Glaucoma Treatments

In this section, you will find the following:

- Glaucoma Medications
- Laser Therapies
- Conventional Surgical Procedures

In the second section, you will find information on how to search for potential treatments that are being investigated in laboratories and tested in human trials.

Glaucoma Medications

The most common treatments for glaucoma are eye drops and, rarely, pills. There are a number of different categories of eye drops, but all are used to either decrease the amount of fluid (aqueous humor) in the eye or improve its outward flow. Sometimes doctors will prescribe a combination of eye drops. People using these medications should be aware of their purpose and potential side effects, which should be explained by a medical professional. Some side effects can be serious. If you are concerned, call your doctor immediately. A doctor can decide which medications are best suited for a patient based on the individual case of glaucoma, medical history, and current medication regimen.

Types of Medications

Alpha adrenergic agonists both reduce aqueous humor production and increase its outflow. Allergic reactions frequently occur with this class of medication. Side effects may include increased heart rate (tachycardia), irregular heart beat (arrhythmias), elevated blood pressure, headaches, blurry vision, fatigue, dry mouth, and redness in or around the eye.

Examples include:

- apraclonidine (Iopidine®)
- brimonidine (Alphagan®)
- epinepherine (Gluacon® and Epifrin®)
- dipivefrin (Propine®)

Beta blockers work to lower eye (intraocular) pressure by reducing the production of aqueous humor and decreasing the rate at which the fluid flows into the eye. Side effects may include a slow or irregular heartbeat, congestive heart failure, chronic obstructive pulmonary disease, depression, impotence, drowsiness, double vision, and breathing problems.
for patients with asthma or emphysema.

Examples include:

- timolol (Timoptic XE Ocumeter® and Timoptic®)
- levobunolol (Betagan®)
- carteolol (Ocupress®)
- metipranolol (OptiPranolol®)
- betatoxol (Betoptic®)

**Carbonic anhydrase inhibitors** are eye drops or pills used to reduce fluid production in the eye. Side effects may include skin rash, eye redness, stinging or irritation, blurred vision, headache, tingling in the hands or feet, nausea or upset stomach, kidney stones, altered taste (especially with carbonated beverages), weight loss, fatigue, and decreased energy.

Examples include:

- dorzolamide (Trusopt®)
- brinzolamide (Azopt®)
- acetazolamide (Diamox®) – oral medication
- methazolamide (Neptazane®) – oral medication

**Miotics** (cholinergic agents) cause the pupil to become much smaller in diameter and help increase the rate of fluid drainage from the eye. Side effects may include red eyes, headache, blurry or cloudy vision, excessive salivation and tearing.

Examples include:

- pilocarpine (Isopto Carpine®, Pilocar® and Pilopine HS® ointment)
- echothiophate (Phospholine Iodide®)

**Prostaglandin analogs** reduce pressure in the eye by increasing the outward flow of fluid from the eye. Side effects may include blurred vision, eye redness or irritation, a change in eye color (mostly in hazel or green eyes), increase in thickness and number of eyelashes, and joint aches or flu-like symptoms.

Examples include:

- tafluprost ophthalmic solution (Zioptan™)
- latanoprost (Xalatan®)
- bimatoprost (Lumigan®)
- travoprost (Travatan®)

**Combinations** of eye drops may also be used to achieve better results. The side effects for these medications are mentioned above.

Examples include:

- dorzolamide and timolol (Cosopt®)
- latanoprost and timolol (Xalacom®)
✓ brimonidine and timolol (Combigan™)

Prescription assistance program information can be found at www.brightfocus.org/glaucoma/resources/glaucoma-prescription.html.

Laser Therapies

Depending in the type of procedure, laser surgery may be used for open-angle, angle-closure, or neovascular glaucoma. Laser surgery is performed on an outpatient basis in an eye doctor’s office or clinic after the eye has been numbed. A laser is directed toward the trabecular meshwork (tissue near the cornea and iris that drains the aqueous humor from the eye into the blood), the iris, ciliary body, or the retina and is used in various ways to reduce eye pressure. There are several types of laser surgeries:

**Trabeculoplasty** is often used to treat open-angle glaucoma. In argon laser trabeculoplasty (ALT), a high-energy laser is aimed at the trabecular meshwork to open areas in these clogged canals. These openings allow fluid to bypass drainage canals and flow out of the eye. In selective laser trabeculoplasty (SLT) a low-energy laser treats specific cells in the trabecular meshwork. Because it affects only certain cells without causing collateral tissue damage, SLT can potentially be repeated.

