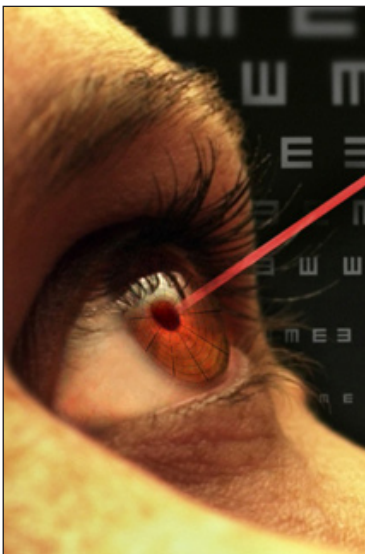


## LASIK Eye Surgery

### Is it right for your eyes?

LASIK (laser assisted in-situ keratomileusis) is a surgical approach used to correct vision in people who are nearsighted, farsighted, or have astigmatism.<sup>1</sup> The goal of LASIK surgery is to reduce dependence on contact lenses or eye glasses.<sup>2</sup> "All laser vision correction surgeries work by reshaping the cornea, or clear front part of the eye, so that light traveling through it is properly focused onto the retina located in the back of the eye. The LASIK procedure **permanently** changes the shape of the cornea using an *excimer laser*<sup>2</sup> (see [FDA-approved lasers for LASIK](#)). For this reason, those thinking about having LASIK eye surgery should:

- be completely aware/informed of how the procedure works,
- know whether or not they are a good candidate for the surgery,



- know the potential benefits and risks, and
- have realistic expectations about the outcome of the surgery.

### Eye Anatomy

#### Refractive error

"The eye is like a camera. In a camera, light passes through a lens system back onto the film."<sup>3</sup> In the normal eye, light rays of an image pass through the cornea and lens (like the camera's lens system) and focus onto the retina (like the camera's film) at the back of the eye.<sup>3</sup> The retina changes these light signals into electrical signals, which are sent to the brain where they are translated into the images we see.<sup>4</sup>

"Ideally, we should see images that are sharp as a result of being focused on the retina."<sup>4</sup> The shape of the cornea and eye, however, can cause blurry vision. "When an image gets focused in front of or behind the retina, the result is blurry vision."<sup>4</sup> These types of problems are called *refractive errors*. Refractive errors include:

- **Myopia** (nearsightedness),
- **Hyperopia** (farsightedness),
- **Astigmatism** (blurred vision due to irregular curvature of the cornea or lens<sup>5</sup>), and
- **Presbyopia** (progressively diminished ability to focus on near objects with age<sup>6</sup>).

Myopia, hyperopia, and some types of astigmatism can often be

corrected with LASIK eye surgery. Presbyopia cannot currently be corrected with LASIK.

### Is LASIK for You?

#### A good candidate

"Not everyone who wears eyeglasses or contact lenses is a good candidate for LASIK."<sup>4</sup> The qualifications of a good candidate for LASIK generally include the following:

- **At least 18 years of age.**<sup>7</sup> This guideline is in place because it is possible for eyes to change until around age 18.<sup>4</sup> In fact, some suggest that vision changes are more likely even into your early 20s,<sup>8</sup> so this is a factor you may want to discuss with your doctor before making a decision for LASIK.
- **Maintained stable vision over the past year.**<sup>7</sup>
- **Have no history of corneal disease.**<sup>7</sup>
- **Do not have significant medical or eye problems**, which may reduce the effectiveness of the surgery or the patient's ability to heal properly and quickly. These may include: diabetes or diabetic retinopathy, cataracts, ocular herpes (herpes infection of the eye), rheumatoid arthritis, lupus, corneal ulcers, keratoconus (thinning of the cornea), macular degeneration, and glaucoma.<sup>4,7</sup>
- **Are not taking medications that may cause vision changes or prevent proper healing**

after the procedure. These medications may include: steroids, retinoic acid, and immunosuppressants.<sup>7,8,9</sup>

