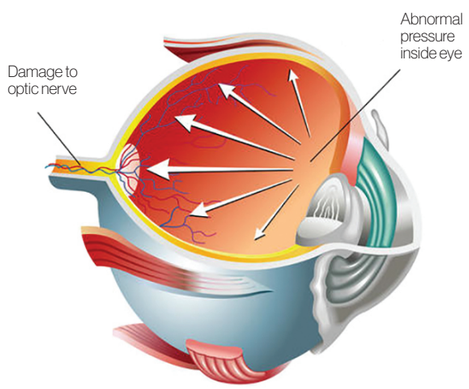
Origins of Glaucoma

Today, glaucoma affects more than 60 million people worldwide.[1,2] A leading cause of irreversible blindness,[3] glaucoma is a group of eye diseases that leads to progressive damage to the optic nerve. It is a disease that has kept scientists working hard to find a cure and developing new treatments over the course of many years.[4]

The term "glaucoma" can be traced back to the Greek and Byzantine eras, with early references included in the works of Homer and the Greek physician Hippocrates.[5,6] Yet, medical therapy for the disease was delayed for centuries due to a near-complete misunderstanding of what it actually was.

Research and innovation have helped doctors identify a patient's risk factors sooner so they can help them slow the progression of vision loss through early diagnosis. We've come a long way, but glaucoma wasn't always so widely understood.

GLAUCOMA



Glaucoma Risk Factors

Just as everyone sees the world a bit differently, no two patients' eyes are exactly the same. In addition to having increased intraocular pressure (IOP), other risk factors include:

Age:

People over 60 are more likely to get glaucoma.[3] For African Americans, the increase in risk begins after age 40. Age increases the risk of glaucoma for all ethnic groups.[7]

Race:

African Americans are significantly more likely to have glaucoma than Caucasians[3] and are much more likely to suffer permanent vision loss as a result. People of Asian descent are at a higher risk of angle-closure glaucoma.[9]

Family history:

A family history of glaucoma increases the risk of developing the disease.[7]

Medical conditions:

Some studies indicate diabetes may increase the risk of developing the disease.[7]

Physical injuries to the eye:

Severe trauma can damage the drainage channel, resulting in an immediate or gradual increase in eye pressure. An injury can also dislocate the lens, closing the drainage angle and increasing pressure.[7]

Other eye-related risk factors:

Eye anatomy, particularly reduced corneal thickness and optic nerve appearance, may reveal risk. Conditions such as retinal detachment, eye tumors, and inflammation may also induce glaucoma. Some studies suggest a high level of nearsightedness may be a risk factor as well.[7]

BEFORE LOCAL IMPLEMENTATION, CPOS MUST ENSURE COMPLIANCE WITH ALL APPLICABLE LAWS AND REGULATIONS, LOCAL INDUSTRY CODES AND LOCAL NOVARTIS COMPANIES' POLICIES

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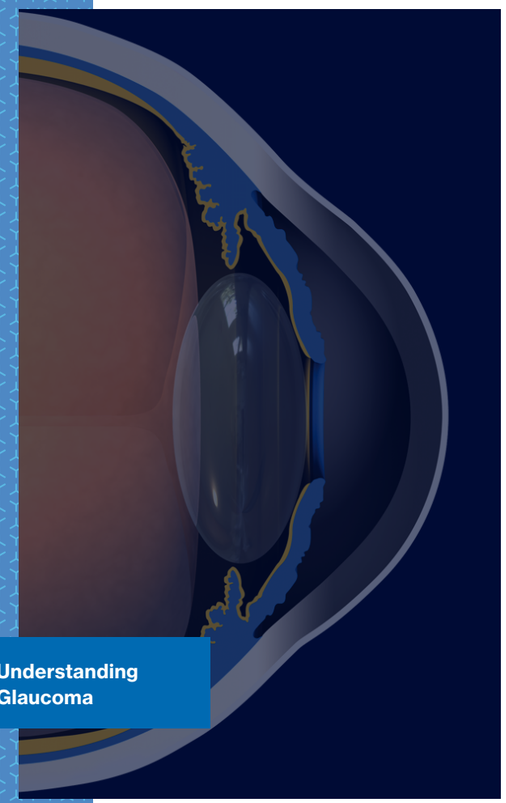
A History of Education and Innovations



