

TYSON EYE

GLAUCOMA *Causes and Treatments*

Naples • Bonita • Estero • E. Fort Myers • Cape Coral • N. Fort Myers

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Glaucoma Causes

Glaucoma is a disease of the optic nerve, which carries vision from the eye to the brain. Glaucoma causes damage to the optic nerve, ultimately leading to vision loss. Most people do not know they have glaucoma until it is found on a routine exam. Unfortunately, damage caused by glaucoma is permanent and vision lost to glaucoma cannot be restored. It is therefore very important to have regular eye exams to screen for glaucoma and diagnose it as early as possible.

Glaucoma is related to the pressure inside of the eye. It was once thought that high intraocular pressure (IOP) was the only cause, but now we know that there are many people who get glaucoma who never have elevated pressure.

As you read through this booklet, it is important for you to understand that although there is no cure for glaucoma, it is manageable. Until a cure is found, our doctors will use the latest technology for managing this disease, and offer you the most innovative treatment options available to stop its progression.

How Does Glaucoma Damage Sight?

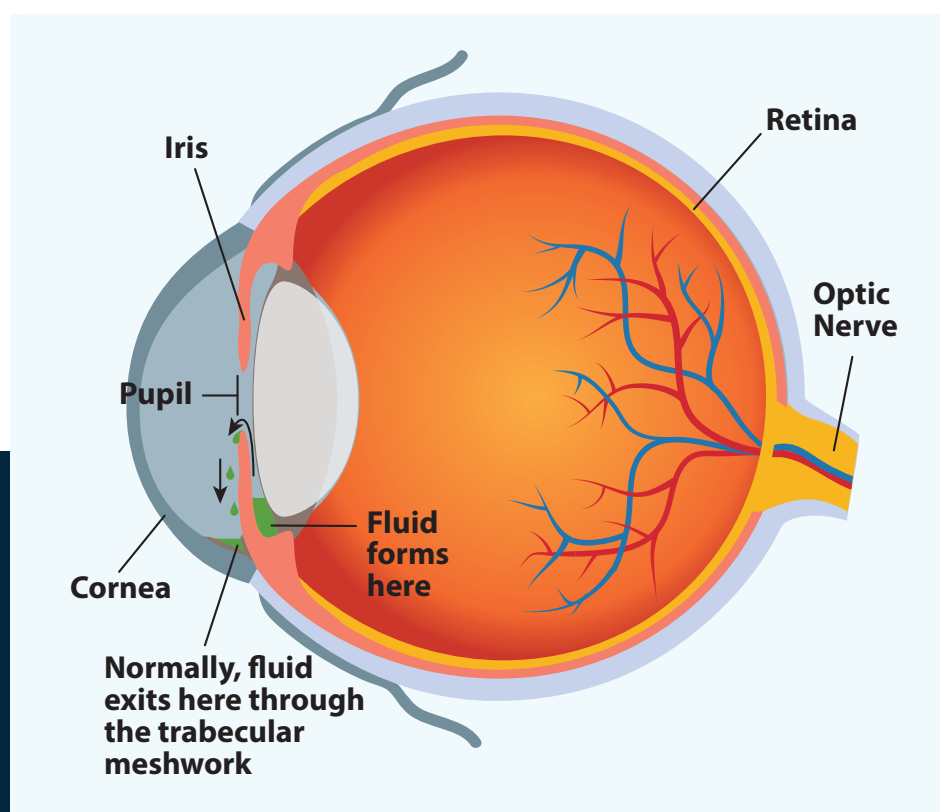
Intraocular Pressure - a Primary Cause of Glaucoma

Your eyes continuously produce a clear fluid called aqueous humor. It is produced by the ciliary body, located behind your iris, the colored part of your eyes. The aqueous humor fills the space between the cornea and the iris, also referred to as the anterior chamber of the eye. This fluid nourishes the cornea, the iris and the lens, and gives the front of the eye its form and shape.

The pressure in the eye is maintained at normal levels when the fluid produced by the eye is allowed to flow out. When the drainage of the eye does not function correctly, the intraocular pressure increases, causing damage to the optic nerve and leading to vision loss.

