



INTERNATIONAL CONGRESS OF THE  
**EGYPTIAN**  
OPHTHALMOLOGICAL SOCIETY

In collaboration with:



**MEACO**  
MIDDLE EAST AFRICA  
COUNCIL OF OPHTHALMOLOGY

# Elita

**SILK**  
Smooth  
Incision  
Lenticular  
Keratomileusis

**Ihab M. Osman**

**EOS 2025**

EGYPTIAN OPHTHALMOLOGICAL SOCIETY





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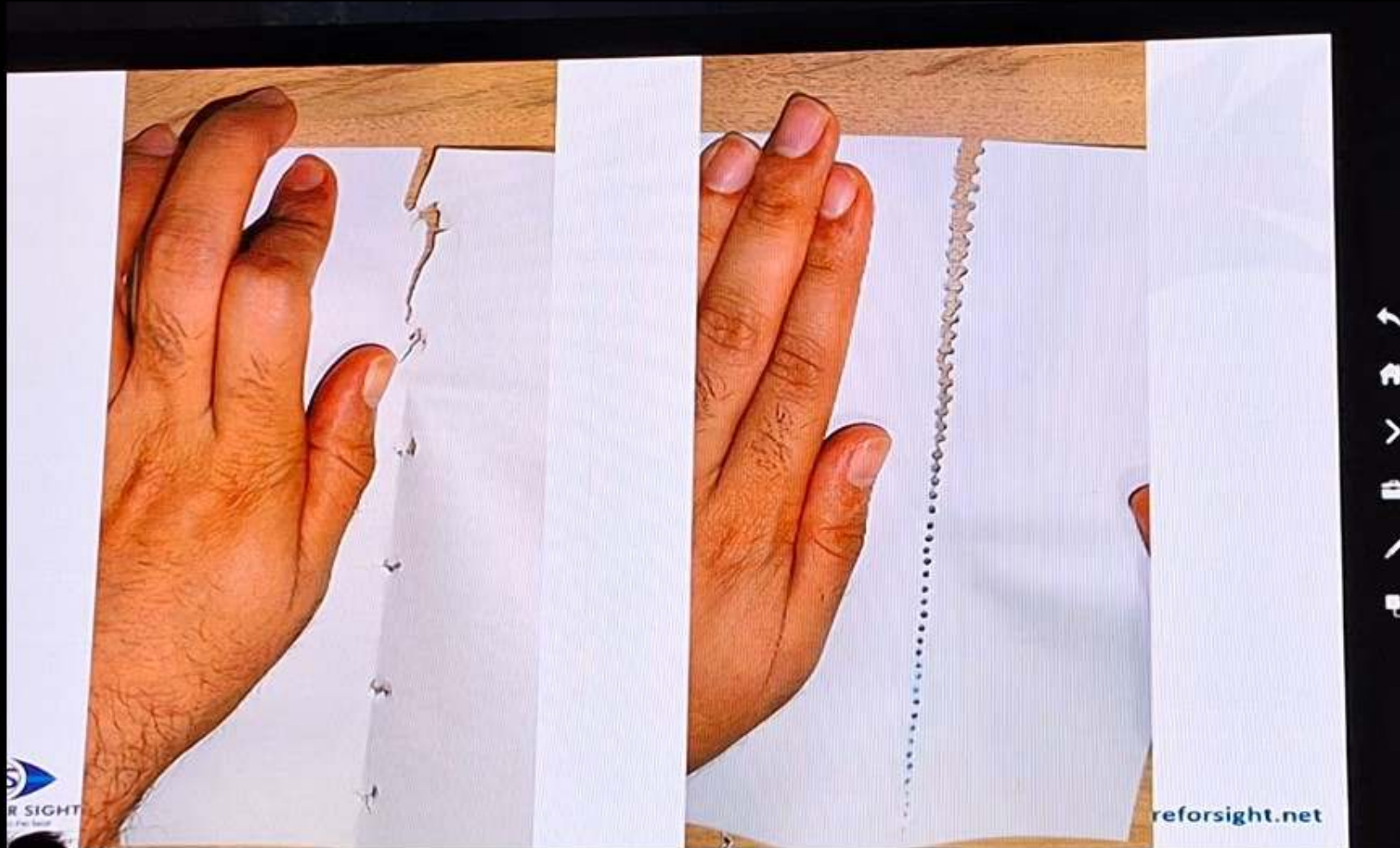
In collaboration with:



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**I Have  
No  
Financial Interest**





