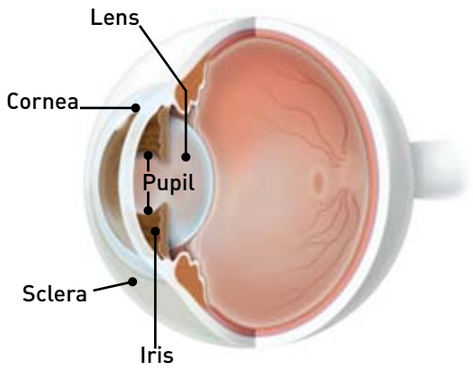
What is the cornea?

The cornea is the normally clear, front window of the eye that covers the colored iris and round, dark pupil. Light is focused while passing through the cornea, allowing us to see.



Our cornea is made up of three main layers:

- the outer or **epithelial** layer;
- the middle or **stromal** layer (this layer accounts for about 95 percent of the cornea's total thickness); and
- the inner or **endothelial** layer.

A healthy, clear cornea is necessary for good vision.

How can an unhealthy cornea affect vision?

If your cornea is injured or affected by disease, it may become swollen or scarred, and its smoothness and clarity may be lost. Scars, swelling or an irregular shape can cause the cornea to scatter or distort light, resulting in glare or blurry vision.

The function of the endothelial cells is to pump fluid out of the cornea, keeping it crystal clear and thin. When many endothelial cells are injured or lost, the fluid that circulates inside the eyeball seeps into the cornea, causing it to become cloudy and swollen. When this condition occurs, medical treatments usually will not help, and a cornea transplant is recommended.

What conditions may cause the need for a cornea transplant procedure?

There are many conditions that can affect the clarity of the entire cornea, including trauma, infections, or hereditary diseases.

Some conditions can affect the cornea's endothelial cells, including Fuchs' dystrophy and pseudophakic bullous keratopathy, as well as previous eye surgery.

Many people who require cornea transplant surgery have diseases that only affect the cornea's inner lining of endothelial cells. If the remaining corneal layers are clear and healthy, **endothelial keratoplasty (EK)** may be considered to improve vision.

Full-thickness cornea transplant vs. EK procedure

With traditional full corneal transplant surgery (known as **penetrating keratoplasty**), a circular portion is removed from the center of the diseased cornea. A matching circular area is removed from the center of a healthy, clear donor cornea, placed into position and stitched into place.

It may take as long as one year or more to recover from a full corneal transplant. It is also possible to have significant irregular curvature of the cornea because of the stitches. In many cases, a contact lens must be worn for the best vision. Also, a transplanted cornea can be prone to damage years after the procedure, meaning that even a minor trauma can cause the transplant to dislocate from its position.

With the EK cornea transplant procedure, only the abnormal inner lining of the cornea is removed. A thin disc of donor tissue containing the healthy endothelial cell layer is placed on the back surface of the cornea. An air bubble pushes the endothelial cell layer into place until it heals in an appropriate position.

The EK surgical procedure takes less time, requires a smaller incision, uses fewer (or no) stitches, has a shorter recovery time, and restores vision faster than with traditional corneal transplant. Also, because stitches usually are not used, the structure of the cornea remains intact, resulting in less visual distortion (astigmatism) than full-thickness corneal transplant.

What happens during the EK procedure?

The EK procedure is done in an outpatient setting under local anesthesia (eyedrops or numbing injections are placed around the eye). Relaxing medications are given in a vein.

The procedure takes approximately 45 minutes. A tiny incision is made in the **sclera** (white portion of the eye). A thin button of healthy endothelial cell layer from a donor is folded and inserted into the eye through the incision and placed on the back surface of the cornea. An air bubble is injected to push this new tissue into place and help it heal in the proper position. The endothelial cells have a natural "pumping" action, which creates suction and rapidly bonds the new donor tissue to the cornea.

For the first 24 hours after surgery, in order to help the air bubble keep the new cornea tissue in place, you will need to lie on your back facing the ceiling for as long as you can tolerate. You will be given eyedrops to use for comfort and to prevent infection. Vision is usually better within one week. After one month, approximately 80 percent of the healing has occurred, but vision may continue to improve over the next four to six months.

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The American Academy of Ophthalmology is an organization of 29,000 ophthalmologists (Eye M.D.s) dedicated to preserving eye health and sight.

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What are risks and complications of EK?

Risks and complications associated with EK can include:

- bleeding in the eye;
- infection;
- swelling of the retina, causing temporary or permanent blurring of vision;
- retinal detachment;
- glaucoma or high pressure in the eye;
- chronic inflammation;
- droopy eyelid;
- loss of corneal clarity;
- poor vision or total loss of vision;
- loss of the eye.

There is also risk of rejection, where the body's immune system starts to fight against the donor cornea tissue. Symptoms of rejection are redness, blurry vision, and light sensitivity. This can happen at any time months or years after the transplant, and can occur after EK as well as traditional penetrating keratoplasty.

Another complication that can occur from the EK procedure is a graft dislocation, where the circular disc slips from position, requiring surgery to reposition it.

If EK fails, a full thickness corneal transplant can still be performed.

EK is not for everyone. Some people with corneal scarring or other conditions are not suitable candidates for the procedure. Your ophthalmologist will discuss your condition with you and explain the best treatment options.

Corneal transplants are a generous gift of sight.

Corneal transplant would not be possible without the thousands of generous donors and their families who have donated corneal tissue so that others may see. This gift, along with the development of endothelial keratoplasty, provides another treatment option for people with corneal disease.

Notes

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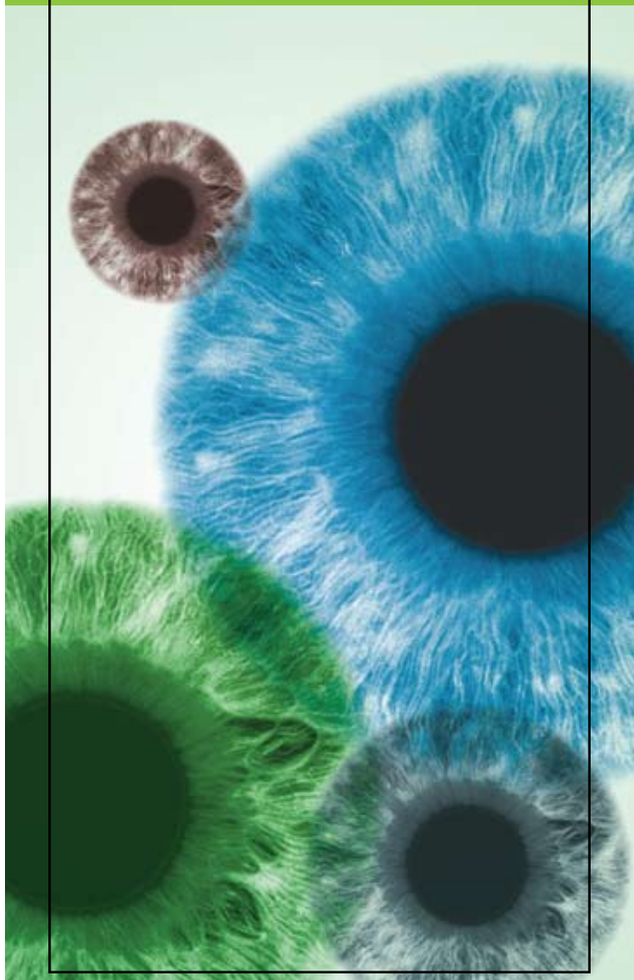
Endothelial Keratoplasty (EK)

A Closer Look



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