

## What is glaucoma?

Glaucoma is a disease of the optic nerve — the part of the eye that carries the images we see to the brain. The optic nerve is made up of many nerve fibers, like an electric cable containing numerous wires. When damage to the optic nerve fibers occurs, blind spots develop. These blind spots usually go undetected until the optic nerve is significantly damaged. If the entire nerve is destroyed, blindness results.

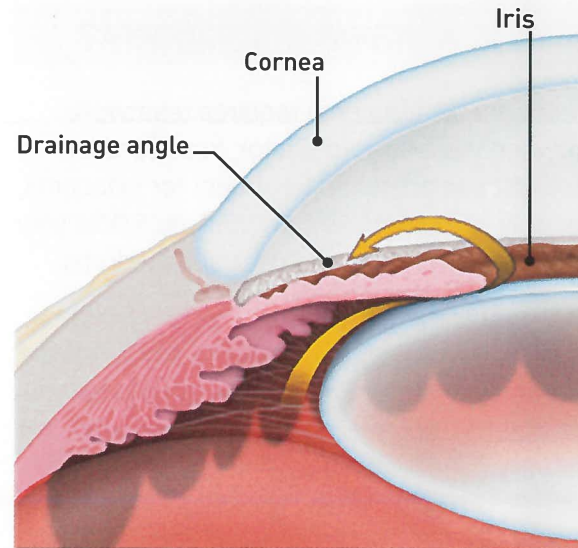
Early detection and treatment by your ophthalmologist (Eye M.D.) are the keys to preventing optic nerve damage and blindness from glaucoma.

Glaucoma is a leading cause of blindness in the United States, especially for older people. But loss of sight from glaucoma can often be prevented with early treatment.

## What causes glaucoma?

Clear liquid called **aqueous humor** circulates inside the front portion of the eye. To maintain a healthy level of pressure within the eye, a small amount of this fluid is produced constantly while an equal amount flows out of the eye through a microscopic drainage system. (This liquid is not part of the tears on the outer surface of the eye.)

Because the eye is a closed structure, if the drainage area for the aqueous humor — called the drainage angle — is blocked, the excess fluid cannot flow out of the eye. Fluid pressure within the eye increases, pushing against the optic nerve and causing damage.



**If the drainage angle is blocked, excess fluid cannot flow out of the eye, causing the fluid pressure to increase.**

## What are the different types of glaucoma?

**Primary open-angle glaucoma.** This is the most common form of glaucoma in the United States.

The risk of developing primary open-angle glaucoma increases with age. The drainage angle of the eye becomes less efficient over time, and pressure within the eye gradually increases, which can damage the optic nerve. In some patients, the optic nerve becomes sensitive even to normal eye pressure and is at risk for damage. Treatment is necessary to prevent further vision loss.

Typically, open-angle glaucoma has no symptoms in its early stages, and vision remains normal. As the optic nerve becomes more damaged, blank spots begin to appear in your field of vision. You typically won't notice these blank spots in your day-to-day activities until the optic nerve is significantly damaged and these spots become large. If all the optic nerve fibers die, blindness results.

**Closed-angle glaucoma.** Some eyes are formed with the iris (the colored part of the eye) too close to the drainage angle. In these eyes, which are often small and farsighted, the iris can be pushed forward, blocking the drainage channel completely. Since the fluid cannot exit the eye, pressure inside the eye builds rapidly and causes an acute closed-angle attack.

Symptoms may include:

- Blurred vision;
- Severe eye pain;
- Headache;
- Rainbow-colored halos around lights;
- Nausea and vomiting.

This is a true eye emergency. If you have any of these symptoms, call your ophthalmologist immediately. Unless this type of glaucoma is treated quickly, blindness can result.

Two-thirds of those with closed-angle glaucoma develop it slowly without any symptoms prior to an attack.

## Who is at risk for glaucoma?

Your ophthalmologist considers many kinds of information to determine your risk for developing the disease.

The most important risk factors include:

- Age;
- Elevated eye pressure;
- Family history of glaucoma;
- African or Hispanic ancestry;
- Farsightedness or nearsightedness;
- Past eye injuries;
- Thinner central corneal thickness;
- Systemic health problems, including diabetes, migraine headaches and poor circulation;
- Pre-existing thinning of the optic nerve.

Your ophthalmologist will weigh all of these factors before deciding whether you need treatment for glaucoma, or whether you should be monitored closely as a potential glaucoma patient. This means your risk of developing glaucoma is higher than normal, and you need to have regular examinations to detect the signs of damage to the optic nerve.

