

# A Lighter, Defter Touch

Years of refinement have made laser eye surgery better than ever

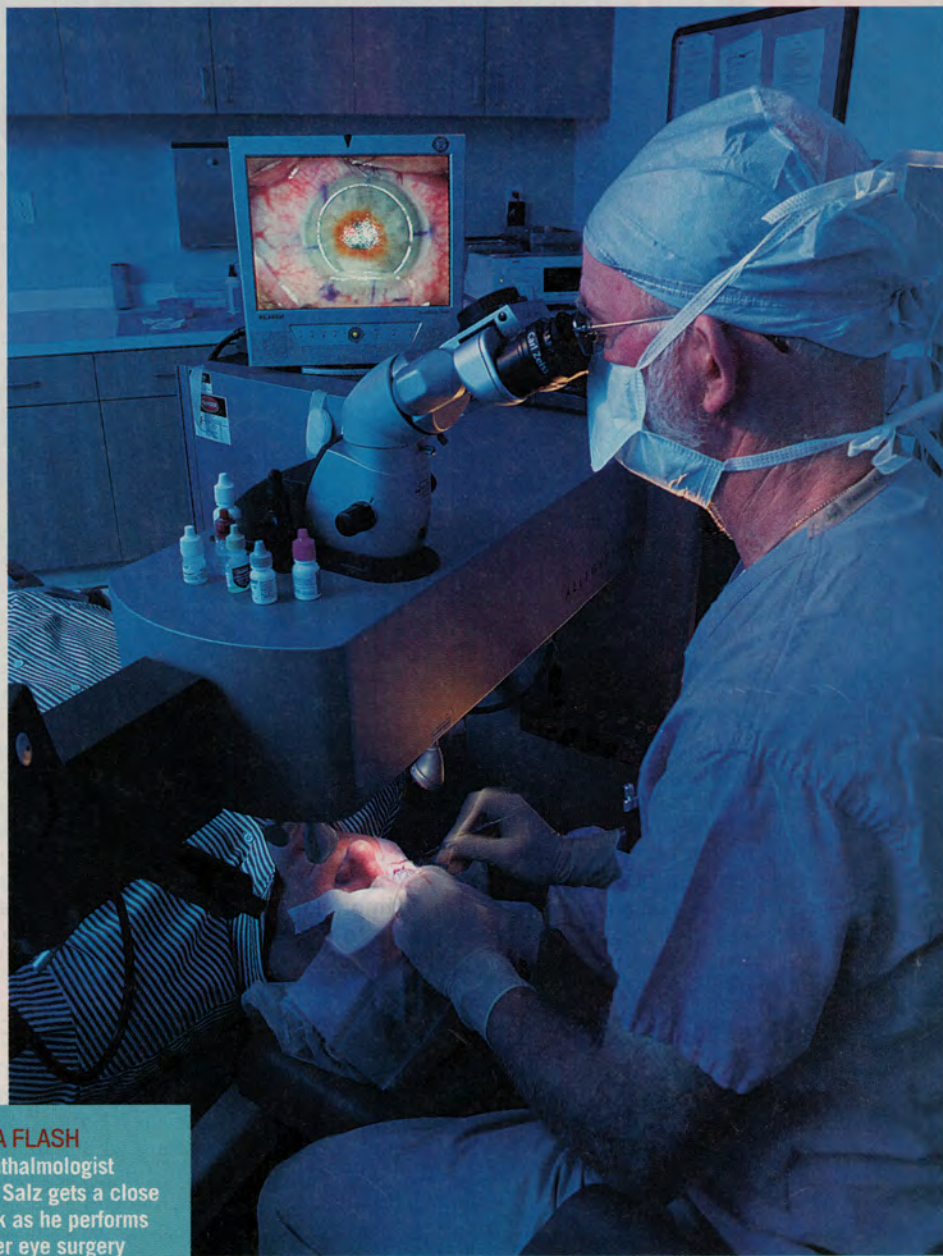
By Michelle Andrews

**W**hen Cindy Duong decided to pitch her contact lenses and have surgery last summer to correct her nearsightedness, she assumed she'd get LASIK. The procedure, in which a tiny flap is cut across the top of the eye's clear, dome-shaped cornea and folded back so a laser can reshape the tissue underneath, is easily the most common type of laser eye surgery, making up 87 percent of all procedures last year. But Duong's doctor said that the cornea in her left eye was too thin to both cut the flap and contour her cornea as LASIK (short for laser-assisted *in situ* keratomileusis) surgery requires. Instead, her doctor suggested she consider a procedure she'd never heard of called photorefractive keratectomy.

