

## **WHAT IS DIABETES AND HOW CAN IT AFFECT MY RETINA?**

Diabetes refers to a group of diseases that affect your body's ability to control blood sugar levels, causing them to rise higher and higher if not treated. Over time, high blood sugar can damage the small blood vessels in your eyes, kidneys, and other organs. The blood vessels in your retina are particularly sensitive to this injury. When diabetes causes damage to the retina and its blood vessels, we call this "diabetic retinopathy".

## **WHAT ARE THE EARLIEST SIGNS THAT DIABETIC RETINOPATHY IS IN MY RETINA?**

In the early stages of diabetic retinopathy, tiny capillary blood vessels become twisted and small spots of blood appear. We call this stage "nonproliferative diabetic retinopathy." Monitoring your retina is important because the damage can progress to the more serious "proliferative diabetic retinopathy" that requires treatment to prevent blindness. In addition to these forms of retinal damage, small capillary blood vessels injured from diabetes may leak fluid. In the normal retina, these capillaries are water-tight, like garden hoses, and they exchange oxygen and nutrients without oozing any blood or plasma. The fluid that leaks from diabetic blood vessels can build up in the retina, causing it to swell and blur your vision. We call this "diabetic macular edema." Left untreated, diabetic macular edema can permanently damage the retinal nerve cells over time.

## **HOW CAN DIABETIC MACULAR EDEMA BE TREATED?**

To stop the leakage and reduce the swelling caused by diabetes (diabetic macular edema), gentle laser treatment can be used to cauterize the leaky vessels. Injectable steroids or other medications may also be helpful, either alone or in conjunction with laser surgery. Commonly, these treatments are repeated over time because the problem typically recurs. Therapy for diabetic retinopathy and macular edema is quite effective in preventing further vision loss, but only occasionally makes your vision better. Controlling your blood sugar with your primary medical provider is an important part of preventing further damage. As part of your eye evaluation, we may get a fluorescein angiogram or optical coherence tomography scan to help assess the level of damage and to guide treatment decisions.

## **ARE THERE WORSE RETINA PROBLEMS THAN DIABETIC MACULAR EDEMA AND NONPROLIFERATIVE DIABETIC RETINOPATHY THAT CAN OCCUR FROM DIABETES?**

As diabetic retinopathy worsens, abnormal blood vessels start to grow on the retinal surface. We call this "proliferative diabetic retinopathy." These new blood vessels are very fragile and can break, causing bleeding into the eye known as a "vitreous hemorrhage." Even worse, this problem can cause your retina to detach, a potentially blinding problem requiring surgery. In these cases, more aggressive laser treatment is applied to the retina to stop the vessel growth and prevent blindness. A common side effect is mild worsening of your night and reading vision, but in general this effect is minimal. In some cases of advanced diabetic retinopathy, normal blood vessels die off (called ischemia). The resulting nerve cell death from insufficient blood flow may permanently blur the vision.

## **WHAT CAN BE DONE FOR THESE MORE ADVANCED FORMS OF DIABETIC DAMAGE?**

For more severe forms of diabetic retinopathy, injected medicines and lasers done in the office may be insufficient to prevent further loss of vision. In very advanced disease, an operation may be needed to clear out the blood in the eye or repair a retinal detachment. This operation, called vitrectomy, involves using miniature surgical instruments to restore a more normal space inside the eye and helps to optimize the function of the retina.

## **WHAT IS NONPROLIFERATIVE DIABETIC RETINOPATHY?**

High blood sugar levels cause damage to the fine vessels that supply blood to the retina, the light-sensitive tissue inside your eyes. As this damage accumulates, your doctor can begin to see the earliest signs of diabetic changes in your retina - distortion of the vessels and tiny retinal hemorrhages. When the damage has not progressed to the point where new, abnormal blood vessels are growing to try to replace damaged ones, then we call the diabetic damage "nonproliferative diabetic retinopathy."

## **MY VISION SEEMS FINE. CAN I STILL HAVE DIABETIC RETINOPATHY?**

Yes. Often there are no visual symptoms in the early stages of nonproliferative diabetic retinopathy. The vision usually deteriorates as progressive damage occurs to the vessels in the central part of the retina, called the macula. Diabetic injury to the blood vessels in the macula can cause swelling (diabetic macular edema) or ischemia - nerve damage from lack of blood flow. It is important not to wait for symptoms to occur before having your eyes examined for diabetic damage. Treatments to preserve your vision from diabetic damage are much more successful if the disease is consistently monitored and treated in its earlier stages.