Spot Size

Spot Size



**Smooth  
Interface**

**Short Procedure  
Time**

**GOOD QUALITY  
FEMTOLASER**

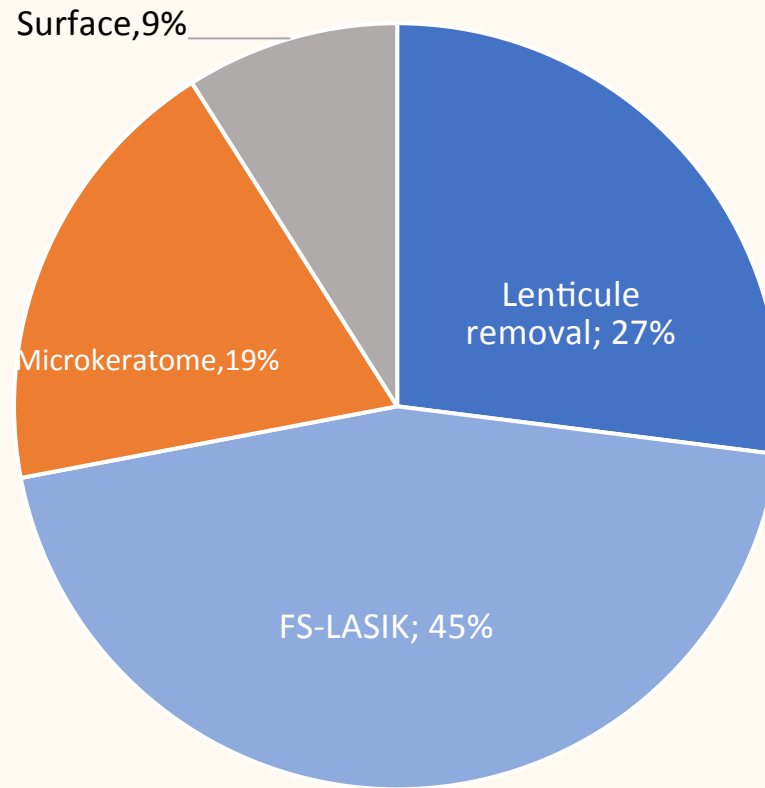
**Easily  
Dissectible  
Lenticule**

**High Precision  
and High Visual  
Quality**

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# Global Distribution of Refractive Surgical Procedures (2022)



# Femtosecond Laser Overview

Johnson & Johnson VISION



elita



ZEISS VISUMAX 800

ziemer  
OPHTHALMOLOGY



FEMTO  
**Z8** NEO

SCHWIND  
eye-tech-solutions



SCHWIND ATOS®

EOS 2020





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# ELITA LASER PARAMETERS



# Lenticule Removal Competitive Summary





Laser and Lenticule Characteristics<sup>9, 10, 15, 19, 23</sup>

				
WEIGHT	227 kg	VISUMAX 500: 870 kg VISUMAX 800: 520 kg	215 kg	< 275 kg
REPETITION RATE	10 MHz	VISUMAX 500: 500 kHz VISUMAX 800: 2 MHz	Up to 20 MHz	Up to 4 MHz
ENERGY PER PULSE	40-90 nJ	110-150 nJ	< 100 nJ	75-135 nJ
TISSUE-BRIDGE FREE LENTICULE	Yes	No	No	No
LASER PATTERN	Radial with fast blanking	Centripetal/centrifugal	Spiral raster	Arc segments-centrifugal/centrifugal
LENTICULE SHAPE	Biconvex	Plano convex	Plano convex	Plano convex







# Lenticule Removal Competitive Summary

At A Glance<sup>9, 10, 15, 19, 23</sup>

				
FEMTOSECOND LASER	ELITA™	VISUMAX 500 VISUMAX 800	FEMTO Z8 NEO FEMTO LDV Z8	ATOS®
LENTICULE EXTRACTION	SILK™	SMILE® SMILE® pro	CLEAR	SmartSight
GLOBAL CLEARANCE	FDA 510(k) Clearance (Flap Only) CE Mark Approval	FDA Approval CE Mark Approval	CE Mark Approval	CE Mark Approval
LENTICULE LAUNCH	2023	2011	2019	2019
Faster lenticule creation decreases incidence of suction loss				
LENTICULE CUTTING TIME	~ 16s	VISUMAX 800: 8 – 10s	60s	30s
MYOPIC TREATMENT RANGE (D)	Sphere: 0.0 to -12.0 Cylinder: 0.0 to -6.0 (cylinder convention)	Sphere: -0.5 to -10.0 Cylinder: 0.0 to -5.0	Sphere: -0.5 to -10.0 Cylinder: 0.0 to -5.0	Sphere: -0.5 to -12.0 Cylinder: 0.0 to -6.0
EOS 2024 EGYPTIAN OPTIC HYPEROPIA		data		No information
However the ease of lenticular dissection compensates for the 6 seconds difference in lenticular creation				

# Lenticule Removal Competitive Summary

Laser and Lenticule Characteristics<sup>9, 10, 15, 19, 23</sup>

				
WEIGHT	227 kg	VISUMAX 500: 870 kg VISUMAX 800: 520 kg	215 kg	< 275 kg
REPETITION RATE	10 MHz	VISUMAX 500: 500 kHz VISUMAX 800: 2 MHz	Up to 20 MHz	Up to 4 MHz
ENERGY PER PULSE	40-90 nJ	110-150 nJ	< 100 nJ	75-135 nJ

