Is LASIK for me?

Part 2 of a 3-Part Series

DURING SURGERY

Answers to your laser eye surgery FAQs
Ron Krueger, MD, ophthalmologist, refractive surgeon with the Cole Eye Institute at the Cleveland Clinic in Cleveland, Ohio, says there is “low” risk of problems with the flap when the surgeon uses a femtosecond laser to create the flap. He explains, “We used to use devices with a blade to cut a flap. We’ve moved away from that and now have a laser that does it. I usually tell people there’s very little that can go wrong making the flap because the laser is so precise. But, after surgery, we want to make sure that flap is in good position; when the patient comes back the next day following the procedure, we want to make sure that the flap has no wrinkles or creases.”

Now that you’ve decided to move ahead with laser eye surgery, you want to know what really goes on in the operating room. What happens between deciding to undergo laser eye surgery and when you leave the surgeon’s office after the procedure?

What are the risks and possible side effects?

The risks associated with laser eye surgery are very low, but potentially include:

- infection or issues with healing, resulting in follow-up treatment;
- permanent vision loss that cannot be corrected with glasses, contact lenses, or further surgery;
- debilitating visual symptoms, such as glare, halos, or double vision that can seriously affect nighttime vision;
- under- or over-treatment, necessitating further refinement to reach the intended correction;
- severe dry eye syndrome.

When patients express concerns about the possibility of getting infections within and/or losing their eyes, Dr. Krueger explains that LASIK doesn’t go inside the eye, but rather treats the surface layers. So, any infection would affect the layers of the eye where it’s more controllable. For these reasons, infections are rare.

For Important Product Information about the WaveLight Lasers please see the last page of this magazine
Am I awake during the procedure?

Yes, you are awake during the procedure. Most surgeons prescribe medications to help calm and relax patients before the procedure.

Is there any pain?

You are given numbing eye drops, so you won’t feel any pain. You will feel the doctor’s hands around your face, and you may feel pressure, but it won’t hurt.

Sanjay “Sonny” Goel, MD, executive medical director, LasikPlus Laser Vision Centers in Annapolis, Maryland, says, “The procedure itself is actually quite comfortable. When you make the flap, you feel pressure on the eye, but it’s not pain. The other thing you feel are the eyelids being held open. You feel that, but it doesn’t hurt; it just might feel a little different or odd.”

After the LASIK surgery, when the anesthesia has worn off, you may feel some irritation. “You might feel like you have a piece of sand or an eyelash in the eye,” Dr. Goel says. Some patients experience some dryness or burning sensation after surgery, he explains, which may “last for maybe three to four hours.”

What will I see during the surgery?

During the procedure, you will see a flashing light, which is the target at which you are instructed to stare. You’ll also see bright lights and shadows, and your vision may go dim or dark momentarily during the surgery. Otherwise, everything is too close for your eyes to focus, and you won’t see much except flashing lights and shadows.

Laser eye surgery is fast—usually less than 10 minutes per eye. Dr. Krueger says, “Once you’re in the laser room, you’re done within half an hour.”

“Even if you would start to look around during the treatment, the laser would detect the eye jumping too much. As soon as it cannot compensate for your movement it will stop, remember the point where the eye was last detected, store the information on how much of the treatment had already been done, and when the surgeon repositions you back into the treatment area, the system remembers the already-performed treatment, and just continues.”

—Michael Mrochen, PhD
Laser eye surgery takes only about 10 minutes per eye.

**What happens if my eye moves during the surgery?**

One of the elements that makes laser eye surgery so safe and successful is the systems' precision. Michael Mrochen, PhD, researcher in medical physics and engineering, the Institute of Refractive and Ophthalmic Surgery, Zürich, Switzerland, says, “Laser systems have high-speed video imaging systems so they can measure your eye about 500 times per second. If your eye moves, the laser follows it. It’s actually measuring your eye’s movement and the laser beam is corrected for that eye movement.” The scanner is 10 times faster than your eye can move. Even if you were to jump away or move out of the laser beam, the system would detect that your eye was not in location, and would immediately switch off the laser.

Dr. Krueger says some patients ask, if they move, “is the laser going to drill a hole in the side of my head? The answer is no, because the tracking system will have been shut off and the laser will stop. And then, once you get your pupil back into alignment, the tracking system is engaged and you continue.”

**What happens if the doctor’s hand shakes or moves?**

Because much of laser eye surgery is computer-driven, there’s less risk related to the doctor’s movements or hand shaking.

**What type of laser is it?**

Usually, two different types of lasers are used:

- femtosecond laser
- excimer laser.