**Laser peripheral iridotomy (LPI)** is frequently used to treat angle-closure glaucoma, in which the angle between the iris and the cornea is too small and blocks fluid flow out of the eye. In LPI, a laser creates a small hole in the iris to allow fluid drainage.

**Cyclophotocoagulation** is usually used to treat more aggressive or advanced open-angle glaucoma that has not responded to other therapies. A laser is directed through the sclera or endoscopically at the eye fluid-producing ciliary body. This helps decrease the production of fluid and lower eye pressure. Multiple treatments are often required.

**Scatter panretinal photocoagulation** is a laser procedure that destroys abnormal blood vessels in the retina associated with neovascular glaucoma.

The most common side effects of laser surgery are temporary eye irritation and blurred vision. There is a small risk of developing cataracts.

Currently, laser surgery is the most frequently used procedure to treat glaucoma. It normally lowers eye pressure, but the length of time that pressure remains low depends on many factors, including age of the patient, the type of glaucoma, and other medical conditions that may be present. In many cases continued
medication is necessary, but possibly in lower amounts.

**Surgery**

Normally, conventional surgeries (also called *incisional therapies*) are used for glaucoma after other treatment strategies, such as medications and laser surgery, have failed. Two procedures are used almost exclusively and usually only for infants with congenital glaucoma. When deciding on a treatment option, an ophthalmologist will take into account the unique aspects of each person’s case, including the severity of the disease, response to medication, and other health issues.

A **trabeculectomy** is normally performed with local anesthetic. The ophthalmologist (surgeon) cuts a flap in the white part of the eye (sclera), removes a piece of trabecular meshwork (eye tissue located around the base of the cornea), and sutures the flap. This creates a new opening (a fluid bubble or bleb will form on the eye’s exterior) through which the fluid (aqueous humor) flows and enters the bloodstream. The surgery is normally done on an outpatient basis, but may require a one-night stay in a hospital. It is performed one eye at a time, usually four to six weeks apart. Responses to this procedure vary. Many people are able to discontinue glaucoma medication afterwards. However, in some cases eye pressure may fall too low and/or the opening may heal over, causing pressure to rise again. There may also be continued changes to the optic nerve. Sometimes a second trabeculectomy must be performed.

Potential short-term side effects of trabeculectomies include blurred vision, bleeding in the eye, and infection. Long-term effects may include worsened cataracts and the sensation of a foreign body in the eye. A buildup of fluid in the back of the eye may cause some shadows in vision.

For those who do not respond to trabeculectomy or are not candidates for this procedure, a **glaucoma drainage implant** may be placed in the eye. This tiny tube, inserted into the anterior chamber of the eye (between the cornea and the lens), facilitates the drainage of fluid.

A surgical procedure using a **Trabectome™** is used for open-angle glaucoma. It is performed on an outpatient basis. After the eye is numbed, a small instrument creates a tiny incision in the cornea, and a piece of the trabecular meshwork is removed to increase fluid drainage. No permanent hole or bleb is left on the eye. Trabectome surgery normally does not have the side effects associated with a trabeculectomy, although there may be some bleeding during the procedure.
Peripheral iridectomy is used with angle-closure glaucoma. A small section of peripheral iris is removed by incision, which allows fluid to drain more easily from the eye.

Canaloplasty and new implant devices are used to enhance outflow of aqueous humor to decrease IOP in the eye. These devices and procedures include the EX-PRESS Shunt, a subconjunctival filtration device; Nonpenetrating Ab Externo Schlemm’s Canaloplasty; Ab Interno Devices, including the Trabecular Micro-bypass Stent and the Trabectome; and the Gold Microshunt, a suprachoroidal device.

Goniotomy is used almost exclusively for infants with congenital glaucoma. In this procedure, a tiny blade is inserted through the cornea to cut the trabecular meshwork. This allows the eye fluid to flow normally out of the eye. Trabeculotomy is also used for infants with congenital glaucoma. An incision is made in the outer portion of the eye, and a tiny probe is used to break through the trabecular meshwork. Eye fluid is then able to drain out of the eye, keeping eye pressure in a more normal range.

Potential Treatments

Many potential treatments for glaucoma are being investigated in laboratories and tested in human clinical trials. For snapshots of current investigations, visit the website www.clinicaltrials.gov and enter glaucoma in the search field.

Clinicaltrials.gov is a database maintained by the National Institutes of Health that lists both government-sponsored and privately sponsored clinical trials conducted in the United States and around the world.