Elevated Intraocular Pressure Causes Optic Nerve Damage

As glaucoma damages the optic nerve, vision loss will usually involve your peripheral vision first (what you see around you while looking straight ahead), not your central vision. Loss of vision from glaucoma is usually a gradual process that most patients do not notice initially. Once vision is lost, it cannot be restored and can lead to permanent blindness if left untreated.



Every year, more than 100,000 Americans develop Glaucoma.

Who is at Risk for Glaucoma

Glaucoma may affect anyone, but there are several risk factors which make you more susceptible, including:

- You have consistently elevated intraocular pressures
- You are an adult over the age of 60
- You are of African-American descent
- You have a family history of glaucoma
- You have low systemic blood pressure (hypotension)
- You have diabetes
- You are very nearsighted (myopic)
- You have experienced trauma to the eye(s)
- You suffer from unexplained headaches and eye pain
- You suffer from ocular migraines

How is Glaucoma Diagnosed?

The early detection of glaucoma is key to controlling its progression and preventing further damage.

Comprehensive eye examinations include measuring intraocular pressure, examination of the optic nerve. If your eyes are suspicious for glaucoma, you may need additional tests to determine if you have glaucoma and the extent to which glaucoma is affecting your vision.

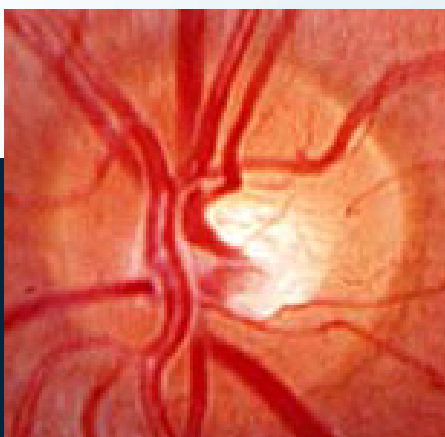
Monitoring Glaucoma: the key to preventing further vision loss

Careful monitoring of glaucoma is a significant step in preventing vision loss. Subtle changes may not be noticeable to you and must be detected to prevent vision loss. As a Tyson Eye patient, you will be asked to fol-

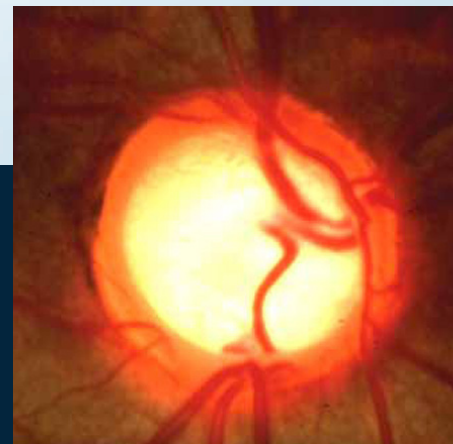
low up at regular intervals depending on your stage of glaucoma. At these visits, different diagnostic tests will be performed and compared to the results in the past.

What you can do to protect your sight from glaucoma:

- Get your eyes examined annually to screen for glaucoma if your eyes are otherwise healthy.
- Follow up for your appointments as recommended by your doctor
- Use your medications as directed
- Stay informed and learn as much as you can about glaucoma.



Normal optic disk



Glaucomatous optic disk
with cupping

Glaucoma Treatments

Glaucoma is treated with medications, laser treatments, or traditional surgery. Below are some exciting advances in the treatment of glaucoma.

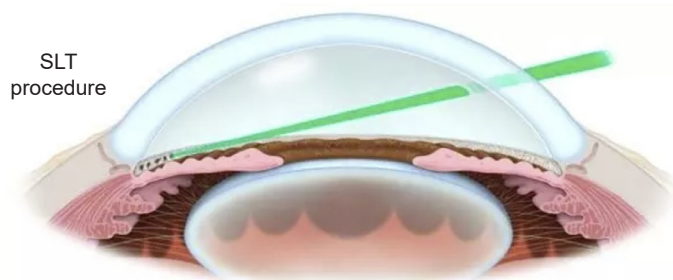
Laser Treatments

Selective Laser Trabeculoplasty (SLT)

SLT is a glaucoma laser treatment done in the office to lower intraocular pressure. This laser works on the trabecular meshwork to improve drainage of fluid. It selects only certain cells to minimize damage to surrounding tissue and can be repeated several times if needed. It is appropriate for patients who have or have not had their cataracts removed.