## **HOW IS THE DIAGNOSIS OF NONPROLIFERATIVE DIABETIC RETINOPATHY MADE?**

The first step is a careful eye exam where both pupils are dilated. To supplement the direct examination of your eye with lights and lenses, the circulation of the retina can be carefully assessed with a special test called a fluorescein angiogram. This is a photographic study of the back of the eye performed after an orange-colored dye is injected in a vein in the hand or arm. The dye circulates through the body into the eye to highlight abnormal vessels, or where treatment may be needed. In addition, the degree and extent of damage to the center of the retina, called the macula, can be evaluated by a painless retina imaging system called an optical coherence tomography scan (OCT).

## **HOW IS NONPROLIFERATIVE DIABETIC RETINOPATHY TREATED?**

Not all forms of nonproliferative diabetic retinopathy require treatment to the eyes, but all patients require continued care and blood sugar control through their primary care provider. If the diabetic damage includes a significant degree of swelling in the central portion of the retina, a condition called diabetic macular edema, laser treatment or medical therapy may be recommended for the eyes involved. Laser photocoagulation is one of the most common treatments for nonproliferative diabetic retinopathy with macular edema. In this kind of surgery, painless brief spots of bright light are used to treat the retina to reduce further loss of vision from diabetic macular edema. Laser surgery may need to be repeated several times. If the diabetic retinopathy progresses beyond the nonproliferative stage to the proliferative stage, a different type of laser therapy will be recommended. (See Proliferative Diabetic Retinopathy.)

## **WHAT IS PROLIFERATIVE DIABETIC RETINOPATHY?**

Proliferative diabetic retinopathy is an advanced form of diabetic eye damage and is caused by longstanding high blood sugars. The hallmark of this advanced form of diabetic retinopathy is the development of abnormal new retinal blood vessels, a process termed neovascularization. With diabetes, the smaller blood vessels tend to clot off over time, leading to the growth of new vessels that proliferate on the surface of the retina. Unfortunately, these new vessels are fragile and bleed easily. When we diagnose a patient with proliferative diabetic retinopathy, we are seeing these abnormally fragile vessels beginning to grow in irregular sheets across the back of the eye. These abnormal blood vessels often bleed and encourage the development of scar tissue.

## **HOW DO THESE ABNORMAL BLOOD VESSELS CAUSE EYE DAMAGE?**

Neovascular vessels, the abnormal blood vessels that grow in proliferative diabetic retinopathy, can bleed abruptly into the middle of the eye, causing a vitreous hemorrhage. Additionally, neovascularization produces scar tissue, which can pull the retina off the interior wall of the eye, creating a situation known as a tractional retinal detachment. New blood vessels may grow on the iris, or the colored part of the front of the eye leading to a painful and blinding rise in eye pressure known as neovascular glaucoma.

## **HOW IS THE DIAGNOSIS OF PROLIFERATIVE DIABETIC RETINOPATHY MADE?**

The first step is a careful eye exam where both pupils are dilated. If new blood vessel growth is suspected, you may need a special test called a fluorescein angiogram. This is a photographic study of the back of the eye performed after an orange-colored dye is injected in a vein in the hand or arm. The dye circulates through the body into the eye to highlight abnormal vessels, or where treatment is needed. If the eye is too filled with blood to examine, your doctor can perform a quick and painless evaluation of the eye's internal structure with sound waves. This kind of "sonar" for the eye is called an ocular ultrasound.

## **HOW IS PROLIFERATIVE DIABETIC RETINOPATHY TREATED?**

Laser photocoagulation is one of the most common treatments for diabetic retinopathy. In this kind of surgery, brief spots of bright light are scattered through the sides of the retina to reduce abnormal blood vessel growth and help seal the retina to the back of the eye. It is a proven way to prevent bleeding and retinal detachment. Laser surgery may need to be repeated several times. If you have very advanced proliferative diabetic retinopathy, a vitreous hemorrhage that will not clear on its own, or a retinal detachment, your doctor may recommend a surgery called a vitrectomy. During a vitrectomy, the surgeon removes the blood-filled vitreous and replaces it with clear salt water, clearing the way for additional laser treatment. A vitrectomy is performed in the hospital or outpatient surgery center with anesthesia. The surgeon will use a special microscope to look into your eye, and will perform the procedure using microsurgical instruments.