Diabetic Retinopathy

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What is Diabetic Retinopathy?

Diabetic retinopathy (DR) is a complication of diabetes mellitus (DM) and is an important cause of avoidable blindness worldwide. Over time, diabetes causes damage to many organs in your body, including the retina. Your retina helps you see by acting as the film projector in the back of your eye, projecting the image to your brain. Diabetes damages the tiny blood vessels that nourish the retina. In the early stages, known as non-proliferative or background retinopathy, the vessels in the retina weaken and begin to leak, forming small, dots of bleeding.

When retinopathy advances, the decreased blood circulation deprives areas of the retina of oxygen. Diabetic retinopathy can lead to severe visual loss or blindness in 2 ways. The first is when it affects your macula, the central part of your retina that provides you with sharp, central vision. When this part becomes swollen, it is called diabetic maculopathy.

At the same time, blood vessels can also become blocked or closed, and parts of the retina die. New, abnormal, blood vessels may then start to grow along the retina and surface of the vitreous (the transparent gel that fills the inner part of the eye). Unfortunately, these delicate vessels can bleed easily. Blood may leak into the retina and vitreous, causing “floaters” (spots that appear to drift in front of the eyes), along with decreased vision. This is called proliferative diabetic retinopathy, and it can even cause scar tissue which can pull off the retina, causing what’s called a tractional retinal detachment (TRD).

In the later phases of the disease, continued abnormal vessel growth and scar tissue may cause a total retinal detachment and glaucoma. The result of either problem, if left untreated, is loss of sight and potentially blindness.

Symptoms of Diabetic Retinopathy

You may not be aware the symptoms of DR in the initial stages of the condition, unless it progresses quickly to the more severe stages. The symptoms of DR include:

- Blurred vision
- Sudden loss of vision in one eye
- Seeing rings around lights
- Dark spots or flashing lights

The symptoms described above may not necessarily mean that you have diabetic retinopathy. However, if you experience one or more of these symptoms, contact your ophthalmologist for a comprehensive eye examination. The following are the risk factors for accelerating DR:

- Poorly-controlled diabetes
- A long duration of diabetes
- High blood pressure
- Elevated blood cholesterol levels
- Sleep apnea
- Gestational diabetes (diabetes during pregnancy)

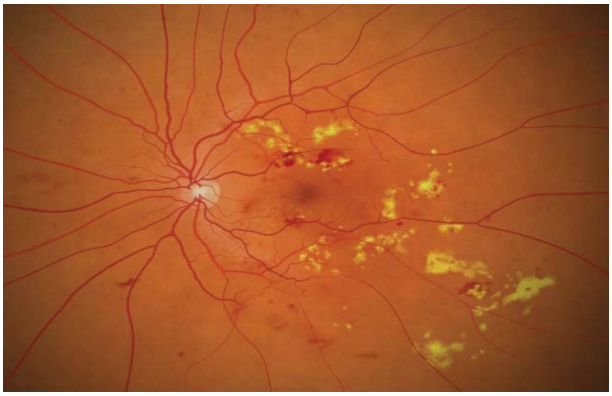

Figure 1. Signs of leakage and bleeding in DR

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Tests for Diabetic Retinopathy

A dilated retinal examination will be recommended by your ophthalmologist to examine the retina and detect the presence of any diabetic changes in the eye. In addition to this, your ophthalmologist may also recommend certain diagnostic procedures such as a fundus fluorescein angiogram (FFA) or optical coherence tomography (OCT) to assess the severity of DR and to determine the best mode of treatment. The angiogram test involves the injection of fluorescein (a yellow dye) into your arm. The dye can then be seen coursing through the blood vessels in your retina and photos are taken. Normal, healthy blood vessels do no leak, however, damaged blood vessels like in DR do, thus helping to target treatment.
An OCT scan uses reflected light to build a cross sectional image of the retina. Macula edema is noted when areas of your retina are shown to contain spaces filled with fluid.

Treatment of Diabetic Retinopathy

In mild cases, treatment is not necessary. Regular eye exams are critical for monitoring progression of the disease. Strict control of blood sugar and blood pressure levels can greatly reduce or prevent DR. In more advanced cases, treatment is recommended to stop the damage of DR, prevent vision loss, and potentially restore vision.
Treatment options include:

Intravitreal Anti-VEGF injections
Anti-VEGF therapy involves the injection of the medication into the back (vitreous cavity) of your eye. The medication is an antibody designed to bind to and remove the excess VEGF (vascular endothelial growth factor) present in the eye that is causing the disease.

Laser Therapy
Laser retinal treatment is often helpful in treating DR. To reduce macular edema, a laser is focused on the damaged retina to seal leaking retinal vessels. For abnormal blood vessel growth (neovascularization), the laser treatment is targeted over the peripheral retina (Pan-retinal Photocoagulation). The small laser scars that result will reduce abnormal blood vessel growth. Laser retinal therapy may be performed in outpatient clinic and greatly reduces the chance of severe visual impairment.

Vitrectomy
A vitrectomy may be recommended in advanced proliferative diabetic retinopathy. During this microsurgical procedure that is performed in the operating room, the vitreous is removed and replaced with a clear solution. Your ophthalmologist may wait several weeks to see if the blood will clear on its own before going ahead with surgery. In addition to a vitrectomy, retinal repair may be necessary if scar tissue has detached the retina from the back of your eye. Severe loss of vision or even blindness can result if surgery is not performed to reattach the retina.

How to Prevent Diabetic Retinopathy

The good news is that there are steps you can take to detect DR early and prevent its progression as below:

• Visit your ophthalmologist or optometrist at least once a year. You may be recommended to visit more or less frequently depending on your situation.
• Maintain optimal blood glucose levels, blood pressure and blood cholesterol.
• Know your HbA1c (a test of your average blood glucose level over three months). Most people with diabetes should aim for a target of lower than 7%. Talk to your healthcare team about what your target should be.

Who should be screened

• All individuals with either Type I or Type II diabetes should be screened annually.
• The interval for follow-up assessments should be tailored according to the severity of the retinopathy. In those with no or minimal retinopathy, the recommended interval is one to two years.
• Women with type I or type II diabetes or women who plan to become pregnant should be screened before conception, during the first trimester, as needed during pregnancy and within the first year post-partum.

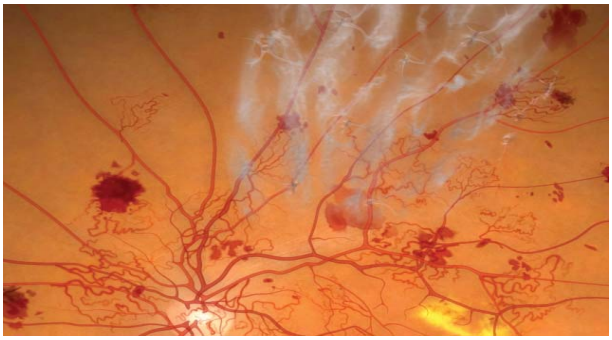

Figure 2. Proliferation of new blood vessels with scar tissue forming on the retina and in the vitreous

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