Wavefront-Guided LASIK

What is LASIK?

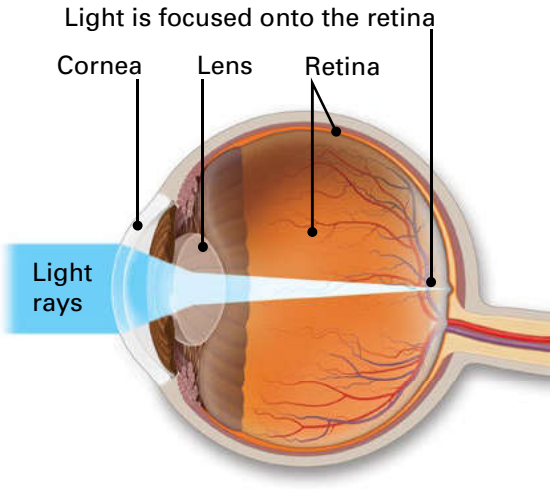
LASIK (laser in situ keratomileusis) is a type of refractive surgery. This kind of surgery uses a laser to change the shape of your cornea. This improves vision problems caused by refractive errors. You have a refractive error when your eye does not refract (bend) light properly.

Eye Words to Know

Cornea: Clear, dome-shaped window of the front of your eye. It focuses light into your eye.

Lens: Clear part of the eye behind the colored iris. It helps to focus light on the retina (back of the eye) so you can see.

Retina: Nerve layer at the back of your eye. It sends light signals to the brain so that you can see.



A perfectly shaped eye focuses light precisely on the retina.

For you to see clearly, light rays must travel through your cornea and lens. The cornea and lens refract the light so it lands on the retina. The retina turns light into signals that travel to your brain and become images. With refractive errors, the shape of your cornea or lens keeps light from bending properly. When light is not focused on the retina as it should be, your vision is blurry.

Wavefront-guided LASIK (or **custom LASIK**) relies on a special instrument to create a very detailed map of your cornea. Your eye surgeon uses this map to program the laser used in surgery. Because the wavefront map is so detailed, it allows your ophthalmologist to make changes to your cornea that might otherwise be missed.

Wavefront-guided LASIK is used to treat myopia (nearsightedness), hyperopia (farsightedness) and astigmatism. This procedure may reduce your need for eyeglasses or contact lenses. In some cases, it may even allow you to do without them completely.

Who is a good candidate for LASIK?

To have LASIK surgery, you need to meet certain requirements. Here are some of them.

- You should be 18 years or older (ideally, over 21 years old, when vision is more likely to have stopped changing).
- Your eye prescription should not have changed in the last year.
- Your refractive error must be one that can be treated with LASIK.

- Your corneas need to be healthy, and your overall eye health must be generally good.
- You need to have realistic expectations about what LASIK can and cannot do for you.

Some people are not candidates for LASIK. They include people with:

- an unstable (changing) refractive error
- extreme levels of myopia, hyperopia or astigmatism
- severe dry eye
- corneas that are too thin
- corneal abrasions or disease
- keratoconus (cone-shaped cornea)
- advanced glaucoma
- a cataract affecting vision
- a history of having certain eye infections
- uncontrolled diabetes
- pregnant or nursing women

Your ophthalmologist can talk with you about other conditions that may keep you from having LASIK.

To determine whether you are a candidate for LASIK, your ophthalmologist will examine your eyes. Here's what will be done.

- The overall health of your eyes will be checked.
- Measurements of your cornea will be taken.
- Your pupil size will be checked.
- Your refractive error will be measured.

In some cases, your tear production may be measured. This is to check if you have dry eye, and if so, how severe it is.

What to expect with wavefront-guided LASIK

Before surgery. You and your ophthalmologist will discuss your vision needs based on your lifestyle. For example, if you play sports, you may be seeking clear distance vision from surgery.

Also, you and your ophthalmologist should discuss your expectations for LASIK. People who have LASIK to achieve perfect vision without glasses or contacts run the risk of being disappointed. LASIK allows people to do most of their everyday tasks without corrective lenses. However, you might need to wear glasses for certain activities, such as reading or driving at night.

Your ophthalmologist will thoroughly examine your eyes and make sure you are a candidate for LASIK. Here is what he or she will do:

- **Test your vision.** This is to make sure that your vision has not changed. It also shows how high your refractive error is and whether LASIK can be used to correct your vision.
- **Check for other eye problems.** Your ophthalmologist will make sure that you do not have eye problems. This is because other problems could affect your surgery, or LASIK could make those other problems worse. For example, if you have dry eyes, they may be worse after LASIK.
- **Measure your pupil size.** Your eye surgeon uses these measurements to program the computer-based laser used during surgery. He or she will also measure the size of your pupil. If your pupil is very large, you could see halos (rings of light) at night after LASIK.