**Increasing Laser Pulse Energy = Increase Total LASER Load**

**SILK Has Least Energy To have an Almost No Dissection of the Lenticule**

**Increase Photodisruption Effect = Increase Light Backscatter**

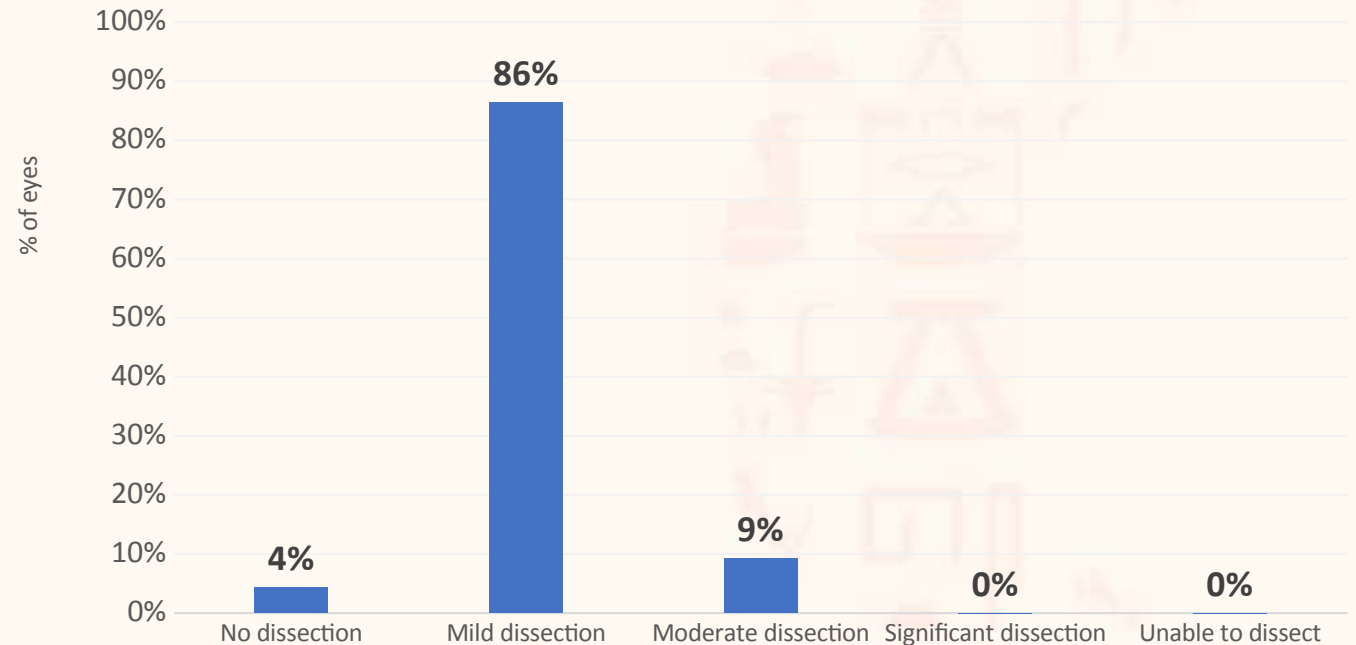
# Easy and smooth lenticule removal



of cases required  
little to no  
dissection

Minimal tissue dissection and disruption leads to fast visual recovery and excellent quality of vision

Ease of lenticule removal evaluation (n=140)<sup>1</sup>



Surgeon-rated questionnaire

Dissection definition:

Mild = <50% of the lenticule needed dissection

Moderate = 50-75% of the lenticule needed dissection

(dia sites only).

# Characterization of Disrupted Tissue Interface Thickness for Keratorefractive Lenticule Extraction Procedure with ELITA™ Femtosecond Laser - Disrupted Interface Thickness for ELITA™ SILK™