SLT has been FDA approved for over 20 years and has become the primary treatment of glaucoma for many doctors. Recent studies have shown better intraocular pressure control, slower progression of glaucoma, and fewer glaucoma surgeries in patients receiving SLT compared to medications.

SLT is performed in the office and takes 1-3 minutes to perform. Patients may experience mild soreness for the first few hours after the procedure but are able to return to their daily activities immediately as tolerated.

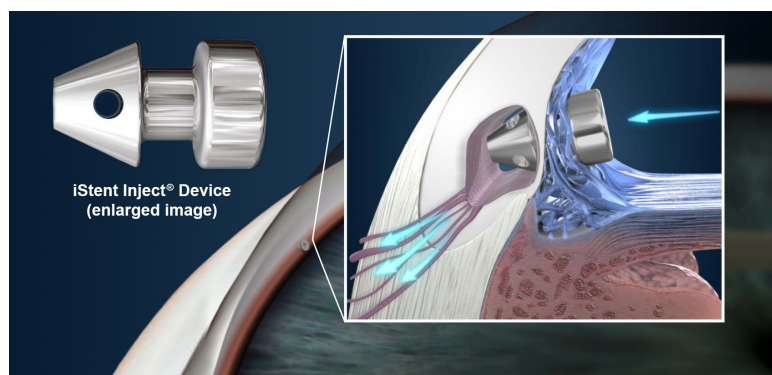


Laser Peripheral Iridotomy (LPI)

This type of laser surgery is used to treat narrow angle glaucoma. This laser treatment involves making a tiny hole in the iris to allow improved flow of fluid to the drainage system of the eye.

iStent® Inject®

iStent Inject® uses two small microstents to bypass your eye's natural drainage and create a lasting outflow pathway. It is implanted during cataract surgery, and does not damage other parts of the eye compared to traditional glaucoma surgeries. It does not limit treatment options that could be helpful to manage your glaucoma in the future.

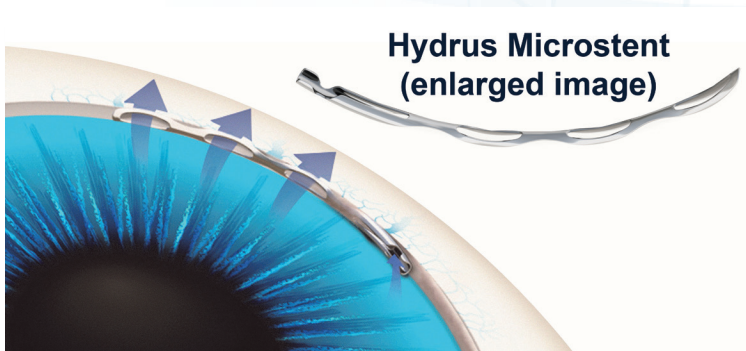


iStent Inject® is the smallest medical device approved by the FDA. It is not seen or felt by you and will not interfere with other medical tests such as MRI scans.

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Hydrus® Microstent

The Hydrus® Microstent is an additional type of glaucoma stent implanted during cataract surgery. The stent is made of nickel-titanium alloy (nitinol) and spans 90 degrees of the eye's natural drainage canal. The Hydrus® Microstent is approximately the size of an eyelash – small enough that it is typically never felt or seen by patients. Its design allows for continued dilation of and maximum fluid flow through Schlemm's canal to reduce intraocular pressure and medication use in patients with glaucoma.



Goniotomy

Goniotomy is a surgical procedure in which the doctor creates an opening in the trabecular meshwork, which covers the area where fluid leaves the eye. It may be done with cataract surgery or as a standalone procedure in people before or after cataract surgery. It is also applicable for patients who have had prior glaucoma surgery or have severe disease.

Endoscopic CycloPhotocoagulation (ECP)

Endoscopic CycloPhotocoagulation, or ECP is a surgical procedure in which a camera is inserted into the eye to view the ciliary body. The ciliary body is responsible for producing fluid inside of the eye. ECP is then used to apply heat energy to the ciliary body to decrease its production of fluid. It is often combined with often performed on patients at the time of cataract surgery or afterward. It can also be performed on those patients who had SLT or ALT laser procedures, glaucoma filtration surgery or other surgical procedures that were not successful at controlling intraocular pressure.

