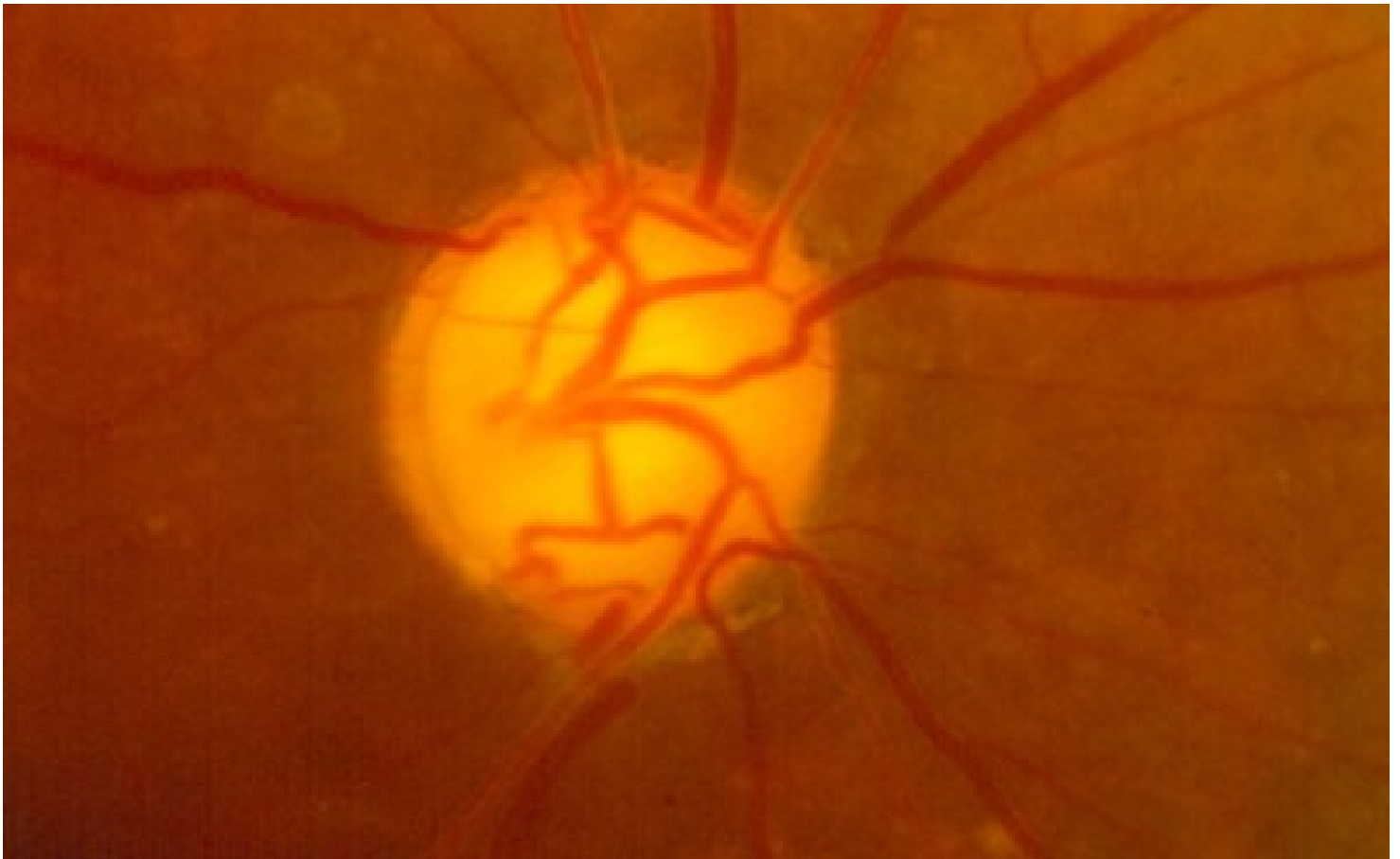


What is Glaucoma?

