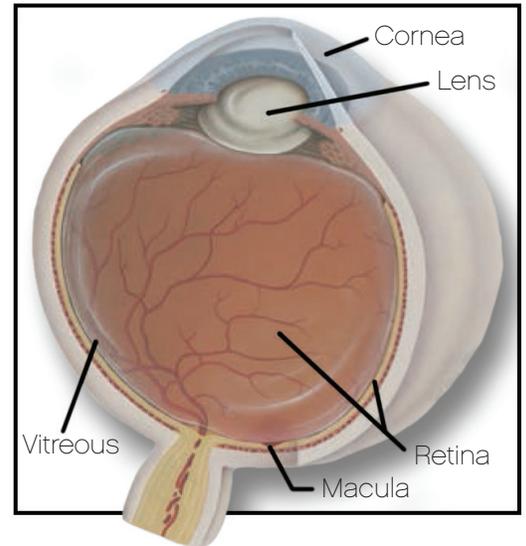


# DIABETIC RETINOPATHY

## What is the retina?

The eye works like a camera. The lens system in the front of the eye (cornea, pupil and lens) focuses light onto the back of the eye, the retina. The retina is the inner lining of the eye and works like the film in a camera; it senses light and allows you to see by transmitting this information to your brain where it is interpreted as images. Light hits the retina after passing through a space in the center of the eye called the vitreous cavity. This cavity is filled with a clear, jelly-like substance called vitreous. The macula is the central area of the retina and is the only area that can see fine details. Damage to the macula can severely affect your central vision and make it difficult to perform activities such as reading fine print, recognizing faces, and threading a needle.



## What is diabetic retinopathy?

Patients with diabetes mellitus (DM) can have abnormal blood sugar levels and this can affect the eye in many ways. In diabetic retinopathy (DR), the retinal blood vessels are damaged. Diabetic retinopathy can affect Type I (insulin dependent) and Type II (non-insulin dependent) diabetics.

There are three main ways that diabetic retinopathy causes vision loss; diabetic macular edema, proliferative diabetic retinopathy and poor perfusion of the retina due to lack of normal blood flow (ischemia).

## Diabetic Macular Edema (DME)

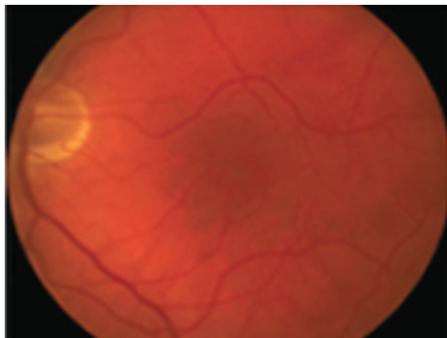
Non-proliferative diabetic retinopathy (NPDR) and background diabetic retinopathy (BDR) describe early stages of diabetic retinopathy. Blood vessel damage in diabetic retinopathy can lead to abnormal leakage of fluid and blood into the retina. This leakage can cause the retina to swell. If this swelling occurs in the macula it is called DME and vision can be affected. This is the most common cause of visual loss in patients with diabetes and ranges from mild to severe.

## Proliferative Diabetic Retinopathy (PDR)

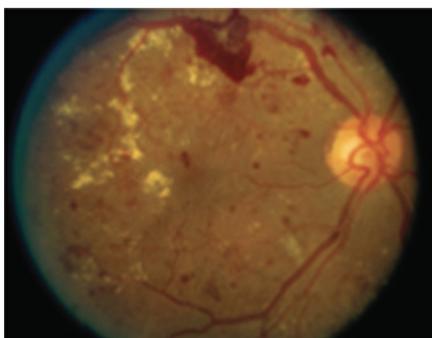
PDR occurs when abnormal blood vessels grow into and on top of the retina. These abnormal blood vessels are fragile and can bleed into the eye causing vitreous hemorrhage. This can cause dark floaters, and may cause immediate and severe loss of vision. Pulling and contraction of these abnormal vessels and their associated scar tissue on the retina can lead to tractional retinal detachment, where the retina is pulled away from the back of the eye leading to loss of vision.

## **Examination and Diagnostic Testing**

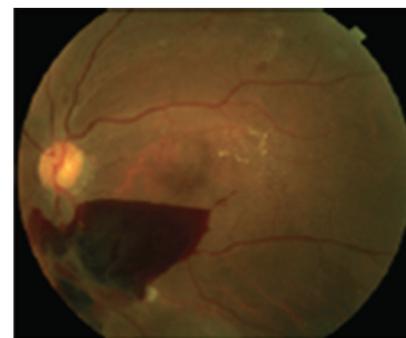
Diabetic retinopathy is diagnosed by your ophthalmologist during a dilated eye exam. Your doctor may obtain photographs of the retina and diagnostic tests including ocular coherence tomography and fluorescein angiography to help guide treatment.