Tyson Eye was one of the first Eye Centers in the country where surgeons were trained in Endoscopic CycloPhotocoagulation (ECP).

OMNI

The OMNI® Surgical System is indicated for canaloplasty (microcatheterization and transluminal viscodilation of Schlemm's canal) followed by trabeculotomy (cutting of trabecular meshwork) to reduce intraocular pressure in adult patients with primary open-angle glaucoma.

It may be done with cataract surgery in patients with severe glaucoma or those on multiple medications, or as a standalone procedure to help lower eye pressure or decrease medications needed to control the pressure.



- **Glaucoma was recognized as early as 400 B.C.**
- **In the 1800's, glaucoma was cited as a distinct eye disorder.**

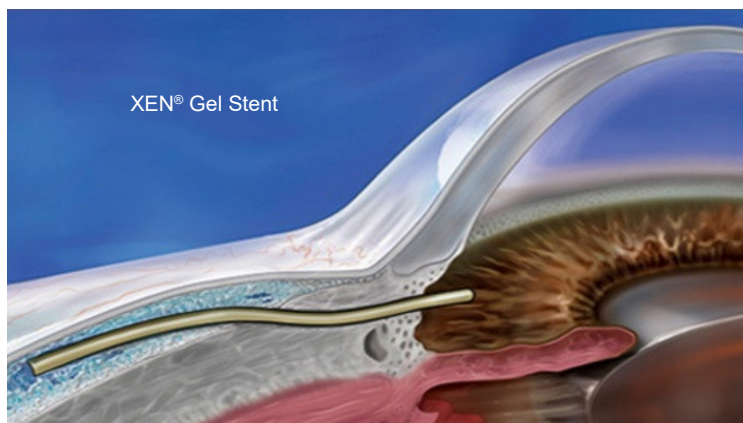
Glaucoma Treatments

Xen® Gel Stent

The XEN® Gel Stent is a surgical implant designed to lower eye pressure glaucoma patients where previous surgical treatment has failed and/or medications alone were insufficient (also known as refractory glaucoma)

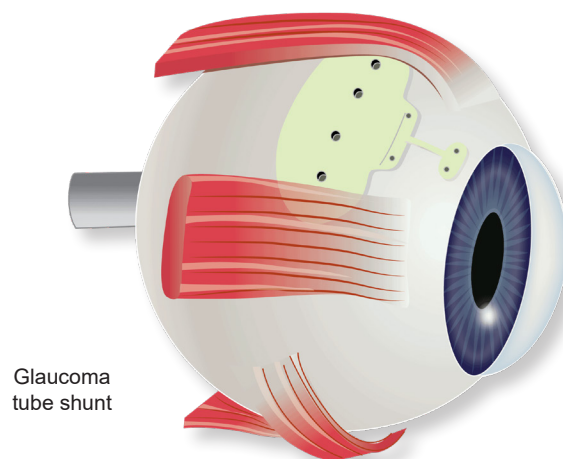
The XEN® Gel Stent is implanted just under the conjunctiva and drains fluid from inside the eye. It creates a small channel in the eye to drain fluid and help lower eye pressure.

The XEN® Gel Stent is designed to stay in the eye permanently. You may or may not need to use glaucoma eye drops after the procedure. The doctor will determine your need for eye drops after the procedure.



Trabeculectomy and Tube Shunts

During a trabeculectomy or tube shunt procedure, your surgeon creates a passageway that drains fluid from inside your eye to behind it. Generally, these surgeries are only an option once all others have been exhausted and have failed to stop the increase in intraocular pressure.



Durysta

Durysta is a tiny, dissolvable implant your doctor places into the eye. It is the first FDA approved dissolvable ocular implant to reduce eye pressure in patients with glaucoma. Your doctor may recommend this as an option if you would like to decrease the number of medications you take or your intraocular pressure is uncontrolled on your current medication regimen.

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Glaucoma Medications

Eye drops can be used to keep your eye at a healthy eye pressure and are an important part of the treatment routine for most people with glaucoma. A variety of glaucoma eye drops are now available by prescription that work by increasing the drainage of fluid from the eye or decreasing its production. Sometimes a combination of eye drops is prescribed to obtain the best results.