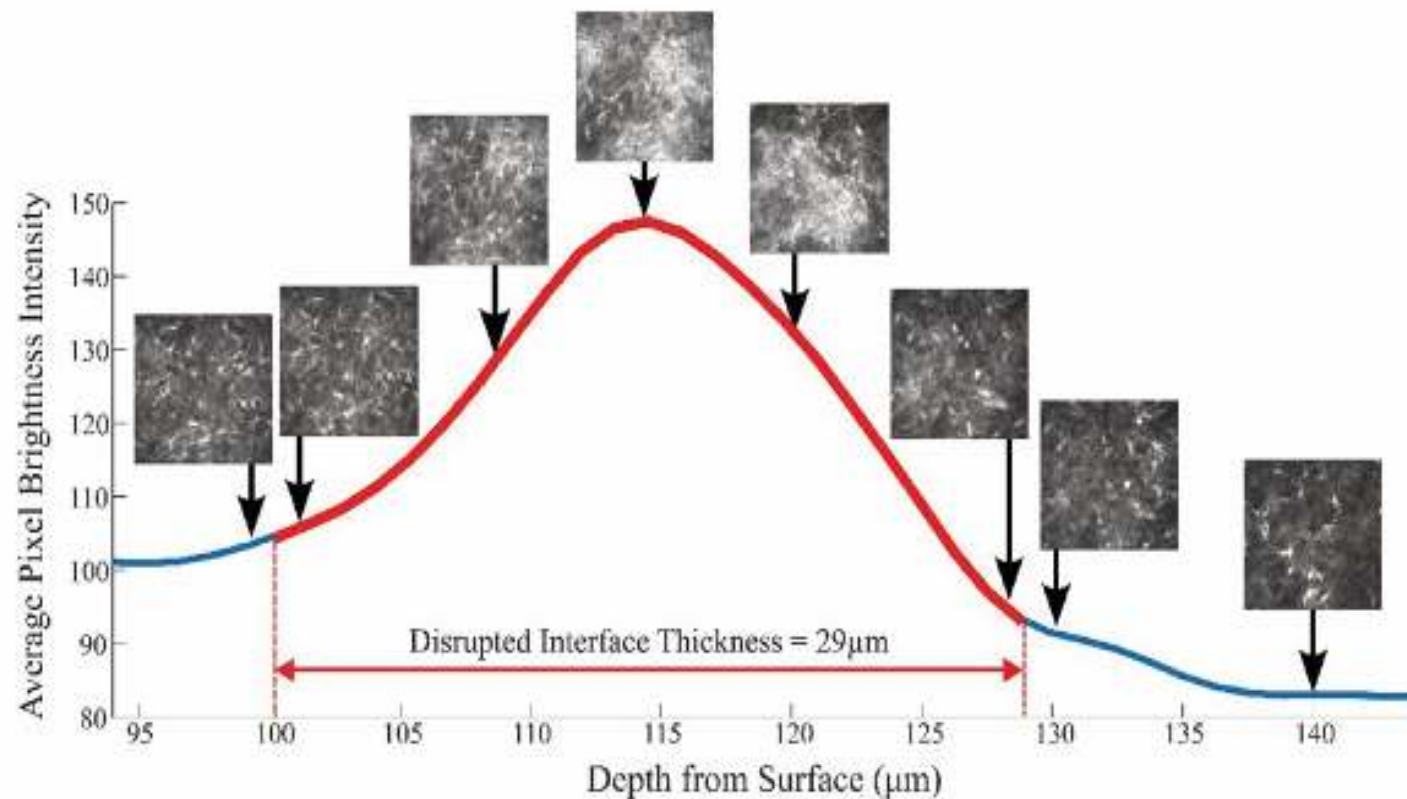
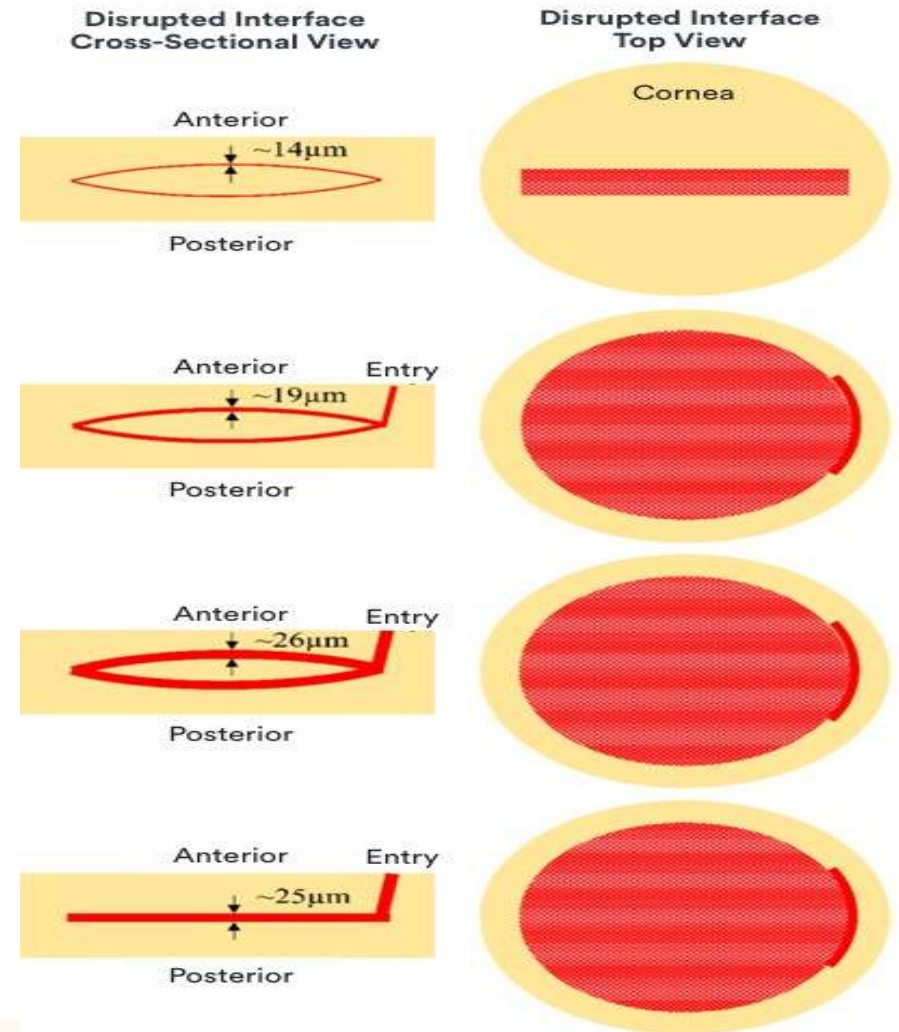
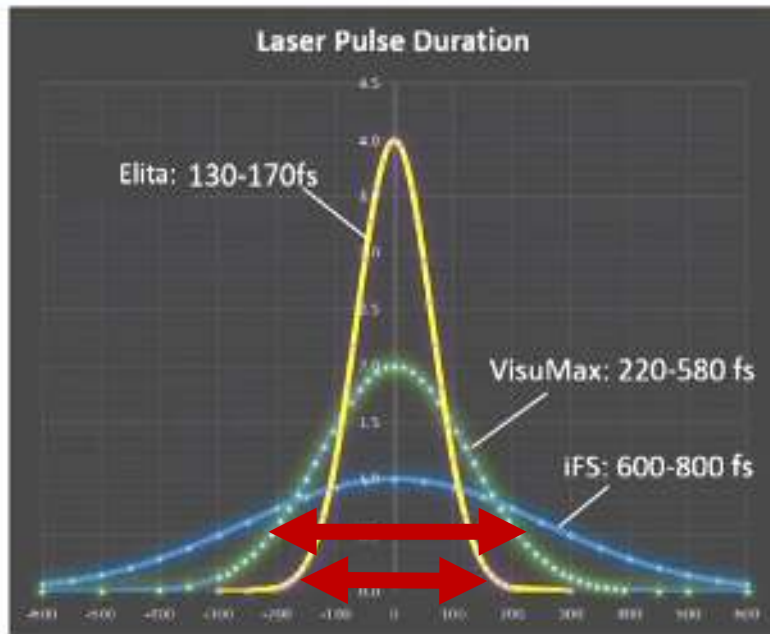


