

# LASER SURGERY OF THE EYE

## WHAT IS A LASER?

The word **laser** stands for “**L**ight **A**mplification by **S**timulated **E**mission of **R**adiation.” A laser is a concentrated beam of light, created when an electric current passes through a special material. The name and the color of the laser depend on the type of special material that is used:

- argon gas: blue-green light;
- krypton gas: red or yellow light;
- YAG (yttrium-aluminum-garnet): invisible infrared light;
- argon-fluoride (excimer): invisible ultraviolet light.

Laser surgery in ophthalmology can successfully treat many types of eye diseases.

## HOW DOES THE LASER WORK?

There are two different ways that lasers are used to treat eye diseases.

**Thermal lasers (argon and krypton):** The light is converted to heat when it reaches the eye.

The heat is used to:

- seal blood vessels (veins and arteries) that are bleeding or leaking fluids;
- destroy abnormal tissue such as a tumor;
- bond the retina to the back of the eye.

**Photodisruptive lasers (YAG and excimer):**

The light cuts or sculpts the tissue, similar to a knife.

The beam of light is used to:

- cut thin membranes inside the eye that are blocking vision;
- change the shape of the eye’s surface;
- create an opening in the iris for treatment of narrow-angle glaucoma.

## WHAT ARE THE ADVANTAGES OF USING LASERS?

Laser surgery of the eye has several advantages:

- there is no risk of infection from the laser light;
- laser surgery can be performed in an outpatient setting; allowing you to go home shortly after the procedure is finished;
- the surgeon has great precision and control.

# ***WHICH EYE DISEASES CAN LASER SURGERY TREAT?***

## **Diseases of the retina**

**Retinal tears or holes:** The retina is the inner layer of the eye that senses light and helps you to see. If the retina tears, it can separate from the back wall of the eye. This is called a detached retina, and it can cause you to lose sight. Symptoms of retinal tears include:

- sudden flashes of light;
- “floaters” or specks in your vision.

Most retinal tears can be treated with the argon or krypton laser, if they are found before the retina detaches. The laser helps bond the retina to the wall of the eye, preventing a retinal detachment. If retinal detachment has already occurred, the laser may be used as part of a surgical repair of the detachment.

**Diabetic retinopathy:** Eye disease from diabetes is a major cause of vision loss. Diabetic retinopathy can cause blood vessels in the retina to grow abnormally. The vessels can leak fluid (macular edema) or bleed inside the eye. Laser surgery can accomplish the following:

- seal leaking blood vessels to reduce macular edema, helping to prevent further vision loss;
- slow or stops growth of abnormal blood vessels, decreasing the chance of bleeding in the eye.

**Macular degeneration:** The macula is the small, central area of the retina that allows us to see fine details clearly. Macular degeneration affects your central or reading vision. Most people have “dry” macular degeneration, which cannot be helped by laser surgery. Some people have “wet” macular degeneration. With this condition, abnormal blood vessels cause bleeding and scarring of the macula. In certain cases, these people may be treated with the argon or krypton laser. The laser seals the blood vessels to prevent further damage. There are other retina problems that can be treated with the laser, including:

- retinal vein occlusions;
- histoplasmosis;
- central serous retinopathy;
- some tumors of the eye.

### **After cataract surgery**

After a cataract has been removed, the capsule of the lens sometimes becomes cloudy. The neodymium-YAG laser can open up this cloudy membrane and restore clear vision.

## **Glaucoma**

Glaucoma is a disease of the optic nerve. This nerve sends images from the eye to our brain and allows us to see. Glaucoma is the second most common cause of blindness in the United States, and the leading cause of legal blindness among African Americans. Glaucoma damages the optic nerve, usually because the fluid pressure inside the eye is too high.

Loss of vision from glaucoma can often be prevented if your ophthalmologist discovers the disease before too much damage occurs to the optic nerve. Eyedrops are typically used to treat glaucoma. However, laser surgery is also used to lower the pressure in the eye. There are some advantages to treating glaucoma with a laser rather than with drops.

## **Refractive surgery**

In procedures such as photorefractive keratectomy (PRK) and laser in situ keratomileusis (LASIK), the excimer laser is used to sculpt the cornea and reduce or eliminate the need for eyeglasses or contact lenses.