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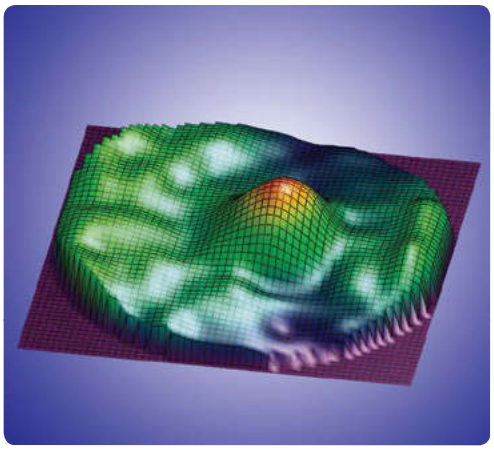
- **Measure your cornea.** Your ophthalmologist will check the thickness of your cornea and take precise measurements of the cornea's surface.
- **Make a wavefront map of your cornea.** Using a **wavefront scanner**, your eye surgeon will create a detailed map of your cornea. Here's how it works.
  - You will sit in front of a wavefront scanner, resting your chin on a pad. You will stare past (not at) a target light to keep your eyes unfocused.
  - The wavefront scanner sends a beam of light into your eye to the retina. This wave of light rays is then reflected back out of the eye. A sensor records the light pattern as it comes back out of your eye.
  - The wavefront scanner uses that light pattern to create a very detailed, 3-D map of your cornea. The map shows where light is not traveling evenly through the eye due to imperfections of the cornea.
  - Your ophthalmologist programs the map into the laser. This helps guide the laser precisely to points where the cornea needs to be reshaped.



A wavefront map of an eye with visual imperfections.

During LASIK

LASIK is done in an outpatient surgery center or your ophthalmologist's office. Your eye surgeon uses a laser to reshape your cornea. Here is what to expect:

- Your eye will be numbed with eye drops.
- Your eye surgeon will place an eyelid holder on your eye to keep you from blinking. He or she will also place a suction ring on your eye to keep it from moving. You will feel pressure like a finger pressing firmly on your eyelid. At this point, your vision will go dim or black.
- Using a device called a microkeratome or a laser, your ophthalmologist makes a paper-thin flap in the cornea tissue. Then he or she lifts and folds the flap back.
- You will be asked to stare at a target light so that your eyes will not move. The ophthalmologist then reshapes your cornea using a laser. The laser is a special instrument that has been programmed with measurements for your eye.

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- While your ophthalmologist is using the laser, you will hear a clicking sound. After reshaping the cornea, your eye surgeon folds the flap back down into position and smoothes the edges. The flap attaches on its own in 2–3 minutes, where it will heal in place.

After LASIK

- The ophthalmologist may place a see-through shield over your eye or ask you to wear a shield while sleeping for a few days. This is to help protect your eye while it heals.
- You should plan to go home and take a nap or just relax after the surgery.
- For a few hours, your eyes may feel scratchy or feel like they are burning. You will be given special eye drops to reduce dryness and help your eye heal.

What are the risks of LASIK?

Like any surgery, LASIK carries risks of problems or complications you should consider.

Some people have side effects after LASIK that usually go away over time. However, in rare cases, they may not go away. For example, almost everyone who has LASIK will have dry eyes and changing vision during the day. These symptoms usually fade within a month. For some people, though, they may take longer to disappear or they may remain.

Other side effects, either temporary or permanent, could include:

- eye pain or discomfort
- hazy, foggy or blurry vision
- scratchy eye
- glare
- halos (rings) or starbursts around lights
- being sensitive to light
- small pink or red patches of blood on the white of the eye that go away over time

Other rare risks include:

- eye infection
- worse vision than before LASIK, even with glasses or contacts (called **loss of best-corrected vision**)
- blindness

Also, with LASIK, your vision may end up being under-corrected or over-corrected. These problems often can be improved with glasses, contact lenses, or additional laser surgery.

If you are happy wearing contacts or glasses, you may not want to have refractive surgery. Together, you and your ophthalmologist can weigh the risks and rewards of LASIK.

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Vision after LASIK

About 9 out of 10 people (90%) who have LASIK end up with vision between 20/20 and 20/40—without glasses or contact lenses.

It is important to know that LASIK cannot correct presbyopia. This is the normal, age-related loss of close-up vision. With or without refractive surgery, almost everyone who has excellent distance vision will need reading glasses starting around age 40.

To help with presbyopia, some people have LASIK to get monovision. This means one eye is left slightly nearsighted and the other eye is adjusted for distance vision. The brain learns to adapt so that the nearsighted eye is used for close work, while the other eye sees distant objects. Monovision is not for everyone. To see if you are able to adapt to this correction, you will probably want to try monovision with contact lenses first.

Benefits of wavefront-guided LASIK

Like glasses, contacts or other refractive surgery, wavefront-guided LASIK corrects nearsightedness, farsightedness or astigmatism. However, the wavefront map provides more detail of the cornea than traditional, non-custom LASIK. This helps your eye surgeon identify and correct more specific areas of the cornea. As a result, you may have fewer side effects of LASIK, including poor night vision, glare, halos around lights and blurriness.

Summary

Wavefront-guided LASIK (or custom LASIK) is a type of refractive surgery. With this outpatient procedure, a laser is used to reshape your cornea, improving how light rays are focused in the eye. A device called a wavefront scanner creates a very detailed map of the cornea. This map is programmed into the laser. This helps guide the laser precisely to points where the cornea needs to be reshaped.

LASIK is used to treat myopia (nearsightedness), hyperopia (farsightedness) and astigmatism. It cannot correct presbyopia, the normal loss of close-up vision that comes with age. However, some people have LASIK to achieve monovision. This allows them to use one eye for close vision and the other for seeing distant objects clearly.

With LASIK, people can do most of their everyday tasks without corrective lenses. However, you might need to wear glasses for certain activities, such as reading or driving at night.

Your ophthalmologist will thoroughly examine your eyes to make sure you are a good candidate for wavefront-guided LASIK. You and your ophthalmologist will also discuss the risks and rewards of this refractive procedure.

Get more information about LASIK from EyeSmart—provided by the American Academy of Ophthalmology—at **aao.org/lasik-link**.

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