Informative Guide Into Understanding the Disease



**Eye Associates of Wilmington, P.A.
Glaucoma Service**

**Katherine I. Ochsner, M.D.
Jason L. Hendrix, O.D.**

**1729 New Hanover Medical Park Dr.
Wilmington, NC 28403**

Phone: (910) 763- 3601

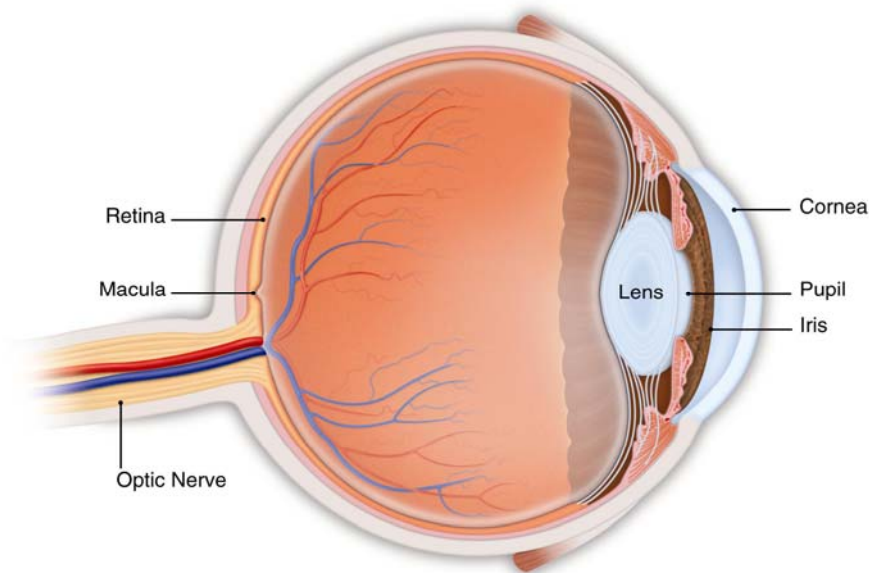
Fax : (910) 763- 4608

Website: www.wilmingtoneye.com

What is Glaucoma?

Glaucoma is a disease that can damage the eye's optic nerve and result in blindness. Worldwide, it is estimated that about 66.8 million people have visual impairment from glaucoma, with 6.7 million suffering from blindness. In the United States, approximately 3-6 million have glaucoma. Of these people in the United States, 13% of the people are above the age of 60 years old, and about 5,500 patients go blind from glaucoma each year. In a typical year, there are more than 300,000 new cases of glaucoma. Eye care professionals estimate that half of those affected may not know they have the disease because symptoms may occur during the early stages of the disease.

It is a complex eye disease where circulation of the fluid in the eye is disrupted. The clear fluid is called aqueous humor, which circulates inside the front portion of the eye. Aqueous humor is made by the ciliary body and then flows out through the pupil. It is then absorbed into the bloodstream through the eye's drainage system called the trabecular meshwork (a meshwork of drainage canals around the outer edge of the iris.) Proper drainage helps keep eye pressure at a normal level. The production, flow, and drainage of this fluid is an active, continuous process that is needed to maintain a healthy level of pressure within the eye. The inner pressure of the eye (intraocular pressure or IOP) depends on the amount of fluid in the eye. With glaucoma, the fluid does not flow through the trabecular meshwork properly. Over time, eye pressure increases, damaging the optic nerve fibers. (Refer to the picture below to orient yourself with the anatomy.)



In more simplistic terms, glaucoma is similar to the blockage of a sink in a kitchen leading to overflow of water. This blockage of the fluid stops the process of the re-absorption of the eye fluid leading to high pressure rise within the eye. This high pressure and other factors as already stated can ultimately lead to the damage of the optic nerve. The optic nerve connects the eye and the brain like a telephone cable. Once the optic nerve is damaged, permanent vision loss can occur.

Who is at risk for developing Glaucoma?

Anyone can get glaucoma, however some people are at higher risk:

- Everyone over the age of 60
- Blacks over the age of 40
- People with a family history of glaucoma
- People who are very nearsighted (myopic)
- People with diabetes
- People who use steroids for systemic conditions
- People with hypertension
- People who have experienced eye injury or eye surgery
- People who have thin corneas

Glaucoma is a leading cause of blindness among Blacks and Hispanics in the United States. Blacks experience glaucoma at a rate of three times that of whites and experience blindness four times more frequently. Between the ages of 45 and 64, glaucoma is fifteen times more likely to cause blindness in blacks than in whites.