Medication Instructions

We are dedicated to providing our patients the best care possible; however, managing glaucoma is a partnership between you and our practice. It is critical that you take your medication(s) as directed and commit to keeping your follow-up appointments.

We have provided instructions and demonstrated how to properly use your eye drops. These medication instructions supply further clarification and tips on how to remember to take your medication.

During your visits to our office please bring your medication(s) so you can verify you are taking the correct medicine at the correct times. We also encourage you to write down any questions you have so they can be discussed.

Be consistent with your medication

- Try to take your eye drops at the same time every day (or as recommended by your doctor). However, if you are late, go ahead and take them.
- Associate taking your eye drops with other daily routines you have established for yourself, such as brushing your teeth or before going to bed.

- Keep your eye drops in the same place in your home so you don't misplace the bottle.
- Ask a friend or family member to remind you to take your drops. Each day, they can ask, "Did you remember your eye drops today?"

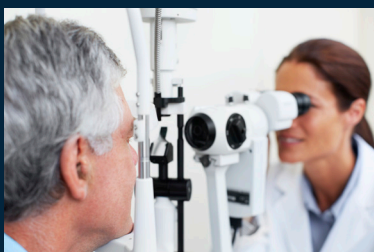
Possible Side Effects From Eye Drop Medication

Most medications have some side effects. As a patient, it is in your best interest to carefully observe any side effects that you may be experiencing from your medications, and report them to your doctor. If the side effects are causing problems that are not acceptable or tolerable to you, a different medication may be prescribed.

If your medication is not effective in lowering your intraocular pressure, it is important for the doctor to know whether:

- It is because you are not using the medication as it was prescribed, or
- The medication simply is not working for you, even though you are taking it as prescribed.

It is very important for you to be quite clear with your doctor and let him or her know if you have not been using your medication as prescribed because of undesirable side effects, lifestyle issues, financial issues, forgetfulness or other issues that prevent you from following your treatment plan.



Early detection of glaucoma is the key to minimizing its devastating effects. Comprehensive annual eye examinations that include your pupils being dilated are critical to ensure early detection.

Glaucoma Medications

There is a RIGHT WAY to put in eye drops

The most common cause of eye drops not working is missing the eye and getting the drops on the eye lid or face. It is important to apply your eye drops correctly, otherwise you may put in too much or too little (or even none at all.) If you put too many drops into the eye you will increase the side effects of the medication, but if you are applying too little your eye pressure and glaucoma may not be effectively controlled.

Most patients put in their own eye drops, although some prefer to have help. If you want to put in the drops yourself, follow the steps below:

- First, always wash your hands thoroughly with soap and water. You can put in the drops in any position you find comfortable—standing, sitting or lying down. Lying down usually is the easiest.
- Hold the bottle directly over the eye. Gently pull down your lower lid with your index finger to form a “pocket.” Then squeeze the bottle until a drop falls into the eye. (Note: If you are using Xalatan, do not squeeze the bottle.) Place only one drop at a time in the eye.
- Close your eye gently. Do not blink rapidly since this will “pump” most of the drop out of your eye before it has had a chance to be absorbed. Don’t squeeze your lids as they will squeeze the drop out.
- Repeat the previous steps in the other eye. In order to maximize the effectiveness of the eye

drop, keep your eye gently closed for about three minutes after the drops are put in your eyes.

- If you need to apply two different drops, wait at least five minutes after putting in the first one to make sure that the medication has been absorbed into the eye.



Make Sure You DO NOT Run Out of Medication

Keep a log of how long the eye drops last so you can make sure to get a refill before running out. If you put more than one drop in they won’t last as long. Once you know how long your medication should last, mark your calendar to refill your prescription one week before you expect to run out. If you use a mail order prescription refill system, reorder when opening your last bottle as it may take several weeks for delivery.

EXAMPLE

If you use drops in both eyes once a day:

- a 2.5 ml bottle should last about a month.
- a 5.0 ml bottle should last approximately 60 days
- a 7.5 ml bottle may last 90 days.

Your medication IS that important!

