The Origins of Lasik

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We use...
A Guide to Considering Lasik Surgery
Understanding Wavefront-Optimized and Contoura™ Vision Topography-Guided Lasik

Introduction

If you are reading this guide, you likely want to wake up every day with clear vision—without dependency on glasses or contact lenses. You are in the right place. Lasik surgery offers a personalized solution for vision correction using the most advanced technology available in the world.

In 2017, there were more than 500,000 laser eye surgeries performed in the United States. While this is a large and growing number, the reality is that only a small portion of the population has realized vision correction through Lasik. There are many more prospective patients in the United States who are researching Lasik surgery—perhaps including you. That’s why we have created this guide.

At Lasik Vision Centers of Cleveland (LVC), we want our prospective patients to have a thorough understanding of Lasik to make an educated choice about whether to pursue laser eye surgery. During your research you’ve probably come across many unfamiliar terms, such as topography-guided Lasik, Contoura™, corneal mapping, or custom Lasik. We hope that by the end of this guide, you will have a better understanding of these terms, as well as the current Lasik technology being used today, the new enhancements that are possible, and the steps to determining whether you are a Lasik candidate.
The Origins of Lasik

Lasik is an acronym that stands for *laser in-situ keratomileusis*. The latter word, *keratomileusis*, comes from the Greek words for *cornea* and *to carve*. Put simply, Lasik is a refractive surgery, or a procedure that aims to correct an error in refraction. A refractive error occurs when the eye’s shape prevents light from focusing directly on the retina. If you currently wear glasses or contact lenses, you likely have one of the most common refractive errors (see chart) which are commonly corrected by Lasik.

A wavefront-optimized Lasik procedure includes the use of intralase bladeless technology to create the thin hinged flap in the eye’s cornea, reshape the tissue of the eye, and reposition the flap, which adheres back to the eye and naturally heals. Based on a series of scans and tests, some patients are candidates for an additional enhancement known as Contoura™.

### Common Refractive Errors*

<table>
<thead>
<tr>
<th>Error</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>Myopia (Nearsightedness)</td>
<td><em>A condition in which close-up objects appear clearly, but far away objects appear blurry</em></td>
</tr>
<tr>
<td>Hyperopia (Farsightedness)</td>
<td><em>A condition in which close-up objects appear blurry</em></td>
</tr>
<tr>
<td>Presbyopia</td>
<td><em>An age-related condition in which seeing close-up becomes more difficult</em></td>
</tr>
<tr>
<td>Astigmatism</td>
<td><em>A condition in which the eye does not focus light evenly on the retina</em></td>
</tr>
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*Source: nei.nih.gov*
The Origins of Lasik

Lasik, although the most well-known, is not the first procedure that aims to treat refractive errors. To understand the origins of Lasik, we need to first go back to Russia in 1978, when an ophthalmologist named Svyatoslav Fyodorov made an accidental discovery when treating a patient who had experienced eye trauma including lacerations on the cornea. The lacerations occurred in a radial pattern and, after they healed, the patient noticed his existing nearsightedness was significantly improved. Dr. Fyodorov began to perform this procedure, creating small incisions into the cornea in a radial pattern, on other patients with refractive errors. The procedure became known as radial keratotomy, or RK.

RK came to the United States through Dr. Leo Bores, who had visited with Dr. Fyodorov in Russia several times. During the 1980s and into the 90s, millions of patients would undergo RK, despite its lack of scientific testing and proper medical approval. A similar procedure called astigmatic keratotomy, or AK, was also performed to correct and reduce astigmatisms. Both procedures lacked precision in vision correction and eventually decreased in popularity.

Before Dr. Fyodorov discovered RK, another important discovery was key to the eventual use of laser technology to correct refractive errors. In 1976, IBM began testing the excimer laser to etch computer chips. In the early 1980s, Dr. R. Srinivasan started to test the laser on biological tissues. He discovered the laser’s ability to cut extremely precise, smooth grooves in different materials—a striking difference from the lack of precision used by surgeons in the RK and AK procedures. The first patient procedure using an excimer laser was done by Dr. Theo Seiler in 1985 in Germany. This procedure, which applied the excimer laser directly to the surface of the cornea, became known as photorefractive keratectomy, or PRK, and was widely used to treat patients with nearsightedness. PRK’s popularity, like that of RK and AK, was slow to rise and the wide acceptance and use of laser vision correction did not truly grow until Lasik was introduced in 1998.
Wavefront-Optimized LASIK

As you discovered, the origins of Lasik date back several decades, with Lasik officially introduced in 1998. Since then, as technology has advanced, the procedure has been carefully honed, developed and improved. Today’s standard Lasik procedures use the latest and newest wavefront-optimized technology to give the patient the most precise vision correction possible. Wavefront-optimized Lasik is based on “fingerprint” of a patient’s eye, including all the cornea’s aberrations, which guides the surgeon in providing a precise result using the ALLEGRETTO WAVE® Eye-Q Excimer Laser.

While years ago, Lasik procedures did use a mechanical cutting tool called a microkeratome, these procedures are now entirely blade-free. Instead of a blade, an intralase laser is used to create a cornea flap, which prepares the eye for the use of an excimer laser on the inner cornea. Through applying tiny, rapid pulses of laser light, the excimer laser—not a metal blade—is used to correct the patient’s vision.

