

Introduction

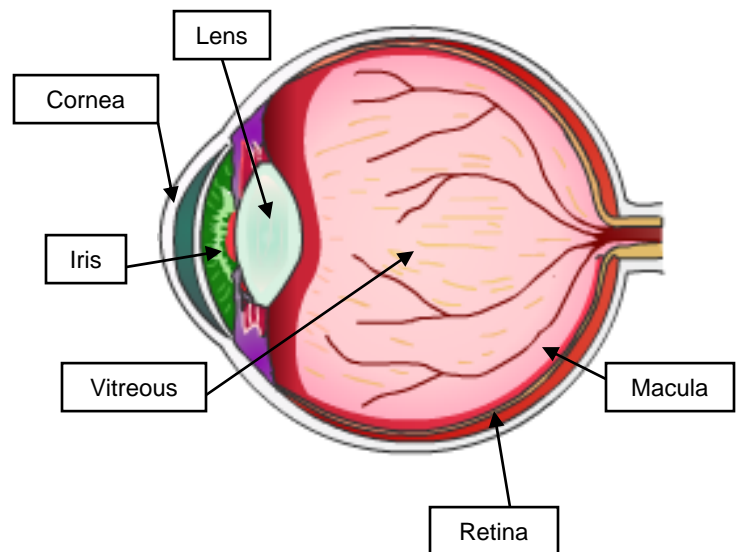
Patients with diabetes are more likely to have eye problems that can lead to blindness. Diabetic retinopathy is a disease of the eye's retina that is caused by diabetes. If discovered early, diabetic retinopathy can be treated easily. Your doctor may ask you to have a photographic screening for diabetic retinopathy. Photographic screening is a medical test that helps detect diabetic retinopathy.

This reference summary explains what diabetic retinopathy is and how it can be discovered early through photographic screening.

How the Eye Works

The following section describes how the eye works and diseases of the eye, such as diabetic retinopathy.

Light first hits the eye's cornea, which allows light to enter the eye through the iris. The iris controls the amount of light that enters the eye by changing the size of the pupil. As light passes through the pupil, it enters a clear lens similar to the lens of a camera, which focuses the light onto the back of the eye. The focused light passes through a clear gel called "vitreous" until it reaches the back of the eye.



The back of the eye is called the retina.

The retina changes light signals into electric signals that are sent to the brain through the optic nerve. The brain translates these signals into the images we see. The middle part of the retina is called the "macula" and is responsible for sharp, central vision.

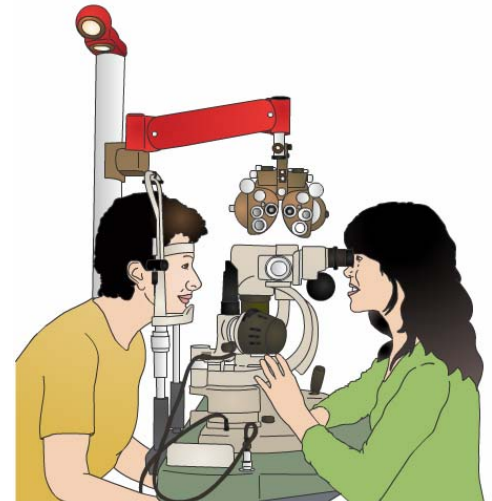
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The rest of the retina, known as the periphery, allows us to see things off to the side, above, and below us.

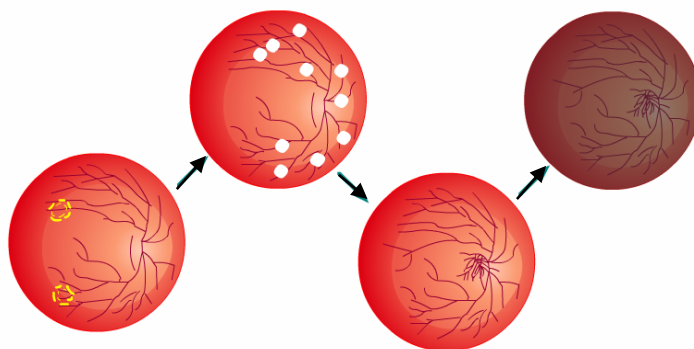
Like other parts of the body, the retina needs blood to function correctly. Blood flows to the retina through small blood vessels.