The PRK procedure doesn't entail a flap. Instead, the surgeon removes the very top layer of cells from the cornea, often by scraping them away after loosening them with alcohol, and then uses a laser directly on the exposed surface to shape it. Although the Food and Drug Administration approved PRK in 1995, a few years earlier than LASIK, the latter quickly surpassed PRK in popularity. That's because patients who had LASIK usually experienced clearer vision right off the bat and felt little pain or scratchiness in their eyes post-surgery. With PRK, the eyes generally take several days to heal comfortably, and vision remains blurry for the first few days or weeks.

Duong had PRK on her left eye and LASIK on her right. As expected, she noticed an immediate improvement in the vision in her right eye and felt no discomfort. Meanwhile, her left eye was irritated, and her vision was blurry for about a week. But then a funny thing happened. As the

**IN A FLASH**  
Ophthalmologist Jim Salz gets a close look as he performs laser eye surgery at his clinic in Los Angeles.



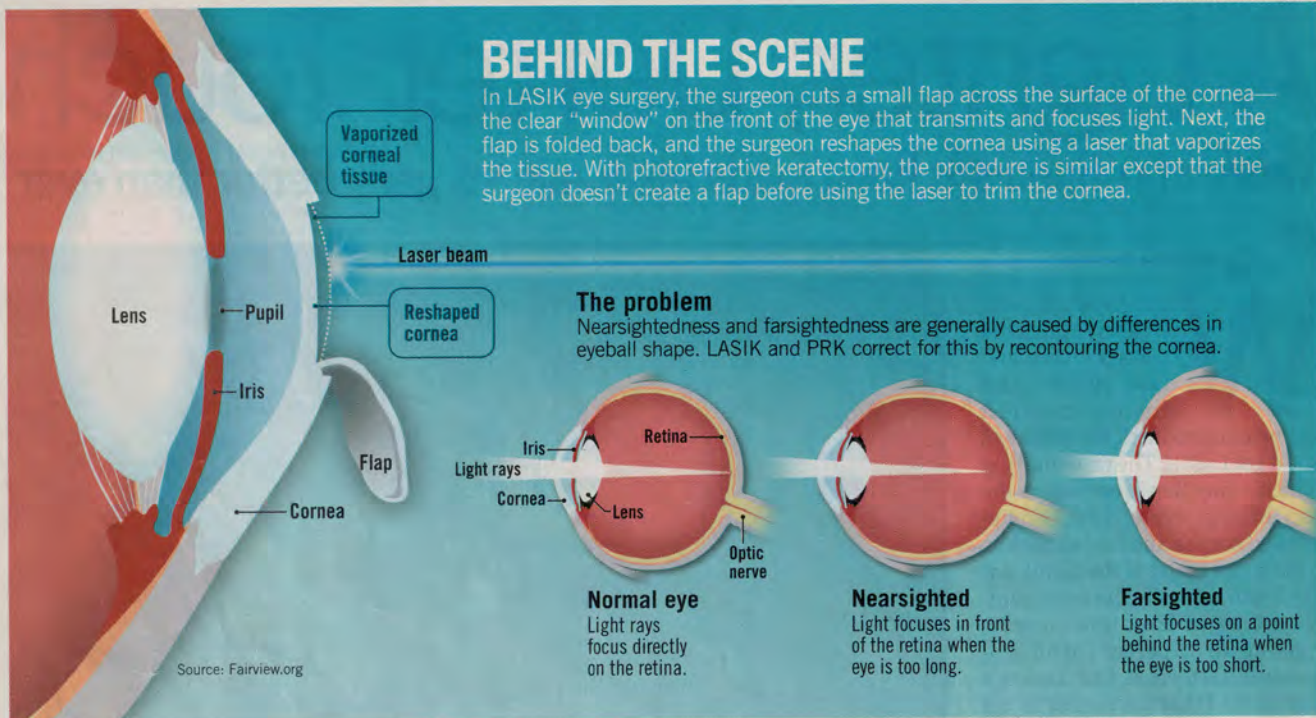
weeks passed, she noticed that her left eye caught up with and then surpassed the eyesight in her right eye. Her left-eye vision was slightly clearer, and she had fewer problems seeing at night. "Now, my PRK eye is much better than my LASIK eye," says the 26-year-old chemist from Chica-

go. "At night, there's definitely a blurriness in my right eye more than my left."