What are the signs and symptoms of Glaucoma?

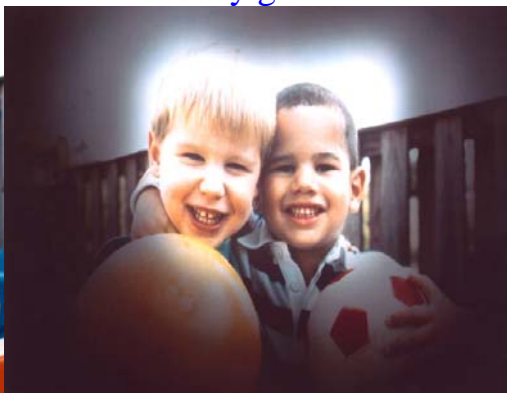
In the vast majority of cases, especially in the early stages, there are few signs or symptoms. Glaucoma usually occurs in both eyes, but extra fluid pressure often starts to build up in one eye first. At first, glaucoma has **NO** symptoms. Vision stays normal, and there is no pain. As glaucoma remains untreated, people may notice that although they see things clearly in front of them, they miss objects to the side and out of the corner of their eye.

Without treatment, people with glaucoma may find that they suddenly have no side vision. It may seem as though they are looking through a tunnel. Over time, the remaining forward vision may decrease until there is no vision left.

Normal vision



Vision as it might be affected by glaucoma



In later stages of the disease, symptoms can include:

- Slow loss of side or peripheral vision
- Hazy vision
- Eye and head pain
- Nausea or vomiting
- Sudden sight loss
- An inability to adjust the eye to darkened rooms
- Difficulty focusing on close work
- Rainbow-colored rings or halos around lights
- Frequent need to change eyeglass prescriptions

How is Glaucoma diagnosed?

Most people think that they have glaucoma if the pressure in their eye is increased. This is not always true. High pressure puts you at risk for glaucoma, however it may not mean that you have the disease. The old way of referring to glaucoma is that if your pressure was above the normal range of 12-21mm Hg then you might have glaucoma. New research has been shown that this is not always the case. Whether or not you develop glaucoma depends on the level of pressure that your optic nerve can tolerate without being damaged. That could mean that a person with a pressure of 12 could have glaucoma, therefore the level of pressure varies from person to person.

Glaucoma is like pieces of a puzzle that are put together and then analyzed. That is why an eye examination is very important. To detect glaucoma the following tests (pieces of the puzzle) are performed:

Visual acuity: This is performed to test how well you see at various distances.

Tonometry: This standard test determines the fluid pressure inside the eye. During this test, eye drops are used to numb the eye. Again remember from above the normal range is 12-21 mmHg. However, it is important to remember that eye pressure can vary hourly, daily, and weekly. Many factors can affect the up and down changes in a person's intraocular pressure. These daily changes are normal and should not affect your glaucoma on a long-term basis.



Pachymetry: Measures the thickness of the cornea. This measurement can vary from patient to patient. A probe is gently placed on the front of the cornea to measure its thickness. If a cornea is thicker than average, pressure readings with tonometry may be higher.

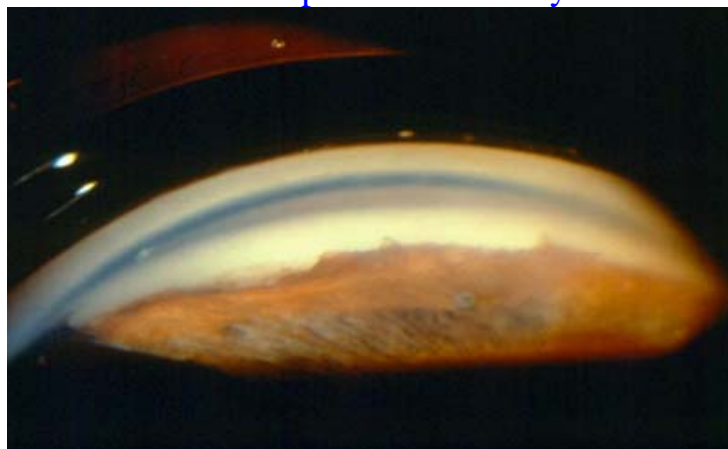
Visual Field: Produces a map of your complete field of vision. Measures your side vision (peripheral vision) to determine whether your vision has been affected by glaucoma. During this test, you will be instructed to look straight ahead at a central target and signal with a clicker when you see a flashing light off to the side. The goal is to press the clicker no matter how bright or dim the light. Try to relax and respond as accurately as possible during the test. Don't worry if you feel like you missed some of the lights, the computer will go back and retest those areas. Sometimes, the visual field will need to be repeated to see if the results are the same. After glaucoma has been diagnosed, visual field testing is usually done one to two times a year to check for any changes in your vision.