- **Are not pregnant or nursing**, which can make vision changes more likely.<sup>7,8</sup>
- **Do not have scarring on the cornea.**<sup>9</sup>
- **Do not have a history of dry eyes**, which may be aggravated following surgery.<sup>9,10</sup>
- **Do not have thin corneas.**<sup>10</sup>
- **Do not have extra-large pupils in dim conditions.**<sup>11</sup>
- **Have a prescription within certain limits** (currently, myopia up to -12D; astigmatism up to 6D; hyperopia up to +6D).<sup>9</sup>
- **Do not actively participate in contact sports** in which blows to the face and eyes are a normal occurrence.<sup>10</sup>
- **Do not have a job that prohibits refractive surgery.** Be sure to check with your employer, professional society, and military service before undergoing any surgery.<sup>10</sup>
- **Cost is not an issue.** Most medical insurance will not pay for refractive surgery. Although the cost is coming down, it is still significant.<sup>10</sup> You will also want to be aware that some medical experts who tout low cost may not have the experience or qualifications of a doctor who charges more.
- **Have realistic expectations.** LASIK surgery cannot provide perfect vision every time. There are some risks involved, and you should be aware of these risks and have realistic expectations for the outcome of your surgery.<sup>7,9</sup>

## Realistic Expectations

### Do you have them?

“LASIK is a relatively new technology. The first laser was

approved for LASIK eye surgery in 1998. Therefore, the long-term safety and effectiveness of LASIK surgery is not known.”<sup>12</sup> Use the following checklist from the U.S. Food and Drug Administration<sup>11</sup> (FDA) to assess if you have realistic expectations:

- Overtreatment/undertreatment.** Are you willing and able to have more than one surgery to get the desired result?
- May still need reading glasses.** Do you have presbyopia?
- Results may not be lasting.** Do you think this is the last correction you will ever need? Do you realize that long-term results are not known?
- May permanently lose vision.** Do you know some patients may lose some vision or experience blindness?
- Dry eyes.** Do you know that if you have dry eyes they could become worse, or if you don't have dry eyes before you could develop chronic dry eyes as a result of surgery?
- Development of visual symptoms.** Do you know about glare, halos, starbursts, etc. and that night driving might be difficult?
- Contrast sensitivity.** Do you know your vision could be significantly reduced in dim light conditions?
- Bilateral treatment.** Do you know the additional risks of having both eyes treated at the same time?
- Patient information.** Have you read the patient information booklet about the laser being used for your procedure?<sup>11</sup> Ask your doctor for it.

If you are unaware of the risks, ask your doctor for further information, and read [What Are the Risks and How can I Find the Right Doctor for](#)

[Me?](#) Also, see the LASIK Surgery Checklist in its entirety [here](#).

## Finding the Right Doctor Make an informed choice

Levels of risk and benefit can vary from surgeon to surgeon depending on their level of experience with a particular procedure. Be wary of basing your decision simply on cost. Don't settle for the first eye center doctor you find or procedure you investigate. Also, be wary of centers that advertise “20/20 vision or your money back” or “package deals.”<sup>12</sup> “There are never any guarantees in medicine.”<sup>12</sup> Remember that the



decisions you make about your eyes and LASIK will affect you for the rest of your life.<sup>12</sup> Have *all* of your questions answered before

choosing LASIK eye surgery and your LASIK surgeon. Here are some [questions to ask your potential surgeon](#). Also, see the LASIK Institute's [Tough Questions for Doctors](#) for further information.

## Before, During, After What happens next?

If you decide to have LASIK surgery, you will need to do some things to prepare and know what to expect.