Duong isn't the only fan of PRK. Although LASIK remains the laser eye surgery of choice, in the past few years, more eye surgeons have been performing PRK. In some cases, they are turning away from LASIK entirely, say experts. Between

## BEHIND THE SCENE

In LASIK eye surgery, the surgeon cuts a small flap across the surface of the cornea—the clear “window” on the front of the eye that transmits and focuses light. Next, the flap is folded back, and the surgeon reshapes the cornea using a laser that vaporizes the tissue. With photorefractive keratectomy, the procedure is similar except that the surgeon doesn’t create a flap before using the laser to trim the cornea.



Source: Fairview.org

2005 and 2006, the percentage of all laser eye surgeries that were performed using PRK and other “surface ablation” techniques—in which tissue is ablated or removed from the surface of the eye rather than from the inside as it is with LASIK—rose from 8 percent to 13 percent, according to Market Scope, an ophthalmic research company. Meanwhile, the actual number of laser surgeries declined slightly during that time, from 1.41 million to 1.38 million. “Surgeons today are doing a higher percentage of PRK than in the past, and their mix is changing,” says Dave Harmon, president of Market Scope.

lens behind it and focus directly on the retina, producing a clear image. This nerve-sensitive tissue at the back of the eye converts the image into electrical impulses that travel along the optic nerve to the brain. If someone’s eyeball is too long, however, the light rays focus in front of the retina and, if too short, on a point behind it. The surgeon can’t change the actual shape of a person’s eyeball. However, using a computer-controlled ultraviolet beam of light called an excimer laser, he or she can reshape the cornea, the eye’s principal focusing mechanism, to improve visual acuity. (Laser eye surgery can also correct astigmatism,

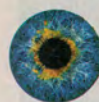
times clouded by a whitish haze caused by scarlike tissue that developed after the surgery. “You’ve given the eye a loud message that there’s been an injury, and the eye will respond with healing,” says Richard Foulkes, an adjunct professor of ophthalmology at the University of Illinois, who performed the surgery on Duong. “Too vigorous healing would cause hazing.”

Thanks to an antibiotic eyedrop called mitomycin C, the hazing problem has been almost eliminated in the past five years and with it one of the major downsides to PRK. And the use of contact lenses to act as bandages to protect the eyes during the first several days following surgery makes recovery from PRK less painful. At the same time, surgeons have discovered that LASIK isn’t necessarily the miracle cure for bad eyesight that it originally appeared to be. For one thing, although a patient’s vision is initially better with LASIK, as the weeks and months pass, studies indicate that people who’ve had PRK may achieve a slight edge in improved eyesight. Dry-eye problems, the No. 1 complication of laser eye surgery, also tend to occur more frequently with LASIK since the surgery cuts into the cornea and severs some of the corneal nerves that stimulate tears.

Finally, there’s the flap itself. Most flaps are cut with a mechanical blade called a microkeratome. If the flap is too

a blurriness that typically occurs when the surface of the cornea is uneven.)

**Fool the eye.** Refractive surgeons, who generally correct people’s vision by changing how light rays “refract,” or bend in the eye, discovered that by working inside the eye, as they do with LASIK, they could fool it into not recognizing that it had been wounded by the laser. After surgery, the eye didn’t feel painful, since pain is a response to wound healing. And because the eye’s surface hadn’t been interfered with, vision recovery was immediate. Similarly, LASIK sidestepped a problem that plagued early PRK procedures: A patient’s vision was some-



## LASIK IS THE MOST POPULAR TYPE OF LASER EYE SURGERY, MAKING UP 87 PERCENT OF ALL PROCEDURES.

Two other surface-ablation techniques, LASEK and Epi-LASIK, are essentially newer versions of PRK. Instead of removing the very top layer or “skin” of the eyeball, they push it to one side and then replace it following laser surgery on the surface of the cornea. Research is inconclusive, but many experts say these newer techniques don’t actually reduce the discomfort caused by the surface ablation.