Visual Field Machine



Gonioscopy: Determines whether or not the angle where the iris meets the cornea (drainage system) is open and wide or narrow and closed. To perform, drops are used to numb the eye. A hand-held contact lens is then gently placed on the eye. The lens then allows the doctor to view the drainage system to determine if it is open or closed.

Gonioscopic view of the eye



HRT: Stands for Heidelberg Retina Tomograph, which is a scanning laser that produces a computer generated analyzation of the nerve fiber layer. This is accomplished by taking a picture of your optic nerve to obtain a three-dimensional high resolution image. The computer then compares you to other people of the same sex, age and race.

Dilation: This allows for a better view of the optic nerve to check for signs of glaucoma damage by looking at the shape and color. A nerve that is cupped or not a healthy pink color is cause of concern. Eye drops are used to dilate (widen) the pupil. After the examination, your close-up vision may remain blurry for several hours.

Normal Optic Nerve



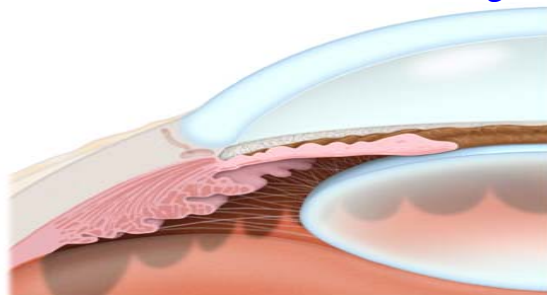
Are there different types of Glaucoma?

There are several types of glaucoma. The two main types are open angle and angle closure.

Open angle glaucoma

The most common form of glaucoma, affects about 3 million people in the United States. Half of whom do not know they have the disease. “Open-angle” means that the angle where the iris meets the cornea is wide and open. The trabecular meshwork (drainage system) becomes less efficient at draining aqueous humor. The drainage canals become clogged over time causing the eye pressure to build up, which leads to damage of the optic nerve.

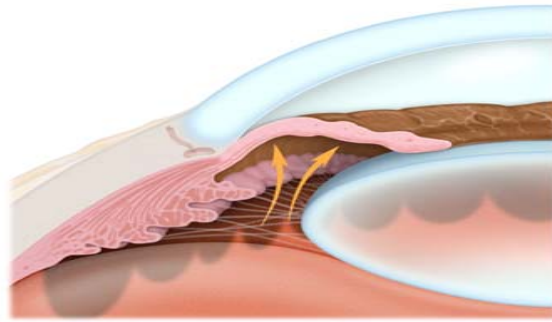
Picture showing Open Angle, where fluid can reach the Drainage System



Angle Closure Glaucoma

This type is less common and is very different from open angle glaucoma. This type of glaucoma is a much more urgent form. Angle closure means that the angle between the iris and cornea are closed. The drainage angle of the trabecular meshwork becomes blocked by the iris. Therefore, the fluid can not drain from the eye causing the pressure to rise very fast. Symptoms include severe eye or brow pain, redness of the eye or decreased or blurred vision. Angle Closure must be treated as a medical emergency.

Picture showing Close Angle, see how iris blocks the drainage system



How is Glaucoma Treated?

Treatment of glaucoma depends on the specific type, severity and how the glaucoma is responding to treatment. It is important to remember that you will **NEVER** be cured of glaucoma. The goal of treatment is to control it. We will now discuss the various treatments that are available.

Medications:

Glaucoma medications are used to treat elevated pressure inside the eye and can be effective in delaying the onset of glaucoma. Research has shown using medication can reduce by more than 50% the chance of open angle glaucoma from developing or worsening. Therefore, that is why medication is the most common early treatment for glaucoma. They come in form of eye drops and pills, and work by either causing the fluid to drain better or decrease the amount of fluid made by the eye.