### Before the Surgery (pre-operative)

Before the surgery, your medical history will be evaluated and your eyes will be tested to make sure you are a good candidate for the procedure. Tests will likely include measuring corneal thickness, refraction (measures a person's ability to see an object at a specific distance<sup>13</sup>), and pupil dilation.<sup>1</sup> If you wear contact lenses, you will be asked to not wear them for a



period of time before these tests. This request is made because contact lenses change the shape of your cornea for up to several weeks after you have stopped using them depending on the type of contacts you wear.<sup>14</sup> Not leaving your contacts out long enough for your cornea to assume its natural shape before surgery can result in inaccurate measurements and a poor surgical plan, resulting in poor vision after surgery.<sup>14</sup> You will also want to be sure to bring your eyeglasses to the surgeon so your prescription can be reviewed.<sup>14</sup>

Tell your doctor about any past or present medical and eye conditions, any and all medications you are taking, and any medications you may be allergic to.<sup>14</sup>

The day before the surgery, you should stop wearing creams, lotions, makeup, and perfumes. These products, along with debris along the eyelashes, can increase the risk for infection during and after surgery.<sup>14</sup>

Before surgery, you will want to arrange for transportation to and from surgery and your first follow-up visit. Some medications given may impair driving, and your vision may also be initially blurry.<sup>14</sup>

### The Surgery

If you are not feeling well the morning of your surgery, call your doctor to see if the procedure should be postponed.<sup>1</sup>

“The surgery should take less than 30 minutes.”<sup>14</sup> You will lie on your back in a reclining chair. A numbing drop will be placed in your eye, and an instrument (i.e., lid speculum) will be used to hold your eyelids open. A suction ring with the cutting instrument (i.e., microkeratome blade) attached to it will be placed on your eye, and very high pressure will be applied to create suction to the cornea. Your surgeon will then use the microkeratome blade to cut a flap in your cornea. (Note: This blade should only be used once and then thrown away.) The ring and blade are then removed, and the corneal flap is folded back on its hinge to dry the exposed tissue.<sup>14</sup>

“The laser will be positioned over your eye, and you will be asked to stare at a light. This is **not** the laser used to remove tissue from the cornea. This light is to help you keep your eye fixed on one spot once the laser comes on. **Note:** If you cannot stare at a fixed object for at least 60 seconds, you may not be a good candidate for this surgery. When your eye is in the correct position, your doctor will start the laser.”<sup>14</sup>

“A computer controls the amount of laser energy delivered to your eye. Before the start of surgery, your doctor will have programmed the computer to vaporize a particular amount of tissue based on the measurements taken at your initial evaluation. After the pulses of laser energy vaporize the corneal tissue, the flap is put back into position.

A shield should be placed over your eye at the end of the procedure as protection, since no

stitches are used to hold the flap in place. It is important for you to wear this shield to prevent you from rubbing your eye and putting pressure on your eye while you sleep, and to protect your eye from accidentally being hit or poked until the flap has healed.”<sup>14</sup>

For more information on this surgery, refer to this [website](#).

### After Surgery (post-operative)

“Immediately after the procedure, your eye may burn, itch, or feel like there is something in it. You may experience some discomfort, or in some cases, mild pain; your doctor may suggest that you take a mild pain reliever. Both of your eyes may tear or water. Your vision will probably be hazy or blurry. “Do not resume wearing a contact lens in the operated eye, even if your vision is blurry.”<sup>14</sup> You will instinctively want to rub your eye, but don’t! Rubbing your eye could dislodge the flap, requiring further treatment. In addition, you may experience sensitivity to light, glare, starbursts or haloes around lights, or the whites of your eye may look red or bloodshot. These symptoms should improve considerably within the first few days after surgery. You should plan on taking a few days off from work until these symptoms subside.”<sup>14</sup>

“Healing after LASIK eye surgery usually occurs very rapidly. Most patients notice improved vision within a few days after LASIK eye surgery. However, you should schedule regular follow-up visits with your doctor.

This timeline can help after surgery:

- During the **first 24 to 48 hours** after surgery, see your doctor at least once and schedule follow-up visits at regular intervals for at least the first six months. “At the first post-operative visit, your doctor will



remove the eye shield, test your vision, and examine your eye. Your doctor may give you one or more types of eye drops to take at home to help prevent infection and/or inflammation. You may also be advised to use artificial tears to help lubricate the eye<sup>14</sup> (your eyes will be dry even though they do not feel that way<sup>1</sup>). Do not use any eye drops not approved by your ophthalmologist. Specific follow-up after the surgery varies from one surgeon to another.”<sup>1</sup>