While a few practices still use a blade to create the flap in LASIK surgery, most surgeons use lasers for the entire procedure. “I would say, right now, 70% or more of LASIK surgeries in the United States are being done with a laser making the flap instead of a blade,” Dr. Krueger says.

In bladeless surgeries, two types of lasers work together: The femtosecond laser creates the flap and the excimer laser sculpts the cornea. Why two separate lasers? Each uses completely different technology to accomplish different things.

The femtosecond laser—the one used first to create the flap—uses an infrared wavelength and creates the flap by separating the layers of the cornea, cutting the tissue precisely with very, very short pulses.

The excimer laser then uses an ultraviolet wavelength to reshape the cornea so that light comes into focus on the retina on the back of the eye. And, regardless of the fact that it’s a laser, it doesn’t burn anything. Instead, it works by breaking bonds within and evaporating tissue. It removes microns of tissue without damaging anything below or to the side; that’s how it reshapes the cornea so precisely.

**How well does it work?**

More than 93% of patients achieve at least 20/20 or better vision after LASIK,” says Sonia H. Yoo, MD, refractive surgeon with Bascom Palmer Eye Institute, and professor of ophthalmology, University of Miami Miller School of Medicine, Florida. This represents legal driving vision and it is good enough for most sports and activities.

Because today’s lasers have tracking systems that follow the eye, the results have become more predictable, adds Dr. Shah. “The system compensates for movement, the pattern does not get affected, and you still get an accurate ablation on the eye. The results are a lot more accurate now because of that,” he says.


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Dr. Krueger says it’s critical that the laser systems are properly calibrated, “So, the right amount of treatment goes down, and also that it’s well centered. If it’s not well centered, then you’re going to have some other distortions created. I tell patients that we calibrate before every patient to make sure the right energy is coming out onto your eye. The laser’s tracking system locks onto and follows the movement of your pupil, so, when you’re being treated the laser is following. Even if your eye moves, the tracking system follows it and the laser pulses go where they’re supposed to go.”

Even with this state-of-the-art technology, “there is still a human component to it,” Dr. Groden says. “Honestly, probably the biggest input the surgeon has is the decision-making process. Who should and who shouldn’t have it.”

Policemen, firemen, even corrections officers in the prison system often express concern about wearing glasses or corrective lenses, says Chirag Shah, MD, ophthalmologist, LasikPlus Vision Centers near Philadelphia. “Prison correction officers and policemen come in saying that glasses or contacts can be a handicap. If you get into a fight, the first thing they’re going to do is to try and punch your glasses. If their glasses fall off, then they’re really compromising their own safety and the safety of others, of their partners,” he says.

The Air Force, NASA, and the Navy have studied LASIK flaps in great detail. They found that the force of a pilot ejecting out of a fighter plane would not dislocate the flap, so they permit their pilots and astronauts to have LASIK procedures performed.


“The laser does not generate any heat. Nothing’s burning, there’s no heat with the laser at all. It may smell like something’s burning, but that’s simply the laser interacting with oxygen in the air to form ozone. Nothing’s burning your eye. I could fire the laser on my hand and nothing would happen.”

—Lewis Groden, MD

“The laser creates a new shape to the cornea with extreme high precision. There’s no other mechanical system today that achieves that precision. That’s why these lasers we are using for eye surgery are also the type used to create semiconductor chips and computer chips.”

—Michael Mrochen, PhD
Do I have any restrictions?

How long is the recovery time?

Visual recovery occurs within the first several hours and days and is usually complete one to three months after the procedure. Your vision may fluctuate for several weeks as any inflammation and swelling subside.

For LASIK, the recovery is very rapid. When you walk out of the procedure room, you will already see better, but your vision may also probably have some haziness. That’s due to minor swelling to the eyes’ surface, and will improve within a few hours. Your eyes may feel uncomfortable—like a foreign body sensation of burning and tearing for the first two hours. Close your eyes and nap for a few hours. When you wake up, you’ll feel and see better. Most LASIK patients return to their normal work and lifestyle the day after surgery.

Dr. Shah says, “I tell my patients they can go back to work the next day provided it’s kind of a desk job. So, most patients can resume work; their main restrictions are no eye rubbing and don’t get punched in the eye.”

Most surgeons recommend a follow-up schedule of the first day after surgery, then again at one week, one month, and three months. These examinations watch for infection and monitor healing of the flap (for LASIK).

Did you know?

The less refractive error you have, the greater the chance of achieving 20/20 vision after surgery.

Do I have any restrictions?

You will have some minor restrictions after surgery, especially during the first few days. For example, your surgeon may recommend the following:

- Do not rub your eyes for the first week after surgery; wear an eye-shield at night to prevent inadvertent rubbing.
- When washing/drying your face, wipe the bony areas around the eye, not the eyelid.
- Go without eye make-up—especially mascara—for a week.
- You may shower the day after surgery, but avoid getting water in your eyes.
- Don’t go swimming for the first 10 days.
- Wear sunglasses when in the sun for three to six months to protect against UV exposure.