Figure 1: Blue line represents corneal tissues without elevated corneal backscatter and red line represents corneal tissues with elevated corneal backscatter detected

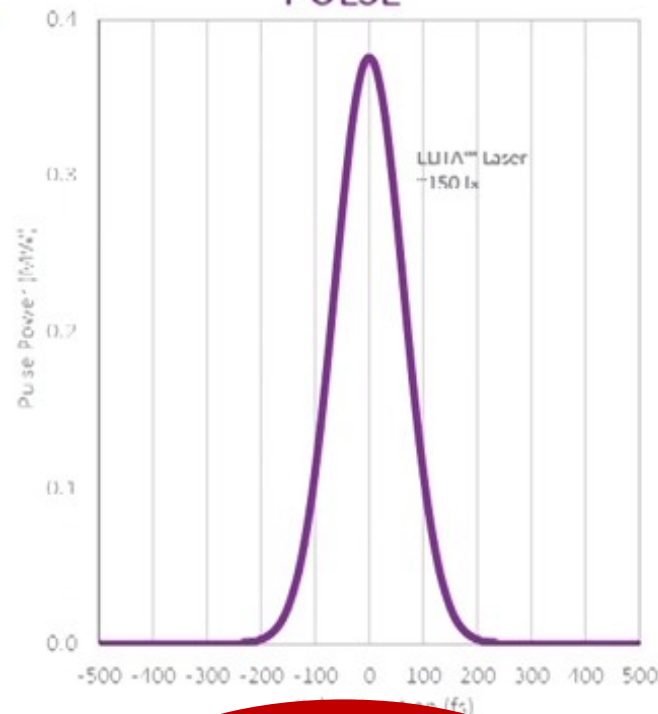


# ELITA LENTICULE GEOMETRY



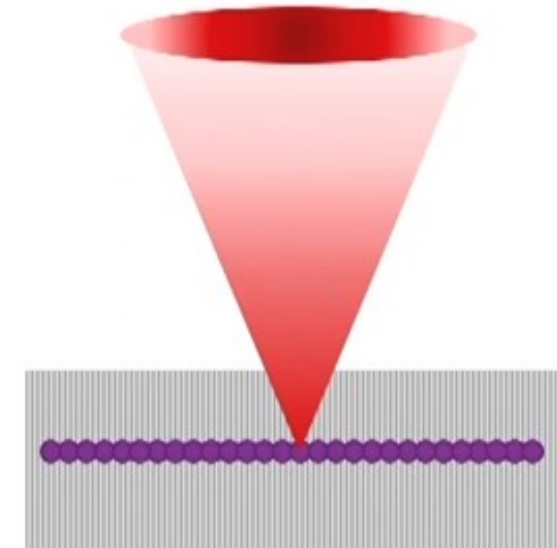
ELITA utilizes the smallest, shortest, lowest energy femtosecond laser pulse on the market.

## ULTRA PRECISE PULSE



Shortest pulse duration (~150 fs)  
Smallest spot size (~1  $\mu\text{m}$ )  
Lowest pulse energy (~50 nJ)

