Patient information

What you should know about SMILE

Understanding minimally invasive Laser Vision Correction

ZEISS

Good vision is something we all want
Laser Vision Correction the gentle way

Clear vision is essential for virtually everything – our work, our daily activities, our quality of life as such. Unfortunately, not everyone has good natural vision. Eye conditions such as nearsightedness, farsightedness and astigmatism, so-called refractive errors, are very common.

Many people wear glasses or contact lenses to see well, but some consider them a great inconvenience. They just want to enjoy good vision without glasses or contacts. Thanks to medical advancements, this is possible. Minimally invasive surgery, for example, is quickly becoming the standard of care in many medical fields, also in refractive surgery.

Today, most refractive errors can be treated with Laser Vision Correction – very effectively, even gently. This is the case with SMILE, an advanced procedure, supporting a comfortable patient experience.

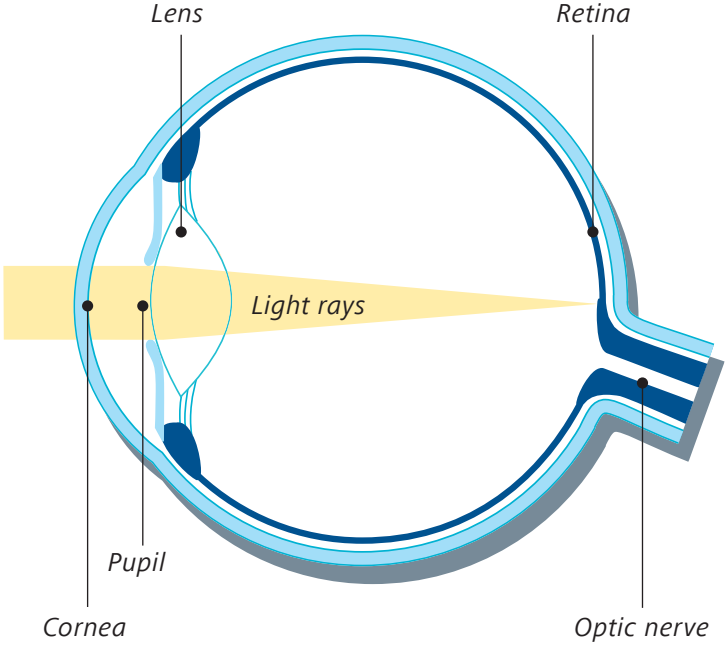
Whether Laser Vision Correction is right for you, depends on a variety of factors. Your eye doctor will be happy to assist you in finding the best option for your vision needs.

How the eye works
Understanding vision

The human eye is truly remarkable in its design. Each eye is unique. The vision quality we enjoy is largely determined by the size and shape of our eyes.

With a healthy eye, light rays entering the eye are focused directly on the retina to form a sharp image, which is then sent to the brain via the optic nerve and results in a visual image.

When the eye's dimensions are not aligned, the light rays are not correctly focused. This results in a refractive error such as nearsightedness, farsightedness or astigmatism (an irregular curvature of the cornea). Refractive errors are very widespread and affect people of all ages.



Normal vision
With normal vision, the eye's dimensions are well-aligned. The light rays are focused directly on the retina to create a clear image.

Common vision conditions

Refractive errors

Refractive errors occur when the curvature of the cornea, which mainly dertermines the refractive power, is not aligned with the eye's length. As a result, the light rays are prevented from focusing directly on the retina.

Nearsightedness (myopia)
When the eyeball is too long, the light rays are focused in front of the retina. Distant objects appear blurry, those up close are clear.

Light rays are focused in front of the retina

Farsightedness (hyperopia)
When the eyeball is too short, the light rays are focused behind the retina. Nearby objects appear blurry, distant ones are clear.

Light rays are focused behind the retina

Astigmatism
The cornea’s irregular shape causes light rays to focus on more than one point. Overall vision appears blurry or distorted.

Light rays are focused in front of and behind the retina

SMILE minimally invasive surgery

An advanced procedure

With the development of SMILE, a minimally invasive procedure has become available. It has quickly established itself as a gentle treatment option.

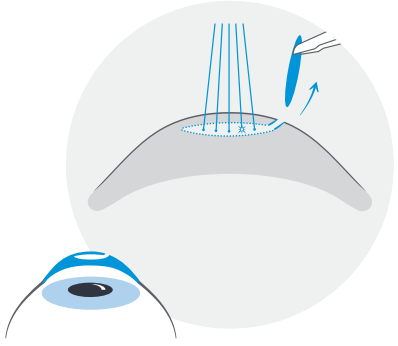
A small piece of tissue (lenticule) is created inside the cornea with the laser and removed through a small incision. Minimally invasive means there is minimal corneal tissue intervention. Many of the upper layers of the cornea are unaffected. This offers the potential for preserved biomechanical stability of the eye and fast healing.