**Normal macula**

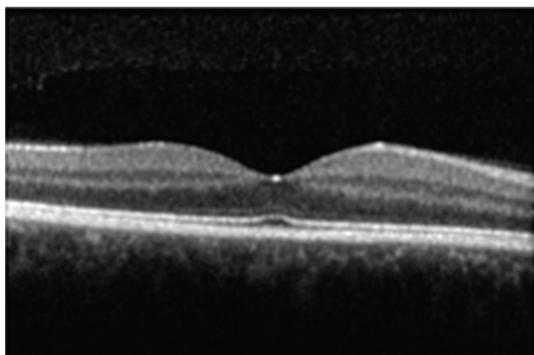


**Diabetic Macular Edema (DME)**

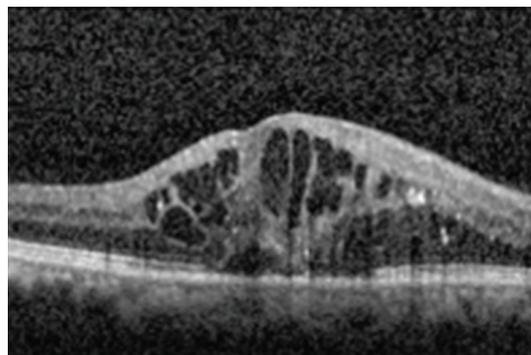


**Proliferative Diabetic Retinopathy (PDR)**

**Ocular Coherence Tomography (OCT):** Detailed images of the retina allow precise localization and qualification of DME and the response to treatments.



**Normal macula OCT**

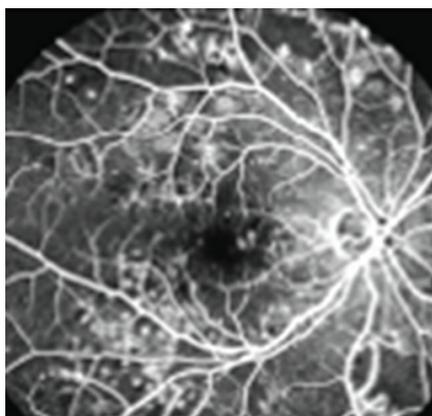


**OCT of severe DME with retinal thickening, cysts and subretinal fluid**

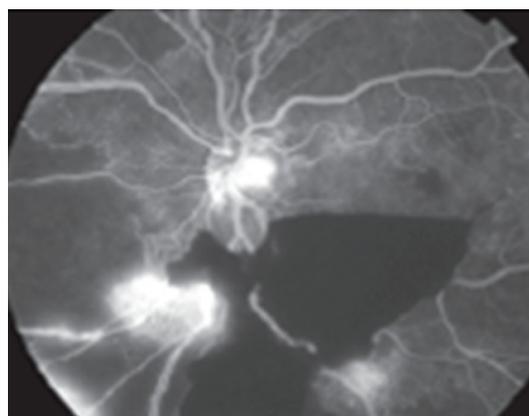
**Fundus Fluorescein Angiography (FA):** Fluorescent dye is injected into an arm vein and detailed images of retinal blood vessels and diabetic retinopathy changes are captured by a camera to facilitate diagnosis and treatment.



**Normal FA**



**DR with widespread blood vessel damage**



**PDR with leaking abnormal blood vessels and blood in front of retina**

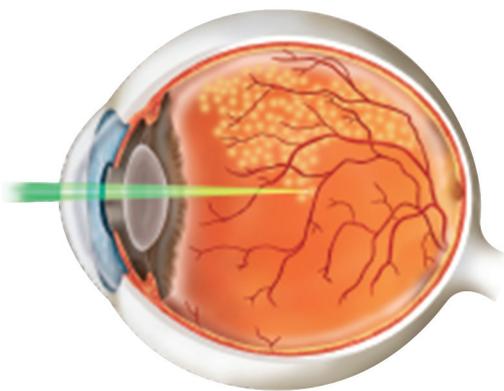
## What is the treatment for diabetic retinopathy?

**Prevention** is the best treatment. Optimal blood sugar, blood pressure, cholesterol and weight control can reduce the long-term risk of vision loss from diabetic retinopathy. Cooperation with your primary care physician is very important to help keep your diabetes and other cardiovascular risk factors under control. Because of the effects of diabetes can have on the eye, patients with diabetes should be seen by an eye doctor and obtain a dilated fundus exam at least once a year. Early detection of diabetic retinopathy allows the best chance of maintaining good vision. Once the diagnosis of diabetic retinopathy has been made, more frequent eye exams may be necessary. Checking your blood sugar at home, recording your blood sugars in a notebook, and showing these numbers to your primary care physician is critical to success in controlling your disease.