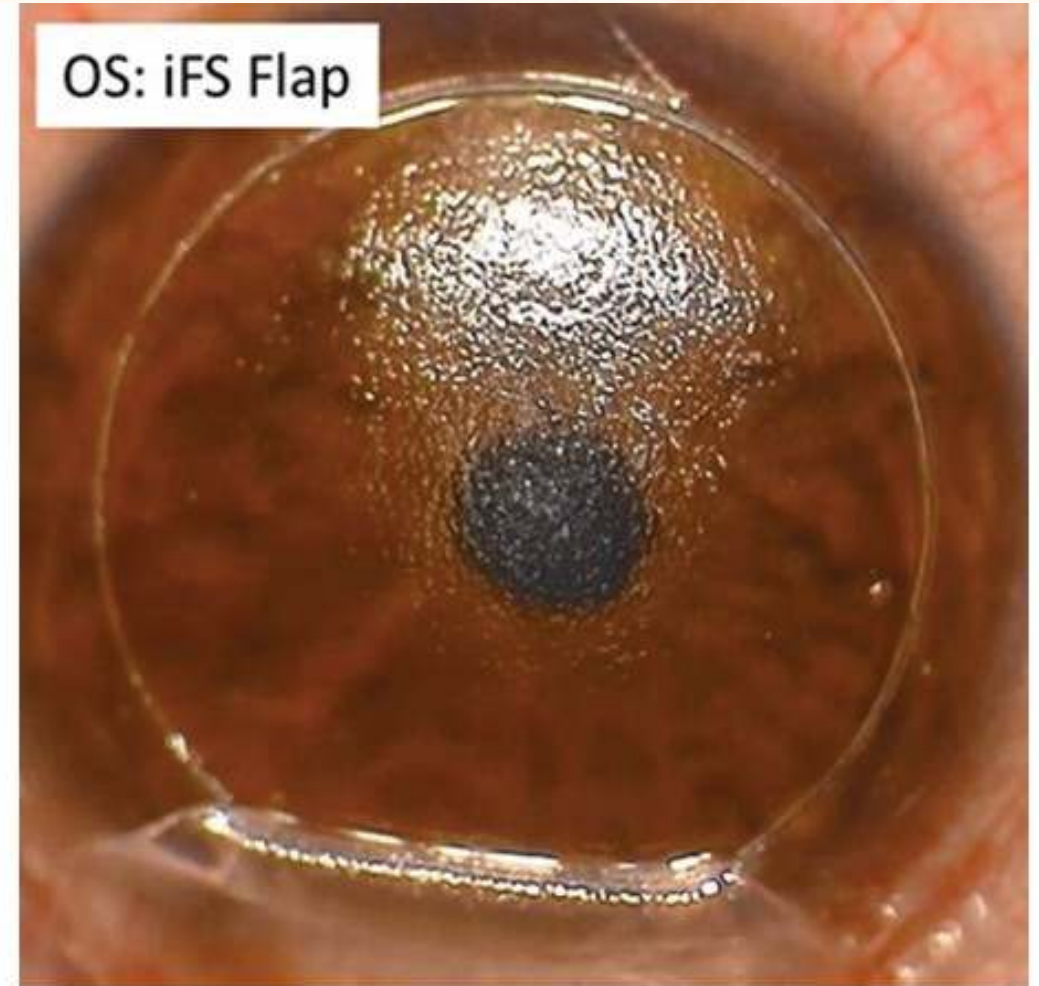
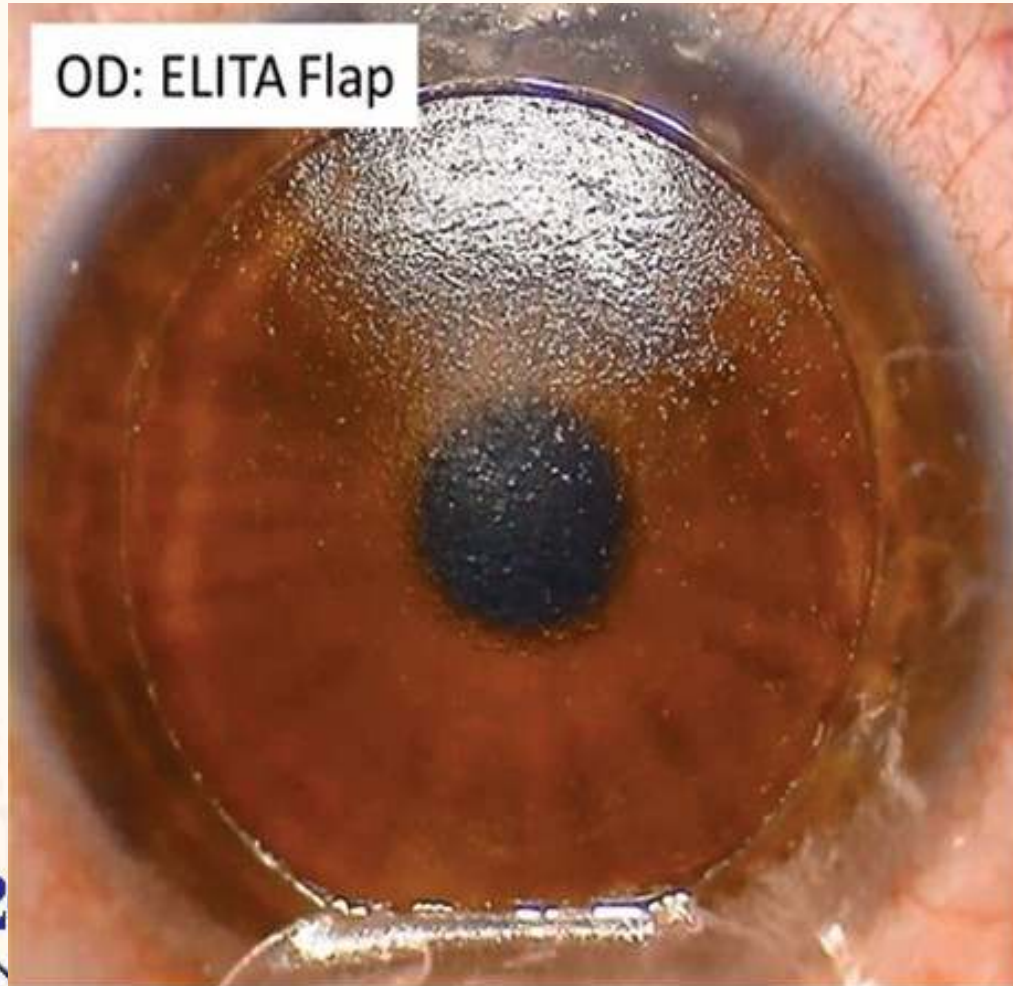
**SUBMICRON OR  
ZERO SPOT SEPERATION FOR  
SMOOTH INTERFACE**