Diabetic Retinopathy

People with diabetes are more likely to develop eye problems than people without diabetes. Diabetes weakens the body's blood vessels. Since the blood vessels of the eyes are small, they can leak, burst, or become blocked when they are weak. The weakening of the eyes' blood vessels is called diabetic retinopathy. Retinopathy means disease of the retina. It is a serious eye condition caused by diabetes.



Weak blood vessels in the retina may leak, which sometimes causes the retina to swell. If swelling affects the center of the retina where vision is clearest, the condition is called diabetic macular edema. Severe diabetic macular edema can cause vision loss.



Proliferative Diabetic Retinopathy

If blood vessels in the retina become clogged, poor circulation or death of parts of the retina may occur. The retina responds to this by trying to grow new blood vessels. When new blood vessels sprout, it is called "proliferation" of the blood vessels. Abnormal blood vessel proliferations are not healthy and grow in the wrong places. Since these blood vessels are very weak, they can rupture

and bleed easily, causing hemorrhaging in the eye.

When new, abnormal blood vessels begin to grow inside the eye where they should not grow, it is called "proliferative diabetic retinopathy." Before this stage, the disease is called "non-proliferative diabetic retinopathy."

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Diabetic retinopathy begins as non-proliferative diabetic retinopathy. Non-proliferative diabetic retinopathy usually has no symptoms. However, when eye doctors look into the eyes of someone with non-proliferative retinopathy, they see certain signs.

Doctors may see hemorrhages in the retina:

- microaneurysms , or dilated blood vessels
- cotton wool spots, which are areas of poor circulation
- exudates, which are fatty deposits indicating poor circulation and leakage

These non-proliferative changes can range from very mild to severe.

When weak blood vessels of the retina rupture, the bleeding may only be in the retina or it may also be in the vitreous gel in front of the retina. Bleeding in the retina damages the retina and can also cause vision loss that prevents reading or driving. In some cases, vision loss can grow to the level of legal blindness.

Blood that leaks from the retina into the vitreous gel makes the gel cloudy and it's hard for light to reach the retina. This causes clouded and blurry vision. When new, weak blood vessels grow, they may also grow into the vitreous gel, which acts as a framework for the blood vessels to grow on.

Scar tissue often grows with new, weak blood vessels into the vitreous. The scar tissue can then shrink, causing the vitreous to pull on the retina. This pulling can make the retina detach leading to severe vision loss or even blindness. Even though most patients with diabetes eventually develop retinopathy, closely controlling diabetes, hypertension, and cholesterol slows down the development of retinopathy and makes it less severe.

Symptoms

People with mild diabetic retinopathy might not have any symptoms for years. On the other hand, people with severe diabetic retinopathy may start losing their vision or become blind.

Symptoms of diabetic retinopathy include:

- blurry vision
- missing areas of vision
- “floaters” in vision that look like cobwebs, strings, or clouds

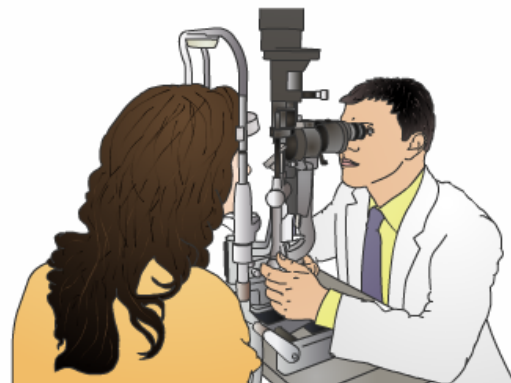


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Other eye conditions can cause the same symptoms as diabetic retinopathy. Only an eye exam will show what is causing these symptoms. Anyone with these symptoms should see an eye doctor as soon as possible, whether they have diabetes or not.

Diagnosis

There is no way for a person to check for retinopathy on his or her own. A doctor must examine the retina to look for signs of retinopathy. An eye exam allows the doctor to see if there are any areas where blood vessels have dilated, or become wider. These areas are called microaneurysms.