Wavefront-optimized Lasik continues to deliver unparalleled results, eliminating patients’ reliance on glasses and contact lenses. However, a new technology has recently evolved to deliver an even higher degree of precision and reduce some subtle post-op irregularities or aberrations that a patient may experience, such as minor halos of light at night or glare. This technology, explored in the next section, is known as Contoura™ Vision Topography-Guided Lasik.
The Origins of Lasik

Snapshot of the History of Refractive Surgery*

1976: IBM develops excimer laser

1978: Dr. Fyodorov discovers RK

1980s-1990s: Millions of patients in U.S. undergo RK and AK procedures

1995: Dr. Seiler performs first excimer laser procedure, known as PRK

1998: Lasik surgery introduced
Contoura™ Vision Topography-Guided Lasik is not a replacement for Lasik surgery. Rather, it is an enhancement to wavefront-optimized Lasik procedures that is a good option for some candidates.

All Lasik procedures involve using a laser to change the shape of the cornea. A nearsighted cornea will be flattened just a bit and a farsighted cornea will be steepened just a bit. An eye with astigmatism will be flattened a bit in certain areas. During wavefront-optimized Lasik, patients with the same vision prescription will be treated the same by the laser. As an example, if two patients have the same vision prescription for contact lenses and undergo Lasik without Contoura™, the laser will flatten both patients’ corneas to correct for that specific prescription. Again, the procedure delivers great results but is not customized to the unique hills and valleys of each patient’s corneas.

Every candidate for Contoura™ undergoes an extremely detailed scan by the Vario Topo-Analyzer that maps their eyes. This technology is the best in the world and measures unique irregularities of the cornea—in all, 22,000 points on the cornea are measured. This scan is then loaded onto a flash drive and plugged into the ALLEGRETTO WAVE® Eye-Q Excimer Laser. This laser adjusts the treatment and instead of treating a flat plane to correct a specific prescription, it will laser deeper on a hill of the cornea and less on a valley. This customized mapping—the most customized Lasik available in the world—will result in the smoothest possible cornea, eliminating high order aberrations such as halos or glare.
While a patient will realize incredible results through either procedure, for some candidates Contoura™ delivers a slightly higher degree of customization.

**Personalize your Lasik procedure with Contoura™ Vision**

We use **22,000 unique elevation points** on the cornea to image and analyze the patient’s eye.

The scans of the patient’s eye are loaded into the **ALLEGRETTO WAVE® Eye-Q Excimer Laser**.

The ALLEGRETTO WAVE® Eye-Q Excimer Laser **automatically adjusts the pulse placement** of the laser to match the topography of the patient’s eye, resulting in the smoothest possible cornea.
Are You a Candidate for Contoura™?

During the initial consultation* with a candidate at LVC, we perform several different scans with various types of equipment, including the Vario Topo-Analyzer and the Pentacam®. Some scans give us the patient's prescription, some test corneal thickness and curves, some test the shape and surface of the cornea, and so on. All these different scans must agree with each other for a patient to be a good candidate for Contoura. For example, if the curves of the cornea measured by the Pentacam® are very different from the curves measured by the Vario Topo-Analyzer, the patient would be best treated with standard wavefront-optimized Lasik and not Contoura™.

Another important consideration in determining a Contoura™ candidate is the degree of astigmatism found on the mapping scans. If the measurements are close to the measurements taken when checking the prescription of the patient, then we will include Contoura™ in the patient's treatment. Currently, approximately 40 percent of Lasik patients at LVC are candidates for the Contoura™ enhancement. We expect this percentage to increase over time.

* Not all candidates for Lasik will be candidates for Contoura™. Lasik providers have the option of including the Contoura™ mapping in a patient's treatment or treating the patient with standard wavefront-optimized Lasik. Several factors play into this decision.

\[A\] Red/Pre: Elevation of 30-yr.-old near-sighted male patient's cornea before Contoura Lasik with Intralase. Patient's natural cornea is steep and raised.

\[B\] Orange/Post: Elevation of same patient's cornea after Contoura Lasik with Intralase. Patient's cornea is much flatter which shortened the length of his eye, correcting his near-sighted prescription.
Are You a Candidate for Contoura™?

Contoura™ helps reduce the high order aberrations that patients sometimes experience following standard wavefront-optimized Lasik surgery.

<table>
<thead>
<tr>
<th>Post-Op Symptoms at 12 Months**2</th>
<th>5.2% decrease</th>
</tr>
</thead>
<tbody>
<tr>
<td>Light Sensitivity</td>
<td>8.0% decrease</td>
</tr>
<tr>
<td>Difficulty Driving at Night</td>
<td>8.7% decrease</td>
</tr>
<tr>
<td>Reading Difficulty</td>
<td>4.8% decrease</td>
</tr>
<tr>
<td>Complaints of Glare</td>
<td>3.2% decrease</td>
</tr>
<tr>
<td>Halos</td>
<td>2.8% decrease</td>
</tr>
<tr>
<td>Starbursts</td>
<td></td>
</tr>
</tbody>
</table>

* Post hoc analysis of visual symptoms compared to preoperative visual symptoms of 230 eyes contained in the FDAT-CAT pivotal trial at 12 months.
** Compared to pre-op.
The LVC Difference

Whether you are a candidate for wavefront-optimized or topography-guided Lasik, you will realize the highest quality results possible through laser vision correction. If you are considering Lasik surgery in Northeast Ohio, we hope you will contact the team at LVC to set up an initial consultation.

Wavefront-Optimized Lasik at LVC

✓ Safe, bladeless procedure guided by advanced wavefront technology
✓ Performed by an experienced and trained Lasik surgeon, Dr. Gregory Eippert
✓ Pre- and post-operative care and consultation provided by a caring, knowledgeable staff
✓ Financing options and payment plans to fit every budget

Contoura™ Vision Topography-Guided Lasik at LVC

✓ Enhancement available to those patients whose corneal measurements and scans align
✓ Reduces subtle high order aberrations such as halos or glare
✓ Performed by an experienced and trained Lasik surgeon, Dr. Gregory Eippert
✓ Pre- and post-operative care and consultation provided by a caring, knowledgeable staff
✓ No added cost