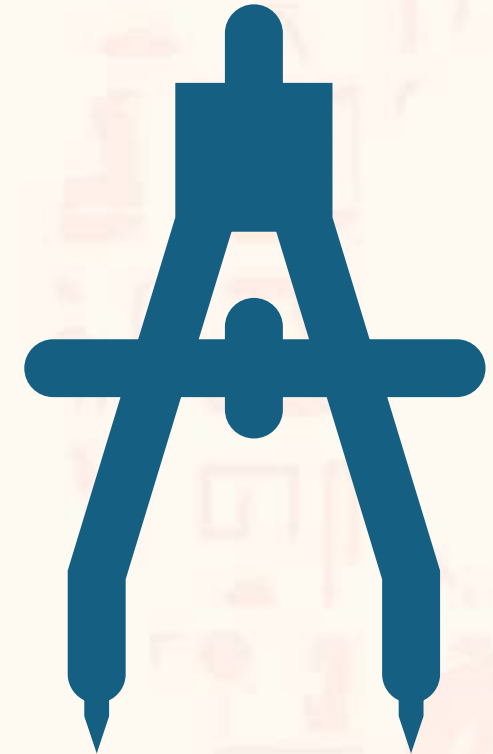
Ultrafast delivery (10 Mhz)  
Contiguous spot placement  
Smooth continuous dissection



# Very Smooth Interface of Dissection



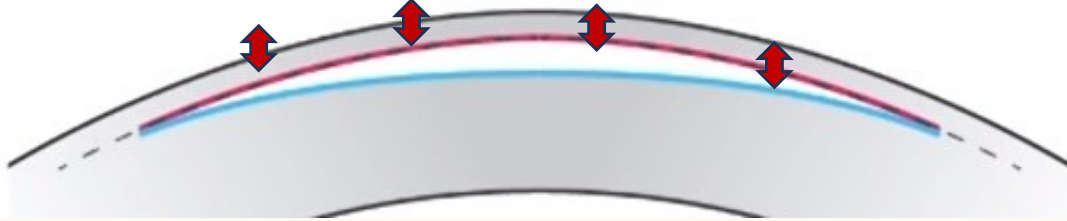
# SILK LENTICULE GEOMETRY



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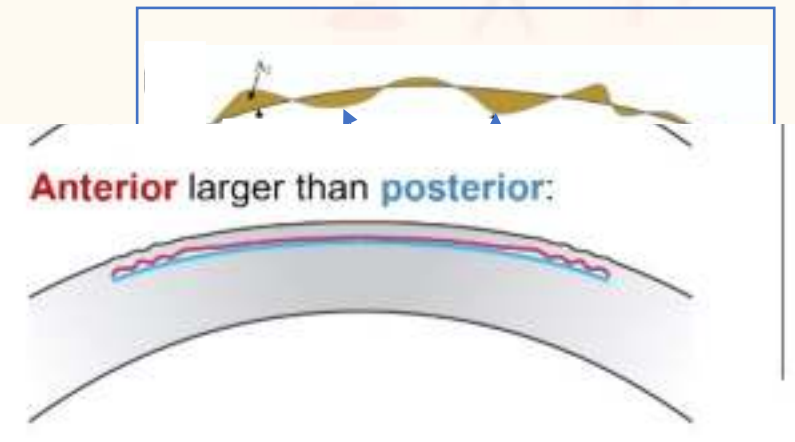
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## Plano-Convex:

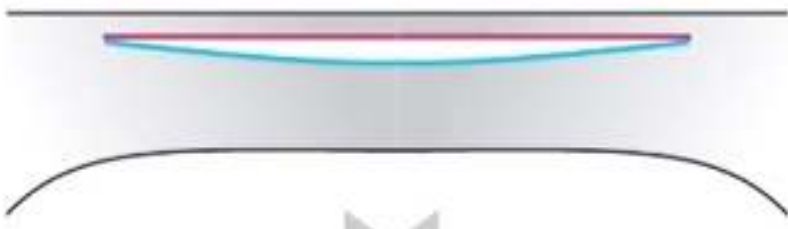


## Microdistortions in Bowman's Layer 3 Years After SMILE for Myopia

Jing Zhao, MD, PhD, Yang Gao, MD, Tian Han, MD, PhD, Li Zeng, MD, PhD, Huamao Miao, MD, PhD, Dong Yang, MD, Qizhi Zhou, MD, PhD, and Xingtao Zhou, MD, PhD