- **Wait 2 weeks after surgery or until your doctor advises you otherwise** before using lotions, creams, or make-up around the eye.
- You should wait **1-4 days** following surgery before beginning any non-contact sports, depending on the amount of activity required, how you feel, and your doctor’s instructions.
- Avoid strenuous contact sports for at least **4 weeks** after surgery. It is important to protect your eyes from anything that might get in them and from being hit or bumped.<sup>14</sup>
- Avoid swimming and using hot tubs or whirlpools for **1-2 months**.
- “During the **first few months** after surgery, your vision may fluctuate.
- It may take up to **3-6 months** for your vision to stabilize after surgery.
- Glare, haloes, difficulty driving at night, and other visual symptoms may persist during this stabilization period. If further correction is necessary, you should wait until your eye measurements are consistent for

## **2 consecutive visits at least 3 months apart** before re-operation.

It is important to realize that although distance vision may improve after re-operation, it is unlikely that other visual symptoms such as glare or haloes will improve.

Also note that no laser company has presented enough evidence for the FDA to make conclusions about the safety or effectiveness of enhancement surgery.”<sup>14</sup>

**Contact your eye doctor immediately** if you develop any new, unusual, or worsening symptoms at any point after surgery. Such symptoms could signal a problem that, if not treated early enough, may lead to a loss of vision.



## **Advantages Benefits of LASIK**

Though we’ve spent a lot of time focusing on risks and realistic expectations concerning LASIK, reasons for choosing LASIK include its many benefits. Here are some reasons you might want to choose LASIK:

- It corrects vision for many. Reports suggest 80 percent of people gain desired vision;<sup>1</sup> 56 percent achieve 20/20 vision; and 90 percent achieve 20/40 vision (some conditions may lessen the chance of achieving such results).<sup>15</sup>
- LASIK eye surgery is associated with very little pain.<sup>1</sup>
- Vision is corrected quickly—almost immediately or by the day after surgery.<sup>1</sup>
- Recovery is quick, and usually no bandages or stitches are required.<sup>1</sup>
- Adjustments can sometimes be made years after LASIK to further correct vision.<sup>1</sup>
- Most patients no longer need corrective eyewear after LASIK.<sup>1</sup>
- For some people, LASIK means a safer, better lifestyle:
  - safety in sports; not having to wear corrective eyewear, and sometimes enhanced performance;
  - safety for parents who are concerned about their children in case there were an emergency where the parent could not readily find their eyewear (e.g., a fire).
  - safety for frequent travelers—less dependency on eyewear, ability to read exit and evacuation signs, and more convenience (less to pack).<sup>15</sup>

Whatever you decide about LASIK, make an informed choice. See your doctor, and discuss the options for your particular case.

To view the references used in this newsletter, go to:  
<http://fcs.tamu.edu/health/healthhints/2008/feb/ref.php>

This document is meant for educational purposes only and is not intended to replace the advice of your doctor or other health care provider.

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## Refractive Error Definitions

### Myopia

"In a myopic eye, the light rays are passed through the cornea and lens, but the point at which they converge (focus) is in front of the retina, not on the retina. This configuration allows clear images of near objects but not those that are far away."<sup>1</sup>

### Hyperopia

"In a hyperopic eye, the light rays do not converge or focus by the time they reach the retina. Hyperopic patients can focus on more distant objects, but not images that are close at hand."<sup>1</sup>

### Astigmatism

"With astigmatism, the rays of light do not converge into a single point but form a line on the retina. There are various types of astigmatism including regular, mixed, and irregular astigmatism. Currently, excimer lasers in the U.S. are approved for treatment of regular and mixed astigmatism. Recent advances in technology now allow for the therapeutic treatment of induced irregular astigmatism. In the future, this application may be expanded to include all types of irregular astigmatism. Patients who believe they

have astigmatism should discuss this subject in further detail with their physician to gain a better understanding of the mechanisms in their case."<sup>1</sup>

### Presbyopia

Presbyopia occurs with age as a progressively diminished ability to focus on near objects.<sup>2</sup>

"Presbyopia affects people as they enter their 40s. Caused by changes within the eye's crystalline lens as one ages, presbyopia affects everyone, and eventually everyone will need to wear reading glasses or bifocals. Presbyopia is not affected by the laser treatment."<sup>1</sup> In other words, presbyopia **cannot** be corrected with the use of LASIK eye surgery at this time.