Glaucoma, sometimes referred to as the “silent thief of sight,” typically causes no pain and produces no symptoms. For this reason, people may become careless about strict use of the eye drops that can control eye pressure and help prevent permanent eye damage. Left untreated, glaucoma often progresses until the optic nerve is irreversibly damaged with varying degrees of permanent vision loss. Non-compliance with a program of prescribed glaucoma medication is a major reason for blindness resulting from glaucoma.

Glaucoma Eye Drop Medications

Beta Blockers (yellow cap)

Drug Brand Names:

Timoptic
Betimol
Istalol
Betoptic S
Betagan
OptiPranolol



Combination Drops

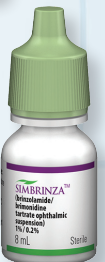
Combigan (blue cap)
A combination of
Brimonidine and Timolol



Cosopt (blue cap)
A combination of
Dorzolamide and Timolol



Simbrinza (light green cap)
A combination of
Brinzolamide and Brimonidine



Prostaglandin Analogs (teal cap)

Drug Brand Names:

Lumigan
Travatan Z
Xalatan
Vyzulta
Zioptan
Latanoprost PF



Alpha Agonist (purple cap)

Drug Brand Name:
Alphagan (Brimonidine)



Rho Kinase Inhibitor

Drug Brand Names:
Rhopressa



Carbonic Anhydrase Inhibitors

Drug Brand Names:
Azopt (Dorzolamide)
Trusopt



Tablet medications

Neptazane
Diamox



HAVING TROUBLE REMEMBERING TO PUT IN YOUR DROPS? SET A REMINDER.

- Set a daily clock or watch alarm to serve as a reminder to take your eye drops.
- Put a reminder note in a prominent location, such as on the refrigerator or on the mirror in your bathroom.
- Keep a calendar nearby and draw an "X" through each day after your medication is taken. This will serve as an easy visual cue as to whether or not you took the medicine that day.

Financial Assistance

Many of our glaucoma patients are rightfully concerned about the high cost of their prescription medications which are the backbone of their treatment plan. According to an article entitled "Why Patients Don't Comply," Eye Net Magazine, April 2004, "[A] survey of California Seniors who take prescription drugs (for all conditions), found that nearly one in five did not fill a prescription or skipped doses to make their medications last longer." There are many sources of help for those patients where cost is an issue in their treatment plan. Check with the sources below for information on discounts.

EYECARE AMERICA - ECA publishes a pharmaceutical directory for the medically under served describing free and discount eye drop programs of major manufacturers. Call 1-800-222-EYES, or go to www.eyecareamerica.org. Click on "Access to Care" Tab and look for the Medication Assistance link.

Together RX - Seven drug companies banded together to form "Together RX," offering discounts on prescription drugs to Medicare enrollees who lack coverage and have incomes below \$28,000 (\$38,000 for couples). Call 1-800-865-7211 or visit www.togetherrx.com.

Pfizer offers several different opportunities for uninsured and low income families to get their prescriptions free or at a reduced cost. Call 1-866-776-3700 or visit www.pfizer.com. Most US pharmacies participate in their Pfriends Program, which offers savings to people without prescrip-

tion coverage, no matter their age or income.

Alcon, Allergan, Merck - Patients on the Patient Assistance Program may receive a six month supply of glaucoma medications when one of Tyson Eye's staff completes a form that must be signed by both the prescribing doctor and the patient. Merck mails the prescriptions directly to the patient.

- Glaucoma Eye Care Program
1-800-391-EYES
- Vision USA - 1-800-766-4466
- Lions Club International
1-630-571-5466



Medicare provides an annual dilated eye exam for Medicare beneficiaries over age 65 at high risk for glaucoma. Those eligible for this service are people with diabetes, family history of glaucoma or African Americans over 50. To learn more, call 800-633-4227.

Diagnostic Technology

Measuring Intraocular Pressure (Applanation Tonometry)

The tonometry test measures the intraocular pressure of the eye. Drops are used to numb the eye. Then your doctor or technician will use a special device called a tonometer to measure your eye's pressure.

During this procedure, you are asked to position your head and rest your chin in the slit lamp (microscope) and look

straight ahead while sitting very still. The test itself takes just a few seconds and requires minimal interaction from you.

The intraocular pressure is measured in millimeters of mercury (mmHg). The end result of this test is a number determined by the resistance of your eye to the applanation (pressure) of the tonometer.