During an eye examination, the doctor can also check for fatty deposits, called exudates, or white patches, called cotton wool spots; both are signs of poor circulation. Exudates are also a sign of leaky blood vessels. Finally, the doctor can find out if new, abnormal blood vessels (proliferations) have sprouted or if there is any swelling that may be threatening central vision.

Patients with mild retinopathy may be told to return for an eye examination only once per year. Those with more severe retinopathy may need to be examined more often. Those with proliferative retinopathy or macular edema usually need treatment.

Treatment

Depending on how severe it is, doctors keep a better watch on early stages of diabetic retinopathy. Good control of diabetes and blood pressure is the best way to slow down the development of retinopathy. Some patients with milder stages of retinopathy may even improve the retinopathy by more closely managing their diabetes, blood pressure, or cholesterol.

For patients who have proliferative retinopathy, the doctor may recommend surgery to slow down its development and possibly prevent more bleeding. The surgery is called laser photocoagulation. Laser photocoagulation is an outpatient office procedure.

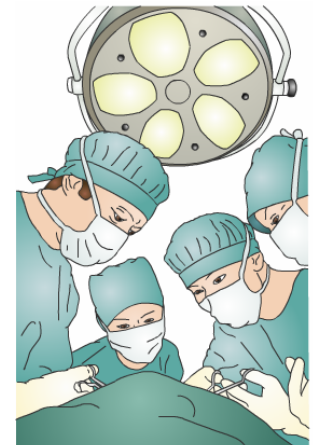
During laser photocoagulation, the eye doctor makes tiny burns on the retina with a special laser. These burns help to dry up the blood vessels and stop them from

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growing and leaking. The pattern and intensity of laser burns depend on the type and severity of the retinopathy.

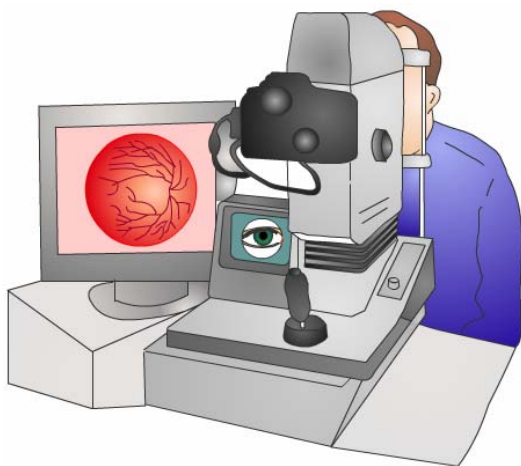
When a lot of blood has leaked into the vitreous, surgery to remove the vitreous is recommended. This surgery is called vitrectomy. When the retina has detached, vitrectomy surgery to reattach the retina may be recommended.

Vitrectomy surgery is more complex than laser surgery and must be done in an operating room under sterile conditions. The surgical options to treat severe diabetic retinopathy are more successful when diabetic retinopathy is diagnosed early.



Why Photographic Screening?

For those who do not have symptoms of diabetic retinopathy, it is now possible to be tested for it during a visit to a primary care doctor or endocrinologist. If diabetic retinopathy is detected, the patient is referred to an eye doctor for closer examination and treatment.



Photographic Screening

This screening test is called photographic screening. Recent advances in wide-angle cameras have made photographic screening possible. While the wide-angle cameras cannot photograph the entire retina, they can photograph the areas that are most likely to develop early signs of diabetic retinopathy.

To be a candidate for photographic screening, you need to

- have had normal results of your eye examinations in the past 2 years
- have no known eye problems,
- be able to see 20/20 in both eyes
- have no new eye symptoms
- have no family history of glaucoma

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The Photographic Screening Test

A nurse or technician who is trained to use the photographic screening equipment takes the photographs. First, your healthcare provider will ask if you want your eyes dilated with a mild dilating eye drop. Even though dilation of your pupils is not required for this test, dilation improves the quality of the photographs and makes it easier for your doctor to pick up very slight changes in your eyes.

If you drive yourself to your appointment or know that you need to drive or see to do a job or care for another person within 8 hours of your appointment, you should probably not have your eyes dilated.

The process of taking the photographs is not painful. You will be asked to place your chin on a chinrest and look at a target while a photo is taken. The flash you see is similar to the flash we use to take pictures at home. You may notice that you see a spot for a few minutes after the flash; it's only temporary and it will disappear. The light used is no brighter than one a photographer would use if you were having your picture taken.

