Diabetic Retinopathy

The retina is the layer of light-sensitive tissue that lines the back of the eye. It converts light into signals that are sent via the optic nerve to the brain, where they are recognized as images. Conditions that affect the retina affect the ability to see. *Diabetes mellitus* is a complex disease that affects many different parts of the body. In diabetic retinopathy, the blood vessels in the retina are affected, leading to loss of vision. There are two main types of **Diabetic Retinopathy (DR)**.

Nonproliferative Diabetic Retinopathy (NPDR) occurs when the damage to the retinal blood vessels causes them to leak fluid and blood.

Proliferative Diabetic Retinopathy (PDR) occurs when neovascularization, the growth of new, abnormal blood vessels, develops on the retina. These new vessels can lead to bleeding and scarring.

What are the symptoms of DR?

In the early stages of DR, there may be no symptoms. Symptoms may not develop until DR is quite advanced, so it is important for people with diabetes to have regular eye exams even if they have no symptoms. As the disease progresses, symptoms may occur suddenly, or they may develop gradually over time. They include reduced vision, blurred or distorted vision, spots, streaks, or floaters. Severe bleeding can cause serious or even complete loss of vision, as can detachment of the retina caused by scarring.

How does DR affect vision?

The macula is the small, central area of the retina that allows sharp, detailed vision, such as that necessary for reading. Blood and fluid leaking into the macula cause swelling, a condition called *macular edema*, which causes blurring and/or loss of vision. *Neovascularization,* the growth of new, abnormal blood vessels, may lead to *vitreous hemorrhage,* bleeding into the vitreous, the clear, jelly-like substance that fills the inside of the eye. With a small hemorrhage, small spots or clouds, called floaters, may appear in the field of vision. A large hemorrhage may block vision completely. Neovascularization may also lead to the growth of scar tissue on the retina. The scarring can pull the retina way from its normal position, causing *retinal detachment*. New blood vessels in certain parts of the eye can prevent the normal flow of fluid out of the eye. This can lead to *neovascular glaucoma*—a dangerous increase in pressure that can damage the optic nerve. Vitreous hemorrhage, retinal detachment, and neovascular glaucoma can cause complete loss of vision.

How is DR detected?

People with DR should have regular, thorough eye examinations. After the pupils of the eyes are dilated (widened) with the application of eye drops, the retina and the inside of the eye can be examined with an instrument called an *ophthalmoscope*. *Optical coherence*

tomography (OCT) uses a thin beam of light and the reflection of that light off the retinal layers to show the anatomy of the retina. *Angiography* is a test that allows the physician to see the retinal vessels and identify abnormalities; a dye that is injected into an arm vein and travels to the retina helps in visualizing the vessels.

How is DR treated?

Diabetic retinopathy is treated with *intravitreal drug injection* or with *laser*. With intravitreal injections, drugs are injected into the eye with a very small caliber needle. The drugs used may include steroids, which reduce inflammation, or drugs that inhibit neovascularization. In some cases, *intravitreal implants*, which release drug over time, are placed in the eye. With laser treatment, a beam of light is used to create small burns on the retina. In focal laser treatment, used for macular edema, burns are placed near the macula to seal the leaking vessels. In scatter or panretinal laser treatment, used for PDR, the burns are placed throughout the retina, except in the area of the macula, to shrink the new vessels and inhibit future neovascularization. In some cases, a combination of laser and injection is used. If vitreous hemorrhage is severe or long-standing, a surgical procedure called a *vitrectomy* may be necessary to remove the vitreous, which is replaced with a substitute. If the retina detaches, retinal reattachment surgery is performed to release the tissue pulling the retina and restore the retina to its correct position.

Can DR be prevented?

Research studies have shown that careful control of blood glucose slows the onset and progression of retinopathy and other complications of diabetes. The risk of complications can also be reduced through nutritious diet, regular exercise, not smoking, and keeping blood pressure under control. It is important to work with your diabetes doctor to determine the best treatment plan for you.

Research is important to us!

Retina Associates of Cleveland has one of the most active programs for retinal clinical trials in the country. As a participating center in the Diabetic Retinopathy Clinical Research Network (DRCRnet) funded by the National Eye Institute, we been actively involved in all DRCRnet research studies since 2003, in hope of providing the option of newer and better treatments for DR.

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