Optical Coherence Tomographer (OCT)

The OCT uses state-of-the-art technology to generate cross-sectional imaging of your retinal tissue and optic nerves. This cross-sectional imaging measures the thickness

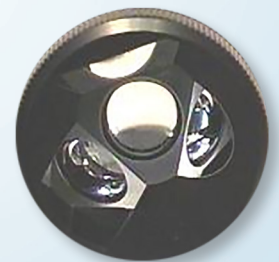
of the optic nerve cells and fibers. IT is used to diagnose glaucoma and to follow it's progression over time



Gonioscopy

Gonioscopy is used to directly view the trabecular meshwork and drainage angle of the eye. It is performed by placing a mirrored lens on the eye to view the anatomy. This test is crucial in

determining if the drainage angle is open or closed. With this lens your doctor can evaluate the entire 360 degrees of the drainage angle around the iris.



Corneal Thickness Measurement (Pachymetry)

Patients who have thin corneas have been shown to be at higher risk for glaucoma progression. The pachymetry test measures the thickness of the cornea

to determine if you have this particular risk factor. Normal cornea thickness is around 540 microns and is usually stable throughout one's lifetime.



National Eye Institute, National Institutes of Health

Glaucoma

Glaucoma narrows field of vision (as shown above). If left untreated, it will cause blindness.

Glaucoma is the leading cause of preventable blindness in the United States.

Fundus Photography

Photographs of the optic nerve and retina are performed to record the appearance of the internal eye at a specific time point. They are usually repeated annually and analyzed for abnormalities. They are also compared to previous photographs for changes over time.

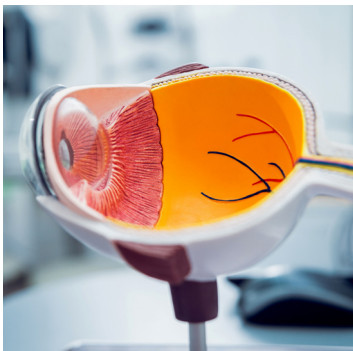
To acquire fundus photographs you will be asked to sit before a camera and look at a blinking fixation light. The camera is then used to photograph areas of the retina, optic nerve and macula.



Visual Field Testing

Visual field testing is crucial in determining unnoticed peripheral vision loss, which is typically affected first in glaucoma. The visual field test uses flashing lights to determine the extent of your peripheral vision. It takes about 10 minutes but

may take more or less time depending on your level of vision. It can be a cumbersome test because it requires undivided attention but is highly important in staging and monitoring the progression of glaucoma.



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Farrell C. Tyson, MD, FACS

Medical Director & CEO

Dr. Tyson, Medical Director of Tyson Eye, is one of the foremost innovators in the field of Ophthalmology. Introducing some of the latest advancements in the treatment of eye diseases, he has revolutionized eye care in Southwest Florida. Dr. Tyson provides specialized treatment methods for cataracts, glaucoma, refractive disorders and other diseases of the eye.

Education

Dr. Tyson received his Biomedical Engineering degree from Johns Hopkins University and his Doctor of Medicine from the University of South Florida College of Medicine. After completing a surgical internship at the Medical University of South Carolina, Dr. Tyson completed his residency in Ophthalmology at the Medical University of South Carolina Department of Ophthalmology at Charleston. He is certified by the American Board of Ophthalmology.



J. David Stephens, MD

Cornea, Cataract & Glaucoma Surgeon

Dr. J. David Stephens is a fellowship trained, board-certified ophthalmologist who specializes in the diagnosis and treatment of cornea and glaucoma disorders. Dr. Stephens utilizes his extensive training and education to provide his patients with the best possible clinical and surgical care. His experience in cornea, glaucoma, and cataract surgeries has made him an expert in dealing with multiple aspects of the eye.

Education

Dr. Stephens earned his Bachelors of Science in Biology from Oklahoma Baptist University. After completing his medical degree from the University of Oklahoma, Dr. Stephens completed his residency in Ophthalmology at John Peter Smith Hospital in Texas and the Wills Eye Hospital at Thomas Jefferson University in Pennsylvania.



Cristos Ifantides, MD, MBA

Cataract & Glaucoma Surgeon

Dr. Cristos Ifantides is a fellowship-trained, board-certified anterior segment surgeon who specializes in routine and complex surgeries of the front of the eye. He is a leader in the field and has pioneered new surgical techniques for complex anterior segment surgery that have been adopted across the world.