If your eyes were dilated, you will need to wear sunglasses until the drops wear off. Someone at the doctor's office will offer you disposable sunglasses. Pupil dilation with the very weak drops used for this type of screening should be worn off in several hours.



Risks

A photographic screening test is very safe. The only risks associated with photographic screening are those that can occur if the eyes are dilated. Although dilation of the eyes improves the quality of the photographs and increases the likelihood of detecting retinopathy, dilation does pose risks in a very small number of people.

Very rarely, dilating drops bring out a hidden condition called narrow angle glaucoma. Glaucoma refers to a high pressure in the eye. Narrow Angle Glaucoma, or NAG, occurs in people who don't have enough space between the cornea and iris. The cornea is the clear part of the eye and the iris is the colored part of the eye. NAG usually remains hidden until something causes the



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space to close off further, leading to high pressure. Dilating eye drops and some oral or IV medications can bring out Narrow Angle Glaucoma.

If someone has a tendency to have narrow angle glaucoma, he or she is going to develop it eventually. The drops may just bring it out sooner than it would develop on its own.

Eye dilation may also make it difficult to drive and increase the risk of having a car accident. Therefore, if your eyes are dilated, it is your responsibility to take the necessary precautions and not drive until the dilation has worn off.

The symptoms of narrow angle glaucoma are eye pain, eye redness, blurred vision, tearing, or halos around lights. In some people, the eye pain causes nausea and vomiting. If you have signs of narrow angle glaucoma within 48 hours after your eyes are dilated, you should call your eye doctor immediately. Only an eye surgeon can diagnose and treat this condition.



If you go to a local emergency room, tell the emergency room doctor that you need to be examined by an eye doctor. Most emergency room doctors do not have the training or experience to diagnose glaucoma.

If you develop symptoms of eye pain, redness, and blurred vision and wait too long before you see a doctor, irreversible damage may be caused by high pressure. If NAG is detected and treated promptly, however, there are usually no permanent vision problems.

Results

After the photographs are taken, an eye doctor will read the photographs and report the results to your doctor. Your doctor will contact you regarding the results and recommended follow-up. Ask your doctor how long this process takes.

If you have signs of retinopathy, you may need to see an eye doctor for further evaluation. If you have no signs of retinopathy, your doctor will probably suggest that you have a photographic screening again in one year.

Photographic screening for diabetic retinopathy is not designed to detect other eye problems. However, sometimes eye problems other than diabetic retinopathy may be

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found. If this is the case, your doctor will let you know and ask you to see an eye doctor for a complete examination.

Sometimes other eye conditions, such as cataracts, prevent the technician or nurse from taking a good picture. In this case, you will also be referred to an eye doctor to determine the problem.

The photographic screening test can diagnose diabetic retinopathy where it mostly occurs, in the back 1/3 of the eye. If retinopathy is not diagnosed, it is your decision whether to have a full eye examination by an eye doctor to check for other eye diseases. A full eye exam could also check for retinopathy in other parts of the retina that weren't examined by a photographic screening.

Summary

Diabetic retinopathy is a serious disease that can cause blindness. The weakening of the eyes' blood vessels due to diabetes causes it.

The earlier retinopathy is detected, the lower the chances are that retinopathy will lead to major vision loss. Early detection makes it possible to diagnose retinopathy at early stages, when treatment is most effective.

Dilated eye examination by an eye doctor can diagnose diabetic retinopathy and is what the American Diabetes Association recommends for all patients with diabetes. However, for patients with normal vision, good diabetes control, and no known retinopathy or other eye diseases, a photographic test allows the healthcare provider to provide a more convenient method of screening for diabetic retinopathy.

The photographic screening test for diabetic retinopathy is a safe and painless test that can detect retinopathy in the majority of people who have it.

The best treatment for retinopathy is prevention. Good control of blood sugar levels, cholesterol levels, and blood pressure can help to prevent or delay retinopathy. Healthy eating and exercise are also good preventatives for retinopathy. Your healthcare provider can refer you to additional resources about diabetes and diabetic retinopathy.



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