinal detachment, vision loss is rapid and marked.¹³

• Diagnosis

In diabetic patients, eye disease is very common. For this reason, regular visits to your ophthalmologist are essential.

During these visits, the ophthalmologist will ask you about when you were diagnosed with diabetes, how your blood sugar has been controlled, and whether you have hypertension or other conditions which may complicate your diabetes.¹⁰

Following this, he will measure your visual acuity, or how clearly you can see from a distance, and the pressure inside your eye. However, the most important test pertaining to the diagnosis of diabetic retinopathy is the examination of the back of the eye. This is performed with an instrument called an ophthalmoscope, sometimes in conjunction with a slit lamp.¹⁰ In order to examine the retina, your pupils will be dilated with special eye drops, allowing a view of the back of your eye. This view will permit the doctor to see whether you have a retinopathy, and if so, evaluate its seriousness. After the test, which lasts about 10 minutes, your vision may be blurred for a short time.

The ophthalmologist may also deem a more sophisticated examination, called fluorescent retinal angiography, necessary. This test allows the retinopathy to be more precisely evaluated. It consists of an intravenous injection of a fluorescent dye, which is then observed as it passes through the small blood vessels of the retina.¹⁰

• Evolution and complications

Retinopathy evolves in two stages:

- Nonproliferative retinopathy is the initial stage characterized by a dilation of blood vessels and micro-aneurysms which appear as small red spots during the examination of the back of the eye. Small haemorrhages (bleeding) with leakage of blood may also be observed.¹³
- Proliferative retinopathy is the second stage. With the progression of the disease, the micro-aneurysms and haemorrhages become increasingly frequent, and the supply of oxygen and nutrients to the retina decreases. To compensate for this, new abnormal blood vessels develop in the retina and grow towards the centre of the eye. These blood vessels may rupture and bleed into the vitreous, which is called an intravitreal haemorrhage. In some cases, retinal detachment occurs.¹³
- Macular oedema refers to a condition where blood or other liquid accumulates inside the macula owing to the increased permeability of blood vessels. As the condition progresses, it results in retinal cell lesions, contributing to vision reduction.

- In general, the development of retinopathy is slow and progressive. In the case of macular oedema, the patient experiences a progressive loss of vision¹³. However, if intravitreal haemorrhages or retinal detachment occurs, the loss of vision is more rapid.¹³

• Treatment

Control of blood sugar levels and blood pressure

The cornerstone of the treatment of diabetic retinopathy is the strict control of blood sugar levels. Indeed, a good control of blood sugar levels will prevent the occurrence and aggravation of diabetic retinopathy.¹⁰ Furthermore, your blood pressure should also be ideally controlled. A clinical study has shown that the maintenance of blood pressure levels below 150/85 mmHg results in a reduction of diabetic retinopathy's progression by 34% and of vision loss by 47%.¹⁰

Treatment by laser photocoagulation

Panretinal laser photocoagulation is a technique used in the case of proliferant retinopathy to eliminate the new blood vessels that have developed in the retina. Six to eight treatment sessions in variable intervals are necessary, depending on the gravity of the retinopathy and the presence of macular oedema¹⁰. This treatment is efficacious, as it facilitates a regression of the newly formed blood vessels in 90% of cases¹⁰. However, owing to the destruction of the peripheral retina, certain side effects may occur: the field of vision may be reduced, night vision may suffer, and macular oedema may occur or worsen.³

Laser therapy is also used with patients suffering from macular oedema.³ In this treatment, the laser targets the macular zone so as to destroy the lesions responsible for the oedema.

Note:

that each session lasts approximately 15 minutes and may be performed as an outpatient procedure. Before the laser therapy commences, anaesthetic eye drops are applied to the subject cornea.

Surgical treatment

The vitrectomy is performed only on patients with intravitreal haemorrhages or retinal detachment. Its objectives are to evacuate the blood present in the eye, destroy the newly formed blood vessels, and re-attach the retina if necessary¹⁰. During this treatment, panretinal laser photocoagulation may also be performed.

• Prevention

Several measures enable the prevention, early detection, or retardation of diabetic retinopathy.

- The risk of eye disease among diabetic patients is very well known. Due to this, you should consult your ophthalmologist regularly. The French Haute Autorité de Santé recommends at

least one visit each year¹⁴. Additionally, if you notice any change in your vision, you should see your ophthalmologist immediately.

- Another essential preventative measure is the strict control of your blood sugar levels. Follow your physician's instructions carefully. In general, regular physical activity, weight loss in the case of overweight, and a healthy diet are a first step towards effective management of the condition. If these measures do not sufficiently decrease your blood sugar levels, your physician may prescribe pharmaceutical treatment. In this event, he may ask you to measure your blood sugar levels yourself and note the results in a journal, enabling him to adjust your treatment. Even if these measures seem constraining, do your best to comply, as your vision and your health are the beneficiaries.
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