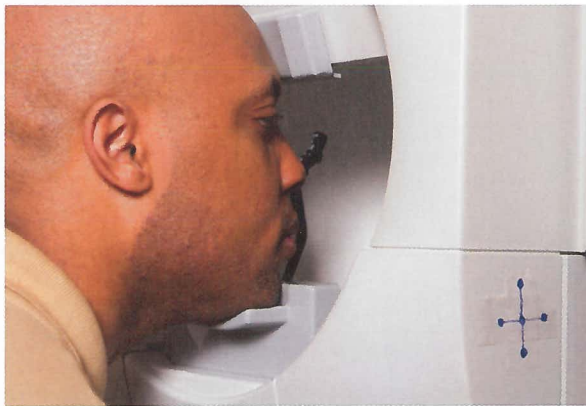
## How is glaucoma detected?

Regular eye examinations by your ophthalmologist are the best way to detect glaucoma. A glaucoma screening that checks only the pressure of the eye is not sufficient to determine if you have glaucoma. The only sure way to detect glaucoma is to have a complete eye examination.

During your glaucoma evaluation, your ophthalmologist will:

- Measure your intraocular pressure (**tonometry**);
- Inspect the drainage angle of your eye (**gonioscopy**);
- Evaluate whether or not there is any optic nerve damage (**ophthalmoscopy**);
- Test the peripheral vision of each eye (**visual field testing**, or **perimetry**).

Photography of the optic nerve or other computerized imaging may be recommended. Some of these tests may not be necessary for everyone. These tests may need to be repeated on a regular basis to monitor any changes in your condition.



Visual field testing is used to monitor peripheral, or side, vision.

## How is glaucoma treated?

As a rule, damage caused by glaucoma cannot be reversed. Lowering eye pressure is the only proven way to treat glaucoma. Eyedrops, laser

surgery and surgery in the operating room are used to lower eye pressure and help prevent further damage. In some cases, oral medications may also be prescribed.

With any type of glaucoma, periodic examinations are very important to prevent vision loss. Because glaucoma can progress without your knowledge, adjustments to your treatment may be necessary from time to time.

## Medications

Glaucoma is usually controlled with eyedrops taken daily. These medications lower eye pressure, either by decreasing the amount of aqueous fluid produced within the eye or by improving the flow through the drainage angle.

Never change or stop taking your medications without consulting your ophthalmologist. If you are about to run out of your medication, ask your ophthalmologist if you should have your prescription refilled.

Glaucoma medications can preserve your vision, but they may also produce side effects. You should notify your ophthalmologist if you think you may be experiencing side effects.

Some eyedrops may cause:

- A stinging or itching sensation;
- Red eyes or redness of the skin surrounding the eyes;
- Changes in pulse and heartbeat;
- Changes in energy level;

- Changes in breathing (especially with asthma or emphysema);
- Dry mouth;
- Eyelash growth;
- Blurred vision;
- Change in eye color.

All medications can have side effects or can interact with other medications. Therefore, it is important that you make a list of the medications you take regularly and share this list with each doctor you see.

## Laser surgery

Laser surgery treatments may be recommended for different types of glaucoma.

In open-angle glaucoma, the drain itself is treated. The laser is used to modify the drain (**trabeculoplasty**) to help control eye pressure.

In closed-angle glaucoma, the laser creates a hole in the iris (**iridotomy**) to improve the flow of aqueous fluid to the drain.

## Surgery in the operating room

When surgery in the operating room is needed to treat glaucoma, your ophthalmologist uses fine microsurgical instruments to create a new drainage channel for the aqueous fluid to leave the eye. Surgery is recommended if your ophthalmologist feels it is necessary to prevent further damage to the optic nerve. As with laser surgery, surgery in the operating room is typically an outpatient procedure.

## What is your part in treatment?

Treatment for glaucoma requires teamwork between you and your doctor. Your ophthalmologist can prescribe treatment for glaucoma, but only you can make sure that you follow your doctor's instructions and use your eyedrops.

Once you are taking medications for glaucoma, your ophthalmologist will want to see you frequently. Typically, you can expect to visit your ophthalmologist every three to six months. The frequency will vary depending on your treatment needs.

## Loss of vision can be prevented

Regular medical eye exams can help prevent unnecessary vision loss.

**People at any age with symptoms of or risk factors for glaucoma**, such as those with diabetes, a family history of glaucoma, or if you are of African descent, should see an ophthalmologist for an exam. Your ophthalmologist will let you know how often to return for follow-up exams.

**Adults with no symptoms of or risk factors for eye disease** should have a complete eye screening at age 40 — the time when early signs of disease and changes in vision may begin to happen. Based on the results of the initial screening, your ophthalmologist will let you know how often to return for follow-up exams.

**Adults 65 years or older** should have an eye exam every one to two years, or as recommended by your ophthalmologist.