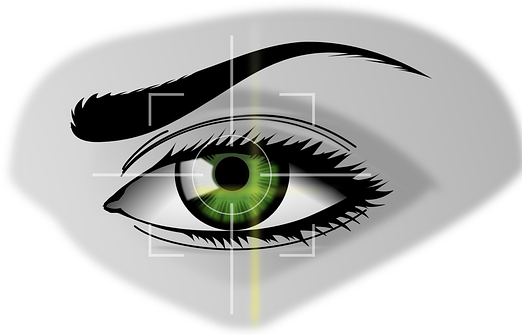
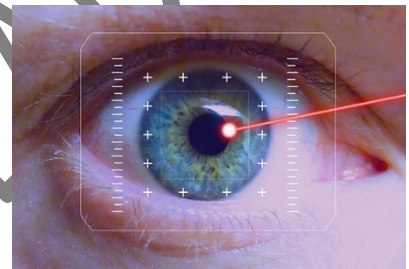


Laser Eye Surgery



What is Laser Eye Surgery?

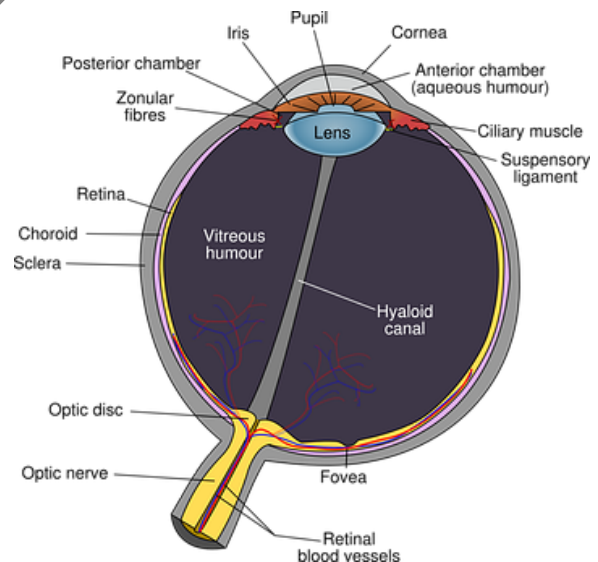
Laser eye surgery is a type of **refractive surgery**. Refractive surgery corrects **nearsightedness (myopia)**, **farsightedness (hyperopia)**, and/or **astigmatism** so that patients either no longer need corrective lenses or need a lower prescription. In all types of laser eye surgery, an **excimer laser** (one that uses short wave, ultraviolet light to clear away some tissue from the surface of the eye) is used to reshape the cornea to allow light to be better focused on the retina, making vision clearer. To properly understand this, let's familiarize ourselves with how the eye works and the three most common vision problems mentioned above.



Laser eye surgery uses ultraviolet laser energy to reshape the cornea.

How Do Eyes Work?

The eye is composed of several parts, but for our purposes, we need to understand the function of the iris, pupil, cornea, retina, lens, and optic nerve. The clear **cornea** sits at the front of the eye and acts as a window. When light rays pass through the cornea, they are bent – or refracted – so they pass through the **pupil**. The pupil is the opening in the center of the **iris**, a flat, colored membrane. When we talk about what color someone's eyes are, we are referring to the color of their irises. Depending on how much light is available, the iris changes the size of the pupil to ensure the proper amount



The eye is composed of many parts.



The pupil is the opening in the center of the iris.

of light enters the eye. This light passes through the **lens**, which can change its width to focus the light rays onto the **retina**. The **retina** sits at the back of the eye and captures the rays using cells called **photoreceptors**. The photoreceptors process light energy into electrical impulses, which are sent through nerve endings and down nerve fibers into the **optic nerve**. The optic nerve then carries these impulses to the brain, where they are processed into an image.

Common Vision Problems

The three most common vision problems are nearsightedness, farsightedness, and astigmatism.



Nearsighted people see nearby things clearly while distant objects appear blurred.

Nearsightedness (myopia) means that people see nearby objects clearly, while objects far away are blurry. This is caused by an elongated eyeball or a cornea that is too curved. Thus, light rays entering the eye are not focused properly to clearly see distant objects. In the United States, nearly 30 percent of the population has some form of myopia.

Farsightedness (hyperopia) is the opposite of nearsightedness. In this condition, nearby objects look blurry while distant objects appear clear. This is due to a shortened eyeball or a cornea that is not curved enough. As with nearsightedness, this results in improperly focused light rays. About 5 to 10 percent of the United States population is farsighted.



Farsighted people see distant objects clearly while nearby things appear blurry.



People with astigmatism have blurred vision at any distance.