Understanding Glaucoma

Treatment Breakthroughs

The first major breakthrough in glaucoma treatment came in 1862 when Sir Thomas Frasier debuted the first IOP-lowering medication.[10]

Despite this milestone, it was still very difficult for doctors to measure IOP accurately and understand if their patients were at risk. Patients had to have their IOP measurements taken while lying down until Dr. Hans Goldmann introduced the tonometer in 1955. This instrument remains the most widely available and commonly used tool in current practice.[11]

Dr. Goldmann's invention was improved further in 1972 as the first non-contact, or air-puff, tonometer was introduced at the World Optical Fair.[12] The air-puff tonometer uses a puff of compressed air to flatten the cornea, which enables optometrists to measure IOP without topical anesthesia.[13]

Advancements in the tonometer since the early 20th century to the air-puff tonometer used today.

Pharmaceutical Discoveries

The first topical IOP lowering agent wasn't introduced until 1978. Since then, scientists have advanced this treatment method and introduced solutions for more patients.[14]

Today, open-angle glaucoma treatment often starts with prescription eye drops to help lower IOP.[7] Patients may need more than one medication to keep their eye pressure low enough. A patient's medication may also be changed if it causes side effects.[7] If eye drops do not adequately lower IOP, surgery may be recommended.[7] While surgery can lower eye pressure, it cannot restore lost vision.[7]

Surgical Solutions

Doctors may also recommend surgical interventions at various stages of glaucoma. Some patients consider surgery early in the disease to eliminate the need for ongoing medication. Others look to surgical options if their glaucoma progression continues even with the use of medication.[15]

Trabeculectomy, also known as a surgical filtering procedure, is a common intervention that removes tissue from the eye to improve the flow of aqueous fluid.[16] Its introduction in 1968 marked a major improvement in then-available surgical treatment options.[18] A more advanced version of the trabeculectomy procedure is still performed today.[17]

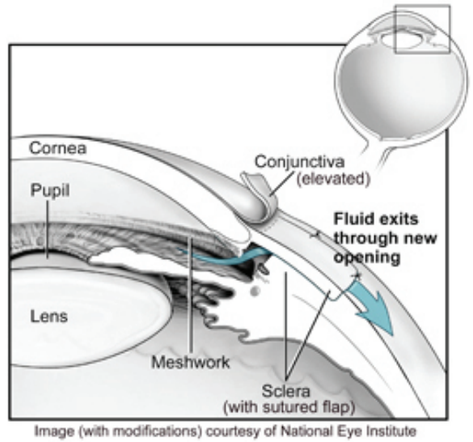


Image (with modifications) courtesy of National Eye Institute

Treatment Compliance

Science has made great strides in treatments for glaucoma patients worldwide to delay the progression of this disease. **Yet, it is estimated that up to 25% of glaucoma patients do not take any of their prescribed medication,[19] and nearly 50% of glaucoma patients stop taking medication within six months of treatment.[20]**

Early diagnosis and proper treatment can potentially slow and help delay the progression of this disease. Glaucoma must be carefully and consistently treated over the course of one's life,[7] and high IOP must be managed around the clock.[21] This means any prescribed therapy must be adhered to throughout the course of treatment.[7]

Alcon is proud to be a part of this rich history of innovation, but we know there are many needs that remain unmet for glaucoma patients. As a world leader in providing treatments for patients living with glaucoma, we are committed to actively working to address unmet medical needs and reduce the burden of the disease around the world.

The discovery, diagnosis, and history of treatments and innovations for glaucoma can be divided into three major time periods:

1

400 BC – 1600 AD

The term "glaucoma" is applied to most blinding conditions of the eye, including cataracts[5]

2

1600 – 1854

Ophthalmologists begin to realize that technology is key to a proper diagnosis, and the accuracy of glaucoma diagnoses increases dramatically[22]

3

1854 – Present

The modern era of surgical and pharmaceutical innovations begins with the introduction of the ophthalmoscope[22]