

# IntraLASIK: Creating a LASIK Flap with Precision

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A new laser, the IntraLase FS, may make LASIK (laser-assisted in situ keratomileusis) even safer. Surgeons use it in a LASIK variation called IntraLASIK to create the **corneal** flap under which they reshape your eye to correct your vision. In traditional LASIK, surgeons use a blade called a **microkeratome** to create the flap. Although surgical complications during LASIK are relatively rare, when they do occur, the microkeratome portion of the procedure is often the source of the problem.

The laser's technology is distinguished by the speed of the laser pulse — in the femtosecond (one quadrillionth of a second) range. It is used only to create the flap for IntraLASIK, and then surgeons use an excimer laser to perform the rest of the LASIK procedure.

## How IntraLASIK Works

The surgeon uses IntraLASIK computer software to guide the IntraLase laser beam, which passes into the cornea and pulses a pattern of tiny (3-micron-diameter) overlapping spots. This pattern results in a precise cut of the cornea at a depth determined by the surgeon. As with a mechanical microkeratome, a small section of tissue at one edge of the corneal flap is left uncut, forming a hinge that allows the surgeon to fold back the corneal flap and reshape the corneal bed with the excimer laser as in traditional LASIK.

## Comparing IntraLASIK and LASIK: The Difference Is in the Corneal Flap

**People ineligible for LASIK may be able to have IntraLASIK.** The thickness of the cornea is an important variable in LASIK. Most people have corneas between 500 and 600 microns thick. Most microkeratomes cut flaps that are between 100 and 200 microns thick. For people with thin corneas, LASIK surgeons tend to move cautiously, balancing the thickness of the cornea against the amount of vision correction needed, and even may decide that the procedure is inadvisable in a particular patient.

The IntraLase laser can make corneal flaps as thin as 100 microns, which may allow surgeons to perform IntraLASIK in people with thinner and flatter corneas, according to Vance Thompson, M.D., a Sioux Falls, S.D., refractive surgeon with experience using the femtosecond laser. [Thompson is also an AllAboutVision.com Advisory Board member.]

**IntraLASIK may present fewer complications.** A laser-made corneal flap reportedly differs from a microkeratome-made flap in several other ways. The laser cut follows the curvature of the cornea and produces a flap with vertical edges, unlike the edges left by a microkeratome. This difference in flap architecture may reduce the chance of corneal **epithelial ingrowth**, a complication of LASIK.

Microkeratome-related problems, which are avoided with IntraLASIK, include partial and "buttonholed" flaps, epithelial sloughing, corneal wrinkles and flaps that are too thick, according to Thompson. Microkeratome use is also more difficult in people with prominent orbital rims and small eyes, and introduces sterility issues not posed by the laser, Thompson said.

The IntraLase laser employs a suction ring that utilizes low vacuum (the microkeratome uses high vacuum), and delivers the laser pulse to the cornea through a disposable glass lens. The lower vacuum in IntraLASIK presents less risk of complications associated with the higher pressures needed with microkeratome use. The outer layer of the cornea experiences no trauma and the procedure is painless.

### **After IntraLASIK**

Recovery after IntraLASIK is similar to that after traditional LASIK with a few important differences. Following surgery, some patients have reported experiencing eye irritation for up to two days; LASIK patients with eye discomfort report a similar duration. Although it may take longer (four to seven days) to recover good vision, the approach appears to be associated with a lower incidence of dry eyes, corneal complications and reoperations compared with traditional LASIK.

Flaps made with the laser appear to adhere more tightly to the corneal bed at the end of the procedure, according to Thompson. Laser-made flaps demonstrate a more aggressive healing response at the edges compared with microkeratome-made flaps, some of which can be lifted easily many years after surgery, he said.

Thompson avoids laser-made flaps in patients with previous corneal surgery, such as radial keratotomy.

The "all-laser" LASIK approach, utilizing the IntraLase laser and a standard excimer laser, not only avoids microkeratome-related complications such as corneal irregularities and scarring, which can degrade vision, but also offers the potential for better vision after LASIK. Precision and control in LASIK surgery have everything to do with accuracy of vision correction, quality of resulting vision and reproducibility among differing patients and surgeons. Replacing the mechanical microkeratome, the source of many LASIK complications, with a computer-guided laser may be a significant advance.