SMILE is also a keyhole procedure, meaning that there are no flap-related complications and side effects. As a result, corneal sensitivity, for the most part, is quickly recovered.

Visual recovery, in general, is fast. Patients can normally return to work, take a shower or apply makeup shortly after surgery. Driving and sports activities are possible within a few days.

At a glance

- Minimal invasive and gentle with only a small incision
- No flap necessary, thus reducing the risk of infection and incidence of dry eyes
- Supporting a comfortable and stress-free patient experience
- Generally fast visual recovery within a few days
- Predominantly excellent visual outcomes with high predictability
- Interesting treatment option also for athletes engaging in contact sports, flight crews, military and rescue personnel
- Odorless and noiseless, laser works silently

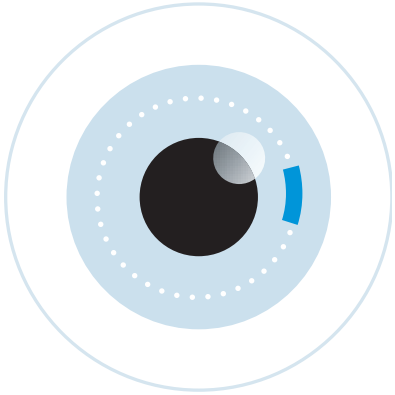


How the procedure is performed

Treatment step comparison: SMILE and Femto-LASIK

LASIK, and its advanced form, Femto-LASIK is by far the most widely performed procedure in the world today. With the development of SMILE, however, a minimally invasive procedure is now possible.

Prior to the treatment
Anesthetic eye drops are applied to the eye.
An eyelid holder is used to prevent the eye from blinking during the procedure.

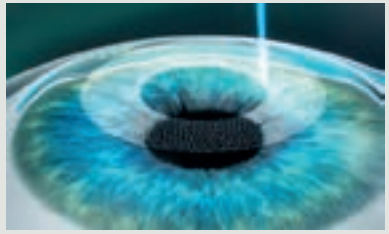


Only a small incision on the surface of the eye

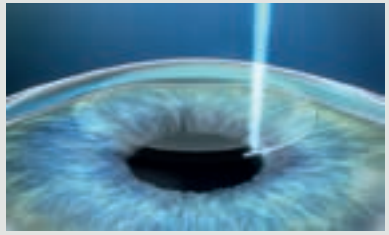
STEP 1

Creating the flap
A flap is created with a highly precise femtosecond laser.

Femto-LASIK



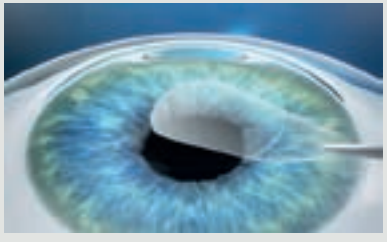
SMILE



Creating the lenticule
A small piece of corneal tissue (lenticule) and a small incision are created inside the intact cornea.

STEP 2

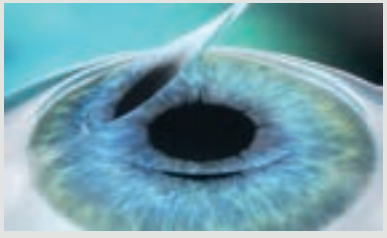
Relocating the patient
The patient is conveniently moved from the femtosecond laser to the excimer laser.

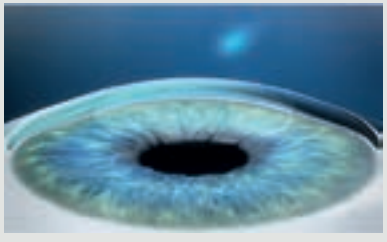


Removing the lenticule
The lenticule is removed through the small incision with minimal disruption to the cornea.

STEP 3

Folding back the flap
The flap is gently folded back, exposing the inner corneal tissue to be treated.

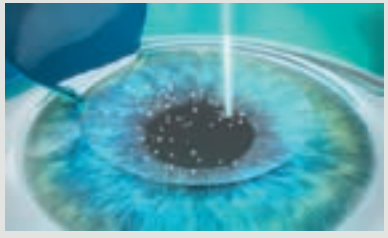




Correcting the error
Removing the lenticule changes the shape of the cornea, correcting the refractive error.

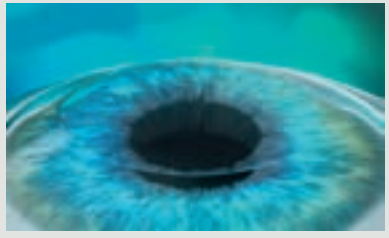
STEP 4

Correcting the error
An excimer laser reshapes the corneal tissue, correcting the refractive error.



STEP 5

Repositioning the flap
The flap is returned to its original position, protecting the eye like a natural bandage.



