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# The Three Generations of Laser Vision Correction PRK, LASIK and SMILE – ever striving for perfection



We make it visible.

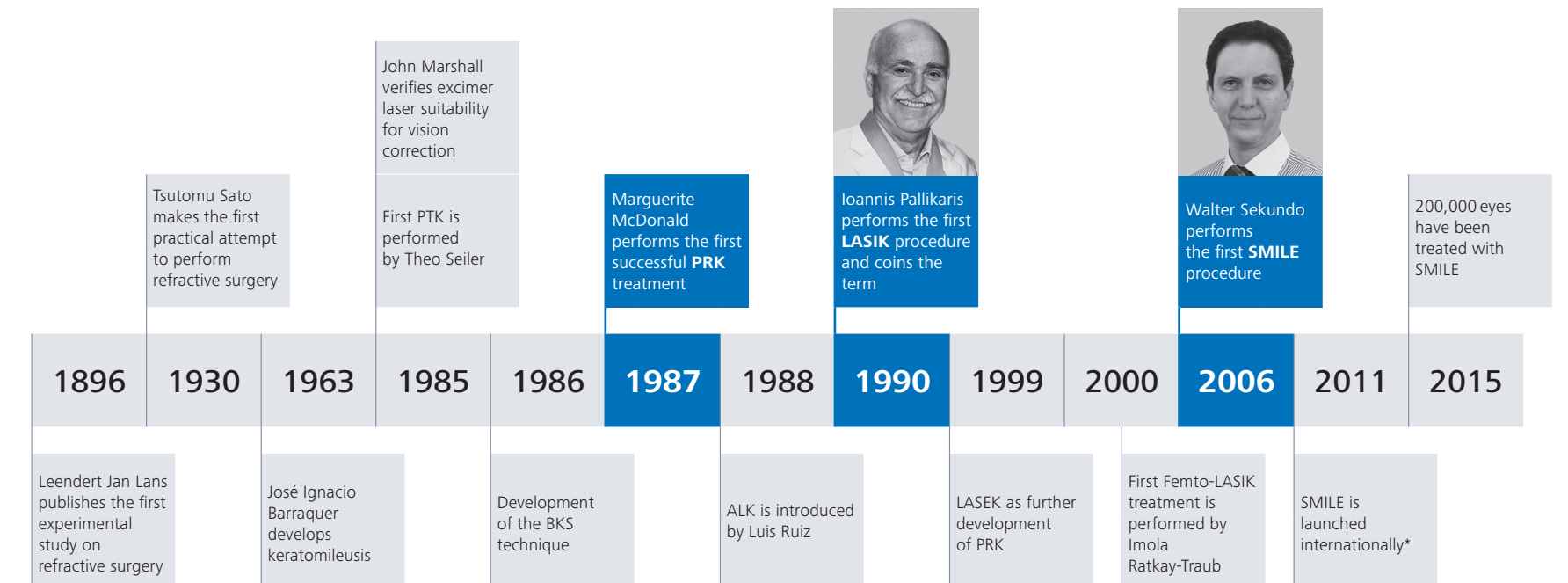
## The Brief History of Laser Vision Correction

Corneal refractive laser surgery is a widely used option for correcting vision impairment, one that has evolved within a relatively brief span of only 30 years. As in other areas of life, advancements were largely driven by a desire for continuous improvement. Three generations of techniques, in particular, shaped the field: PRK, LASIK and SMILE.

PRK, the 1<sup>st</sup> generation of laser vision correction, is characterized by surface ablation surgery of the cornea using an excimer laser. Often considered an economic solution, it continues to be a commonly performed procedure. LASIK, which was introduced as the 2<sup>nd</sup> generation of laser vision correction, also involves reshaping the cornea with an excimer laser. Using flap surgery, it enables quick visual recovery, which in part has made it a very popular treatment today. SMILE, the 3<sup>rd</sup> generation of laser vision correction, is a small incision lenticule extraction technique. Entirely performed with the femtosecond laser, this minimally invasive, flapless surgery is redefining refractive surgery as we know it.

It seems that laser vision correction has never been more advanced, tissue preserving and gentle for the eye than today. The future is minimally invasive.

## Milestones in Corneal Refractive Surgery



\* US approval is pending

## The Three Generations of Laser Vision Correction

PRK

1<sup>st</sup>  
Generation



### Surface ablation surgery

- Subepithelial ablation
- Excimer laser treatment
- Extended visual recovery time
- Patient discomfort

LASIK

2<sup>nd</sup>  
Generation

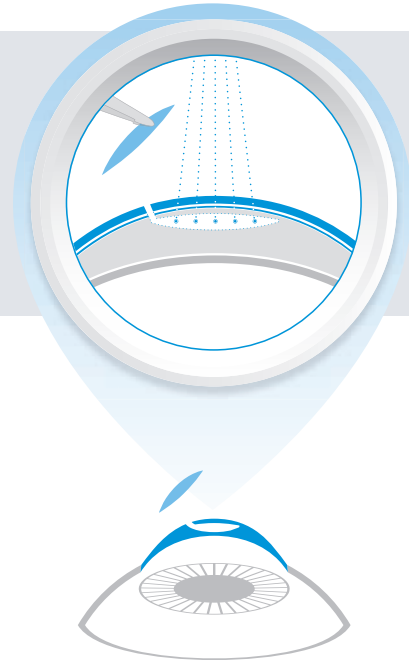


### Flap surgery

- Stromal ablation
- Excimer laser treatment or combined with femtosecond laser
- Quick visual recovery
- Some risk of flap complications