Education

Dr. Ifantides earned his Bachelor of Arts in Classical Studies from the University of Florida. He then went on to earn a Master in Business Administration and a Doctor of Medicine degree from the University of Florida. He fulfilled his residency at New York Hospital and Icahn School of Medicine at Mount Sinai in New York. Dr. Ifantides completed his fellowship at Wills Eye Hospital at Thomas Jefferson University in Pennsylvania.



Types of Glaucoma

There are several different types of glaucoma. The most common types are:

- Open Angle Glaucoma
- Acute Angle-Closure Glaucoma
- Normal Tension Glaucoma
- Congenital Glaucoma
- Secondary Glaucoma
- Pigmentary Glaucoma

Primary Open Angle Glaucoma

- Open angle glaucoma is the most common form of glaucoma, accounting for nearly 80% of all glaucoma cases.
- This type of glaucoma often runs in families, but does not always affect every member of the family. Sometimes only one person in a family will have glaucoma and it can skip one or more generations. It almost always affects both eyes.
- Generally, individuals with open angle glaucoma experience no symptoms. By the time you are aware of vision loss, the degree of optic nerve damage is quite advanced and irreversible.
- Some definitive signs of open angle glaucoma include increased intraocular pressure (IOP), enlargement of the optic nerve cup, decreased

Acute Angle-Closure Glaucoma (Narrow Angle Glaucoma)

- This type of glaucoma accounts for 10% of glaucoma in the United States and is most common in Asians and Inuits
- Most people who are predisposed to developing this type of glaucoma have no signs or symptoms before its onset.
- Those who have been diagnosed with narrow angle glaucoma should avoid taking over-the-counter cold and allergy remedies. These can cause the pupils to dilate and, in rare instances, can cause people to have extremely high eye pressures.
- Narrow angle glaucoma attack symptoms include severe eye pain and redness, decreased or tunnel vision, colored halos, extreme headache, light sensitivity, nausea, vomiting and abdominal discomfort. A person may have one or more of these symptoms, but not everyone has all of them.

Low-Tension or Normal Tension Glaucoma

- Many people develop glaucoma but never have a recorded "high" pressure. However, the treatment for the disease remains the same - lowering the intraocular pressure to slow or stop the progress of the disease

- **Glaucoma is the second leading cause of blindness in the world, according to the World Health Organization.**
- **Primary open-angle glaucoma is responsible for 12.3% of blindness worldwide.**

American Academy of Ophthalmology, Primary Open-Angle Glaucoma - Europe, November 10, 2013

Congenital Glaucoma

- Congenital glaucoma refers to glaucoma which can be either present at birth or appear anytime during the first three or four years of life. It occurs only in about 1 out of 10,000 infants.
- Babies who develop congenital glaucoma cannot express symptoms, and the first sign of the disease may be excessive tearing, light sensitivity, or abnormally large eyes (buphthalmos)
- Congenital glaucoma may be inherited, but in most cases it is not. Most babies with congenital glaucoma are born to healthy parents.
- Although both eyes are most commonly affected, glaucoma is often more severe in one eye than in the other.
- Children with glaucoma make up 2% to 15% of the population in facilities for the blind.

Pigmentary Glaucoma

- Pigmentary glaucoma (otherwise known as pigment dispersion glaucoma), occurs when pigment from the iris is dispersed into the eye and causes drain dysfunction. This raises the eye pressure and may cause optic nerve damage
- Pigmentary glaucoma may cause intermittent blurred vision especially with exercise



Secondary Glaucoma

(Due to other diseases or medications)

- Secondary glaucoma describes a group of conditions leading to elevated eye pressure caused by some other identifiable eye or systemic disease, eye surgery, eye trauma, prolonged use of certain medications, or ocular inflammation.
- There are many causes of secondary glaucoma. These can be either the open angle or narrow angle variety.
- This type of glaucoma is unlike chronic open angle glaucoma in that when the problem causing raised intraocular pressure is corrected or cured (if possible), the pressure may return to normal and further medication may be unnecessary. Unfortunately, existing damage to the visual field will remain.



Over three million Americans have glaucoma - only half of them know they have it.

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