Scan the QR code to see how SMILE is performed.

www.zeiss.com/SMILE-treatment

Three types of Laser Vision Correction
PRK, LASIK, SMILE – key differences at a glance

Laser Vision Correction has been available for nearly thirty years. There have been many developments and continuous improvements, most recently, with the introduction of minimally invasive surgery. In particular, three options of Laser Vision Correction procedures have evolved and are available today: PRK, LASIK and SMILE. The chart at the right provides an overview of key differences.

Further interesting facts

Answers to frequently asked questions

If you are considering SMILE surgery, you probably have many questions. Some of the most frequent ones are addressed here. This information is not intended to replace consultation with your eye doctor.

Who is eligible for SMILE?
SMILE is used to correct nearsightedness, astigmatism, or both. As with other Laser Vision Correction methods, you will first need to undergo a detailed eye examination to determine whether you are a suitable candidate. Many factors play a role, including the nature and degree of the refractive error, the curvature and thickness of the cornea. Your profession and hobbies are also important.

SMILE is an interesting option also for athletes engaged in contact sports, flight crews as well as military and rescue personnel.

How long does the procedure take?
The entire procedure takes about 15 minutes, the laser correction itself only 24 to 28 seconds.

There is no flap with PRK either. How does it differ from SMILE?
With PRK, the top layer of the cornea (epithelium) is removed manually. The exposed deeper layers of the cornea are then ablated using an excimer laser. Disadvantages of PRK include pain and a long healing process. Stabilization of visual acuity also takes relatively long. PRK is not recommended for the treatment of severe nearsightedness. SMILE also requires no flap. The recovery period and experience is similar to LASIK.

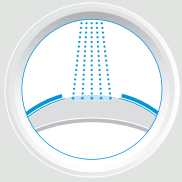
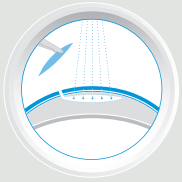
How do I prepare for my surgery?
If you wear contact lenses, most surgeons recommend switching to glasses a few weeks before surgery. You are advised not to apply makeup, lotions or perfume the day you have surgery. Also, it is suggested that you arrange to have someone bring you home afterward.

Does it hurt?
The procedure is virtually painless. Anesthetic eye drops are used to numb the eye.

What happens after surgery?
Following surgery, you will need to go home and rest. A protective bandage or eye shield is placed over the eye to avoid rubbing it. Eye drops and possibly other medication are typically prescribed to prevent infection and aid in the healing process. It is customary to have a post-op examination the next day. Further examinations are usually scheduled for the following weeks or months.

When can I return to my normal activities?
Every healing process is different. In most cases, visual acuity is very good one or two days after the operation, and stabilizes within one week. Normally, you will be able to drive, work and participate in sports without glasses or contact lenses just a few days following treatment.

Is it safe?
Complications following SMILE surgery are very rare, but cannot be completely ruled out. Your eye doctor will discuss these with you.

	 **PRK** photorefractive keratectomy	 **LASIK** laser-assisted in-situ keratomileusis	 **SMILE** small incision lenticule extraction
Method	Surface ablation surgery	Flap surgery	Minimally invasive surgery
Description	Thin outer corneal layer (epithelium) is removed with an alcohol solution or a special brush, and underlying tissue is reshaped with an excimer laser.	**Traditional LASIK:** a flap, a hinged piece of corneal tissue, is created in the outer corneal layer with a controlled blade, folded back, and the underlying tissue is sculpted with a laser (tissue ablation). **Advanced Femto-LASIK:** a femtosecond laser is used to create a precise and predictable flap.	A thin piece of tissue (lenticule) is created inside the cornea and removed through a small incision.
Benefits	■ Greater suitability, treatment option also for patients with thin corneas ■ Requires no flap – no risk of flap-related complications (e.g. flap detachment, flap displacement), lower rate of infection ■ Cost-effective, least expensive of all laser eye surgery procedures	■ Normally quick visual recovery, typically, visual healing and recovery is faster than with PRK ■ Extensive experience, has been the treatment standard for over 20 years ■ Widely available, many clinics offer LASIK or Femto-LASIK	■ Minimally invasive due to only a small incision ■ Gentle and convenient technique ■ Requires no flap – no flap-related complications; low incidence of dry eyes, low risk of infection ■ Generally greater suitability – possible option for patients with contact lens intolerance and a dry eye tendency
Limitations	■ Extended visual recovery period, often accompanied by some discomfort ■ Potential side effect is haze (milky or blurry vision) ■ Sounds and odors during surgery	■ Potential flap complications like infection, flap dislocation or detachment ■ Sounds and odors during surgery ■ Potential side effects like dry eyes or foreign body sensation	■ Not yet available for hyperopic (farsighted) patients ■ Availability, not yet as widely performed as LASIK ■ Side effects are very rare, but cannot be completly ruled out

This brochure is only for basic information. It is not to be considered medical advice or a substitute for obtaining your own medical consultation, during which you will be informed also about possible risks, side effects and restrictions of refractive surgery.

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