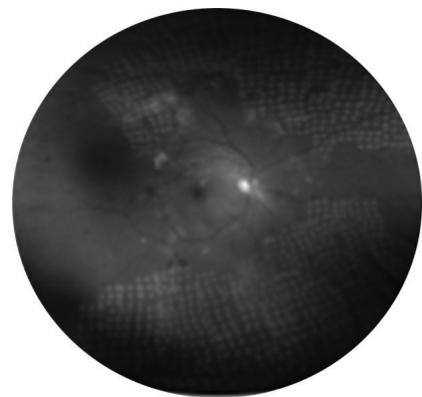
**Medical treatment** may involve the use of injections of medicine into your eye (intravitreal injections) to treat macular edema. Recent science has shown that DME and PDR are controlled by a signal sent from damaged retina called vascular endothelial growth factor (VEGF). Several VEGF blocking drugs (including Lucentis, Avastin and Eylea) and other medications (steroids and steroid implants) when injected into the eye can cause DME and PDR to regress. Most of these agents provide only temporary relief and need to be given repeatedly over a prolonged period of time.

**Laser treatment** may be recommended for people with DME, PDR or severe NPDR. The main goal of treatment is to prevent further loss of vision. The laser is applied to the damaged retina to decrease the leakage of fluid and blood into the retina and to shrink the abnormal blood vessels and prevent them from growing. For macular edema the laser is focused in the macula. For PDR the laser is focused on parts of the retina outside of the macula. Multiple laser treatments may be necessary. This is not a curative procedure and does not always prevent further loss of vision.

If you have any questions or concerns, it is important that you discuss them with your retina specialist.



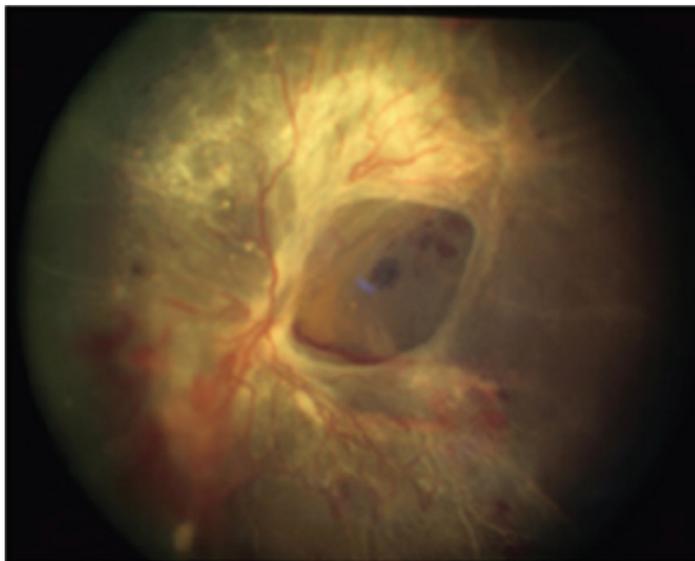
**Schematic of how retinal laser spots are applied**



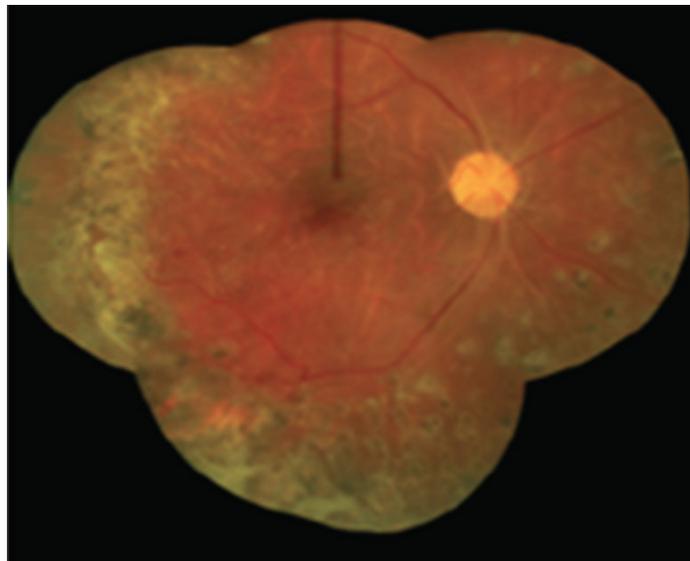
**PRP (Panretinal Photocoagulation) spots immediately following laser surgery for PDR**

## **Surgical Treatment**

Vitrectomy surgery in the operating room may be recommended if bleeding from diabetic retinopathy causes a vitreous hemorrhage and associated vision loss. Additionally, surgery may be needed to treat tractional retinal detachment in the setting of extensive blood vessel and scar tissue growth.



**Pre-operative photo of a patient with a severe tractional retinal detachment**



**Post-operative photo of a patient following successful vitrectomy surgery**

## **What can I expect before and during my vitrectomy?**

Vitrectomy surgery requires a team approach. Before surgery you will likely need to have a physical examination with your general doctor to identify and possibly treat any medical conditions. Your surgeon and anesthesiology team will decide whether local or general anesthesia is appropriate for you.

Most vitrectomy surgeries are performed as outpatient procedures with local anesthesia and the patient may go home the same day. The length of the operation varies from 20 minutes to several hours depending on your condition. Other procedures may be combined with your vitrectomy including peeling membranes or laser application depending on your condition.

Your surgeon will perform your vitrectomy using a microscope and fine instruments that are placed into your eye through small incisions in the sclera, the white part of your eye.