Astigmatism describes an irregularly shaped cornea or improperly curved lens, which causes blurred vision at any distance. Like myopia and hyperopia, the eye is unable to properly focus entering light. Approximately 33 percent of people in the United States have astigmatism.

Reading Sample



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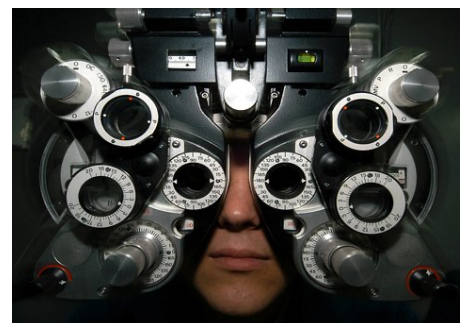
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a contact lens bandage is placed over the eye until the epithelium heals. The recovery time for LASEK is longer than for PRK.

LASIK (laser in situ keratomileusis) is the most common form of laser eye surgery. The corneal preparation procedure for LASIK involves cutting a thin circular flap of epithelium and cornea using either a microkeratome or a femtosecond laser. A microkeratome is a bladed surgical instrument used to cut into the epithelium and cornea. A femtosecond laser pulses laser



Patient vision is usually immediately improved with LASIK surgery.

energy very fast (measured in femtoseconds, or quadrillionth of a second) to break apart precise sections of tissue without affecting neighboring tissues. The corneal flap is folded back so the excimer laser can access the underlying cornea. Following the procedure, the flap is replaced and acts as its own bandage. Healing is faster with LASIK surgery than with PRK or LASEK and patients' vision is often immediately improved. Patients are usually allowed to drive the day after LASIK surgery.

Epi-LASIK (epithelial laser in situ keratomileusis)

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Complications

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There are several risks and complications involved with laser eye surgery, but most are extremely rare. Of the most common are **discomfort** (i.e. mild irritation, dry eyes, and light sensitivity) and **visual aberrations**, such as haziness, reduced sharpness of vision, and the appearance of halos or starbursts around lights ("night glare"), especially at night. Almost all laser eye surgery patients will experience these symptoms immediately following the procedure, but in most cases, they are temporary, disappearing within three to six months. In about 1-2% of cases, these complications persist. Some may be treated (e.g. artificial tears to combat dry eye or an additional procedure to correct the problem) while others are permanent. Some patients may experience **flap complications** due to improper flap creation, leading failure of the flap to properly adhere to the

surface of the eye or the development of wrinkles in the flap. In 2006, around 0.3-5.7% of patients experienced flap complications. Flap complications arose in only 0.37% of 3,009 femtosecond laser operations between 2002 and 2009. All of those were remedied within the session in which they occurred. Potential flap complications include epithelial ingrowth (epithelium cells grown under the flap after surgery) and diffuse lamellar keratitis (DLK; inflammation under the flap causing discomfort and, in some cases, vision loss). When flap complications occur after the operation is concluded, they can usually be corrected by additional procedures or medications.



Vision loss can sometimes occur following laser eye surgery.

Under-correction, overcorrection, and regression are all possibilities with laser eye surgery. This can happen if too much or too little tissue is removed or if the eye doesn't heal properly. Under-correction is more common than overcorrection and correction errors are most common following large corrections for myopia. Often, under- or overcorrection

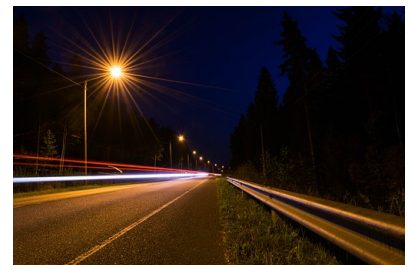
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New Technology

One of the most common side effects of laser eye surgery is what is called "night glare", or the appearance of halos or starbursts surrounding lights at night. A new form of analysis, called **wavefront analysis**, can be built into excimer lasers. This detects subtler vision errors than previously possible and gives a more precise map of irregularities in the eye. This map allows the computer to adjust the laser to correct these small errors, reducing the likelihood of postoperative night glare. However, these risks occur in only about 5-10 out of a 1000 people who have had the surgery.



Night glare is a common side effect of laser eye surgery.

Reading Comprehension Questions:

1. What is laser eye surgery?
2. What
3. What are the three most common vision problems and what are the effects of each?
4. What is
5. List the four types of laser eye surgery in order of recovery time, from shortest to longest.
6. What

Extension Question:

7. Research the side effects of laser eye surgery. In your opinion, is it better to get the surgery or keep wearing glasses/contacts? Explain your reasoning.

Reading Comprehension Questions:

Ecobottle Sample



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