### Sources:

1. Eye Surgery Education Council (2003). Refractive errors [on-line]. Retrieved September 17, 2007. From <http://www.lasikinstitute.org/Refractive.html>.
2. Wikipedia (2007). Presbyopia [on-line]. Retrieved November 30, 2007. From <http://en.wikipedia.org/wiki/Presbyopia>.

## Questions to Ask Your Potential Surgeon

The following is a list of questions you may want to have answered before choosing a doctor to perform your LASIK procedure. To better understand the procedure, you may first want to read *Before, During, After* in the February issue of *HealthHints*.

### Questions for the surgeon:

- How many eyes have you performed LASIK surgery on with the same laser? (Note: There is a learning curve<sup>1</sup> among surgeons in doing particular procedures and using particular devices.)
- How many laser procedures do you perform each month?<sup>2</sup>
- Do you use an [FDA-approved laser](#) for the procedure I need?
- What laser do you use?<sup>2</sup>
- Do you use each microkeratome blade only once?<sup>3</sup>
- What type of testing will you do to determine whether I'm a candidate for LASIK?
- What diagnostic test will you perform to check for dry eyes?
- How will you measure my pupils?<sup>2</sup>
- How do you check to see if my contact lenses have changed the shape of my cornea?
- If my cornea has changed shape, what will indicate that I am ready for surgery?
- What other diagnostic tests will you perform pre-operatively?<sup>2</sup>
- What percentage of patients do you reject for the LASIK procedure?<sup>2</sup>
- Has my prescription for glasses or contact lens been consistent for at least two years?
- Does my nearsightedness, farsightedness, or astigmatism fall within the accepted levels established for surgery by the FDA?
- Are my corneas thick enough to perform LASIK surgery?
- Do I have cataracts, glaucoma, or other corneal diseases?
- Are my corneas scarred?
- Do I have any diseases that would affect the outcome of the surgery or my ability to heal properly?
- Are there any other reasons why I may not be a candidate for LASIK surgery?
- What is your complication rate?<sup>2</sup>
- Am I at risk for complications?
- What can I expect during the procedure?
- What outcome can I expect from the surgery?<sup>4</sup>



- Are all pre-operative and post-operative visits included in the cost of the initial procedure, or will additional charges for pre-operative and post-operative visits apply?
- Can I choose the surgeon who will be operating on my eyes in advance, or will a surgeon be assigned to me the day of surgery?
- Who will be providing post-operative care?
- In the event of a complication, who would be providing emergency care?<sup>5</sup>
- In the event I have questions regarding my healing, who do I go to for answers?
- In the event I have questions regarding my outcomes, who do I go to for answers?
- What are the outcomes you are achieving?
- How many eyes that you have treated have lost two or more line of best corrected visual acuity, and were there any unusual circumstances?
- Has anyone on your staff had the surgery, and are they available to answer questions? Do you provide a list of patients I can contact?
- May I observe a surgery?<sup>2</sup>

### Note the following during your discussion:

- Is the doctor willing to spend the time to answer all of your questions?
- Does the doctor encourage follow-up and management of you as a patient? (Your pre-operative and post-operative care may be provided by a doctor other than the surgeon.)
- Do you feel that you know the doctor and are comfortable with an equal exchange of information?<sup>11</sup> In other words, are you at ease giving and getting information with this doctor?<sup>8</sup>
- Ask the doctor for the patient handbook on the procedure and laser that would be used for your surgery. Once you decide on a doctor and the exact procedure, you will want to carefully read the informed consent forms as well.

### Sources:

1. Eye Surgery Education Council (2007). Risks and complications [on-line]. Retrieved September 17, 2007. From [http://www.lasikinstitute.org/Surgeon\\_Questions.html](http://www.lasikinstitute.org/Surgeon_Questions.html).
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