In general, you won’t have restrictions on your activities after one week to 10 days—during which time your eyes will be healing and stabilizing.

What if my vision is worse afterwards?

It will take a little time for your vision to recover after the surgery, although most patients can see better immediately. During the days and weeks after your surgery, your surgeon will examine how your eyes are healing and will repair any folds or shifts in the flap. If, after three months—when healing is usually complete—your vision isn’t as sharp as it could be, you may be a candidate for a refinement.

In the extremely rare cases of infection, your vision might worsen, although “typically those things can be fixed,” says Stephen Slade, MD, Slade & Baker Vision Center, Houston, Texas. Proper preoperative screening and following postoperative restrictions will help ensure that you obtain the best possible results.

LASIK is not for everyone. The most common risks of LASIK vision correction surgery with refractive lasers include dry eye syndrome; the possible need for glasses or contact lenses after surgery; visual symptoms including halos, glare, starbursts, and double vision; and loss of vision.

“I had this surgery done myself 13 years ago and I remember being able to sit up and see better right away.”

—Sanjay “Sonny” Goel, MD

Dr. Groden says, “I’ve done the procedure on an awful lot of ophthalmologists. That probably says more about the safety and efficacy of LASIK, of laser vision correction; it’s the first refractive surgery procedure that’s widely accepted by ophthalmologists for their own eyes.”
astigmatism, ocular disease, previous corneal or intracocular surgery, or trauma in the ablation zone.
- corneal abnormalities including, but not limited to, scars, irregular astigmatism and corneal warpage:
  - residual corneal thickness after ablation of less than 250 microns due to the increased risk for corneal edema;
  - pupil size below 7.0 mm after mydriasis where appropriate for wavefront-guided ablation planning;
  - history of glaucoma or ocular hypertension of > 23 mmHg;
  - taking the medications serotonin selective (li时时);
  - corneal, lens and/or vitreous opacities including, but not limited to, cataracts.
- irin problems including, but not limited to, cataracts and previous iris surgery compromising proper eye tracking; or
- taking medications likely to affect wound healing including (but not limited to) anticoagulants.
In addition, safety and effectiveness of the Wavefront Excimer Laser System clinical studies, there were a few subjects with various additional risks: 4.2% (4/173) of Wavefront Excimer Laser System treated eyes had these.
- treatments with an optical zone < 6.0 mm or ≥ 6.5 mm in diameter, or an ablation zone > 9.0 mm in diameter; or
- wavefront-guided treatments targeted different from emmetropic (plano) in which the wavefront calculated defect (spherical term) has been adjusted.
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Contraindications: The Wavefront Excimer Laser Systems are contraindicated for use with patients who:
- are pregnant or nursing;
- have a diagnosed collagen vascular, autoimmune or immunodeficiency disease;
- have been diagnosed keratitis or if there are any clinicologic pictures suggestive of keratoconus;
- are taking isotretinoin (Accutane)® or any tetracyclines or hydroxychloroquine (Plaquenil®);
- have severe dry eye;
- have cornea too thin for LASIK;
- have recurrent corneal erosion;
- have advanced glaucoma; or
- have uncontrolled hypertension.

Warnings: The Wavefront Excimer Laser Systems are not recommended for use with patients who have:
- systemic diseases likely to affect wound healing, such as connective tissue disease, insulin dependent diabetes, severe ulcerative disease or any noncompliance status;
- a history of Herpes simplex or Herpes zoster keratitis;
- a significant dry eye that is unresponsive to treatment;
- severe allergies;
- a history of glaucoma;
- an unreliable preoperative wavefront examination that precludes wavefront-guided treatment; or
- a poor quality preoperative topography map that precludes topography-guided LASIK treatment.

The wavefront-guided LASIK procedure requires accurate and reliable data from the wavefront examination. Every stage of every wavefront measurement that may be used as the basis for a wavefront guided LASIK procedure must be validated by the user. Inaccurate or unreliable data from the wavefront examination will lead to an inaccurate wavefront-guided LASIK treatment.

Topography-guided LASIK requires preoperative topography maps of sufficient quality to use for planning a topography-guided LASIK treatment. Poor quality topography maps may affect the accuracy of the preoperative LASIK treatment and may result in poor vision after topography-guided LASIK treatment.

Precautions: The safety and effectiveness of the Wavefront Excimer Laser Systems have not been established for patients with:
- progressive myopia, hyperopia, astigmatism and/or mixed