To understand how laser eye surgery works, it helps to know how nearsightedness and farsightedness typically occur and how the surgery corrects them. In someone with normal vision, light rays of an image pass through the cornea and the

thick or too thin or cuts an uneven plane, it can affect the outcome of the surgery. The flap could wrinkle or not reseal itself properly. And in some patients, cutting a flap carries a slight risk of structurally weakening the cornea itself, which can lead to a very serious condition called ectasia, in which the cornea bulges out. Although many early laser eye surgery problems have been resolved in the more than 10 years that the procedure has been performed, those that remain are almost always related to the flap, says Marguerite McDonald, a clinical professor of ophthalmology at Tulane University Health Sciences Center. Word to the wise: "You can't have problems with the flap if you don't have one," she says.

About 3 percent of people who have laser eye surgery continue to suffer from complications six months after the procedure. Now, new technology is making laser eye surgery more accurate and safer. Instead of a mechanical knife, more surgeons are starting to use a laser called the IntraLase to cut the flap for LASIK surgery. With the IntraLase, surgeons can much more precisely control the depth and diameter of the flap. "IntraLase is the closest we've come to getting accuracy that matches surface ablation," says Foulkes.

**Precise map.** In the past, surgeons simply programmed a person's prescription into the laser to tell it how to trim the cornea. Now, more refractive surgeons are using "wavefront" technology for both LASIK and PRK that creates a more precise map of the unique optical landscape of a patient's eyes. With wavefront, the laser can be set to deal with "higher-order aberrations"—there are about 20 of them—that are responsible for things like glaring and starbursts, says Jim Salz, a clinical professor of ophthalmology at the University of Southern California. "We have a better chance of making your vision 20/20," Salz says, "and fewer optical problems."

Laser eye surgery isn't typically covered by insurance, and it's not cheap, especially using the new technology. At Salz's Los Angeles practice, LASIK with wavefront and IntraLase costs \$2,800 per eye. PRK is a bit less expensive, at \$2,300 per eye without wavefront. Prices may be

lower in different parts of the country, and high-volume centers may charge significantly less than \$2,000 an eye. But price and whiz-bang technology aren't the only elements to consider in the decision-making process. "No amount of technology can make up for an inferior surgeon," says Glenn Hagele, executive director of the Council for Refractive Surgery Quality Assurance, a consumer information group. On its website ([www.usaeyes.org](http://www.usaeyes.org)), the council lists eye surgeons it certifies who meet its standards for postoperative visual acuity and patient satisfaction, among other things. In addition, the group's list of "50 tough questions for your LASIK doctor" tells

why some patients have problems."

After laser eye surgery, about 90 percent of patients achieve at least 20/40 vision, the legal minimum in many states for driving without glasses, according to the American Academy of Ophthalmology. Up to 10 percent of patients need enhancement surgery to fine-tune the results of the original procedure. But being able to read an eye chart isn't the only measure of a successful surgery, and it's in this area that many patients continue to have problems.

Andrew Jankovich had the Cadillac of LASIK eye procedures. His Cincinnati surgeon used the IntraLase laser to cut the flap and wavefront technology to

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**DELICATE WORK**  
In LASIK surgery, the cornea is reshaped to correct vision problems. Here, the cornea is marked before a flap is cut.

potential patients what to ask any doctor they're considering for LASIK or other refractive eye surgery.

Not everyone is a suitable candidate for laser eye surgery. People with very high corrections may not get satisfactory results, for example. But even with a good surgeon working on an ideal candidate, the results can be subpar. "There's no smoking gun," says David Hartzok, executive director of the Vision Surgery Rehab Network in Rockford, Ill., which offers support and assistance to people who've had complications following eye surgery. "More than half the time, we simply don't know

guide the laser that reshaped his corneas. Following the surgery, his vision was 20/15, and his doctor said everything looked fine. But almost immediately, he noticed that his left eye was scratchy and irritated. Instead of going away, the problem worsened, and he now has severe dry eye. It's been a year now, and he says he constantly feels as if there's a hair in his eye or a raw spot there. Special eyedrops make it slightly better, but it never goes away. If he could make the choice again, Jankovich says, "I'd wear 3-inch-thick glasses instead."

For many people, ditching their glasses is a big part of the appeal of laser eye surgery. But before you pony up thousands of dollars, make sure you understand the potential risks and limitations. Only then can you make a clear-eyed choice. ●

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