SMILE

3<sup>rd</sup>  
Generation



### Minimally invasive, flapless surgery

- Intrastromal lenticule extraction
- Femtosecond laser treatment
- Gentle treatment
- No flap complications (e.g. less incidence of dry eye)

## SMILE

Small incision lenticule extraction offers many advantages

SMILE has made minimally invasive, flapless surgery possible for the first time. The clinical procedure is based on the lenticule extraction technique, in which a lens-shaped piece of corneal stromal tissue is removed through a small incision. With an 80% smaller side-cut and a 30% smaller cap cut than is needed for LASIK, SMILE offers the potential for less incidence of dry eye, infection and epithelial ingrowth. The cornea remains largely intact to provide more biomechanical preservation and stability.

**“SMILE is LASIK without a flap and PRK without pain.”**

**Dr. Rupal Shah**

New Vision Laser Centers, Vadodara, India, ESCRS 2011 Vienna

**“We love doing minimally invasive surgery because it’s faster, safer, more gentle on the patient and it delivers really good results.”**

**Dr. David Donate**

Centre Laser Vision Roosevelt, Lyon, France, ESCRS 2014 London

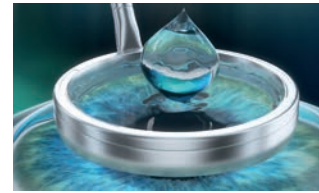
**“Convincing, long-term follow-up results with SMILE mean that this is a technique that’s here to stay.”**

**Prof. Walter Sekundo**

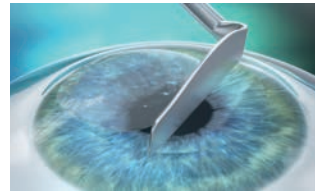
Phillips University Marburg, Germany, DOG 2014 Leipzig

## SMILE combines the advantages of PRK and LASIK

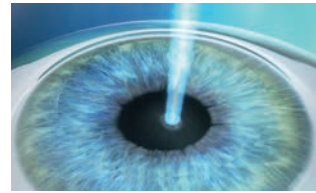
### PRK – 1<sup>st</sup> Generation



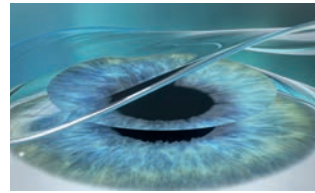
Layer preparation



Epithelial layer removal

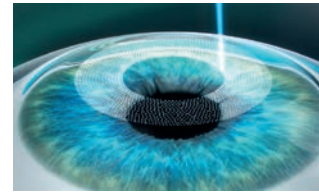


Corneal sculpting



Eye protection

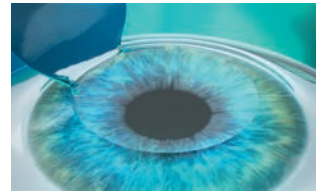
### LASIK – 2<sup>nd</sup> Generation



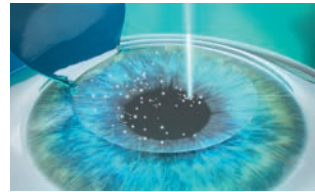
Flap creation



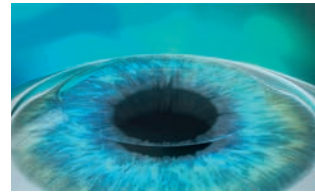
Patient transport



Flap is folded back

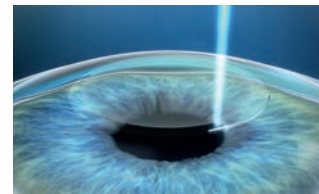


Corneal sculpting

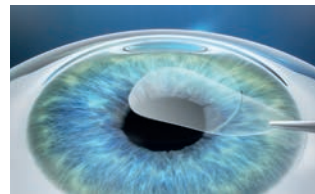


Flap is repositioned

### SMILE – 3<sup>rd</sup> Generation



A refractive lenticule and small incision are created inside the intact cornea – all in one step



The lenticule is removed through the incision with only minimal disruption to the corneal biomechanics



Removing the lenticule changes the shape of the cornea, thereby achieving the desired refractive correction

## ReLex SMILE from ZEISS

The first minimally invasive, flapless SMILE solution

With ReLex<sup>®</sup> SMILE, ZEISS is the first company to provide a way for treating patients with the minimally invasive, flapless SMILE procedure. The development of SMILE suggests that the future of refractive surgery is minimally invasive. Now is the time to move up to the 3<sup>rd</sup> generation of laser vision correction.

### Made for excellent performance

ReLex SMILE is exclusively performed with one laser, the high-precision ZEISS VisuMax<sup>®</sup>, a groundbreaking femtosecond laser that ensures high-level reproducibility and predictability, even with high corrections. Its outstanding cutting precision, exceptional speed and gentle treatment approach make it an ideal platform for advanced corneal surgery applications such as SMILE.

### Perform all three generations of laser vision correction

Combine the VisuMax with a MEL<sup>®</sup> excimer laser from ZEISS, and you can perform all three generations of laser vision correction. It is the only combined platform of its kind that can do that!



The combined setup:  
VisuMax and MEL excimer laser