Glaucoma medications are prescribed to be used at various times during the day depending on the type. Although most people have no problems, some medicines can cause side effects. Some of these side effects include: headache, stinging, burning and redness in the eye. It is extremely important to tell us if you are experiencing any side effects from the medications, so that we can make appropriate changes. It is also very important to take your medications as instructed to keep your eye pressure under constant control to prevent your glaucoma from becoming worse.

Changing your medication does not mean that your glaucoma is getting worse. In fact, it is normal for your medication to change. As your body begins to develop a tolerance for your

medication, it will slowly lose its effectiveness and may need to be replaced by a different medication or another medication may need to be added.

Take home message concerning medications: Be compliant with your medication. That means follow the prescribed medication schedule that is given. Compliance is extremely important to keeping your glaucoma under control and preventing vision loss. If you do not take your medication properly, or at all, it is likely that your glaucoma will become worse. It is up to you to maintain your eye health, because your medications only work as long as they are taken in the prescribed method. Missing a dose here or there is dangerous. The pressure in your eye could build up enough to damage your optic nerve. That is why it is extremely important that you follow your medication schedule closely.

Tips: 1) Make a schedule with the name and number of times you should take your medication each day. 2) Post the schedule in a place where you can see it on a daily basis. 3) If you forget to use your eye drops, put them in as soon as you remember instead of waiting until the next scheduled time. 4) ALWAYS ask us if you have any questions about your medications.



Laser Surgery:

This is the main treatment method for angle closure glaucoma, because it may be the only way that the blocked or incorrectly formed drainage canals can be opened. In cases of open angle glaucoma this may be considered when the maximum amount of medicines are not controlling your eye pressure or when you cannot tolerate the side effects of medications. In many cases, you will need to keep taking glaucoma medications even after laser surgery. Refer to the individual handouts for more information concerning the different types of laser surgery. A brief description follows below on the different laser procedures.

Laser Peripheral Iridotomy (LPI): Used for acute angle closure glaucoma to make an opening in the iris to help the fluid drain from the eye.

Argon Laser Trabeculoplasty (ALT): Used for open angle glaucoma. Laser beam is aimed at the opening of the fluid channel, helping the drainage system work.

Selective Laser Trabeculoplasty (SLT): Newest type of laser surgery that was approved by the FDA in March 2001. Treats specific cells and leaves the mesh-like drainage canals surrounding

the iris intact. It can be repeated many times and offers an alternative for those who have been treated unsuccessfully with traditional ALT or with pressure-lowering medications.

Conventional Surgery:

The purpose of surgery is to make a new opening for the fluid to leave the eye. Although surgery may be done at any time, it is often done after medicine and laser surgery has failed to control your pressure. In some patients, surgery is about 80 to 90 % effective at lowering your pressure. However, if the new drainage opening closes, a second operation may be needed. Keep in mind that while glaucoma surgery may save remaining vision, it does not improve sight. In fact, there is always a chance with any surgery that your vision may not be as good as it was before surgery. Refer to inset for more information on Trabeculectomy.

What to expect from your visits with our clinic?

As a newly diagnosed person with glaucoma, you may require several visits at first to have your pressure checked every week or month until it is under control. After your pressure reaches a stable level, your visits will be decreased. The visits will then typically be spread out into intervals of either 3 months, 4 months or 6 months as long as you remain stable. These visits will be done either with us or your referring eye doctor. It requires a team effort between us, the referring doctor and you. We, along with your referring doctor are here to listen and respond to your concerns and questions.

References:

1. American Academy of Ophthalmology
2. Glaucoma Foundation,
<http://www.glaucomafoundation.org>
3. Glaucoma Research Foundation,
<http://www.glaucoma.org>
4. Glaucoma Surgery by John Thomas, M.D., Chief Editor, Mosby-Year Book, Inc. 1992
5. National Eye Institute, National Institutes of Health
NIH Publication No. 96-651, <http://www.eyesearch.com/glaucoma.htm>
6. National Glaucoma Research, American Health Assistance Foundation
<http://www.ahaf.org>