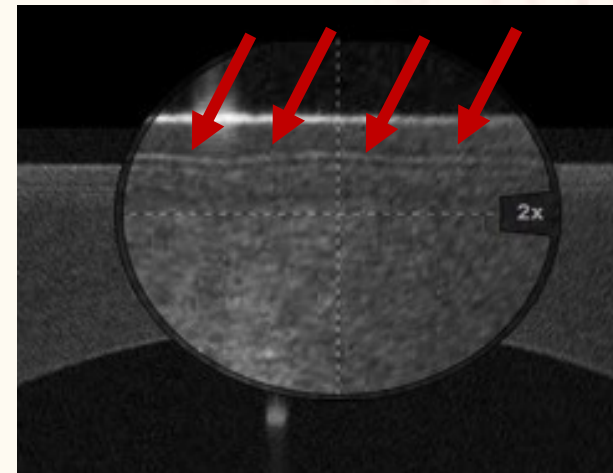


CLEAR Plano-Convex applanated cut:  
**Anterior** cut has *minimal* diameter



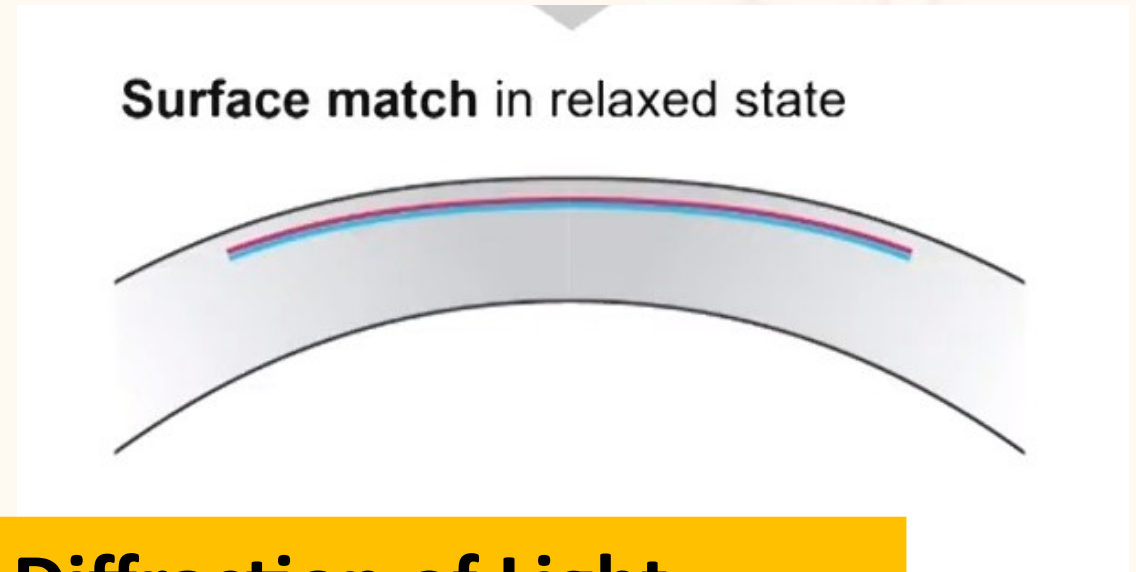
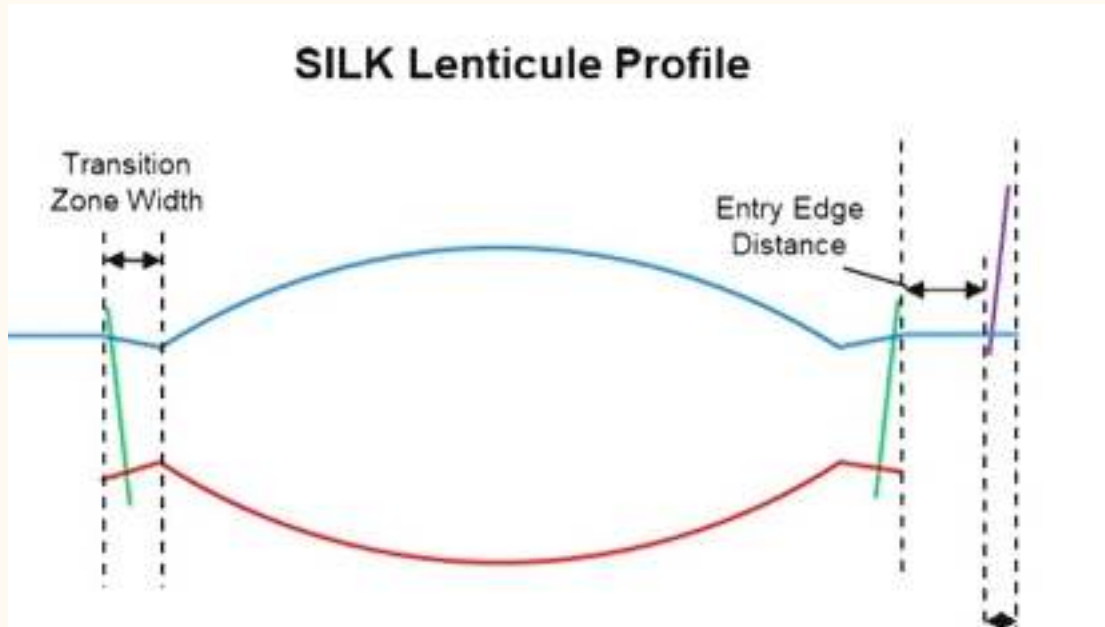
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Courtesy of Dr Rohit Shetty, Dr Pooja Khamar and the research team at Narayana Nethralaya

# SILK Lenticule Is Biconvex



**Smoother Interface = Less Diffraction of Light**

**Rapid Recovery + Higher Visual Quality**

**Less induction of Spherical Aberrations and HOA**



# SILK VS CLEAR LENTICULAR GEOMETRY

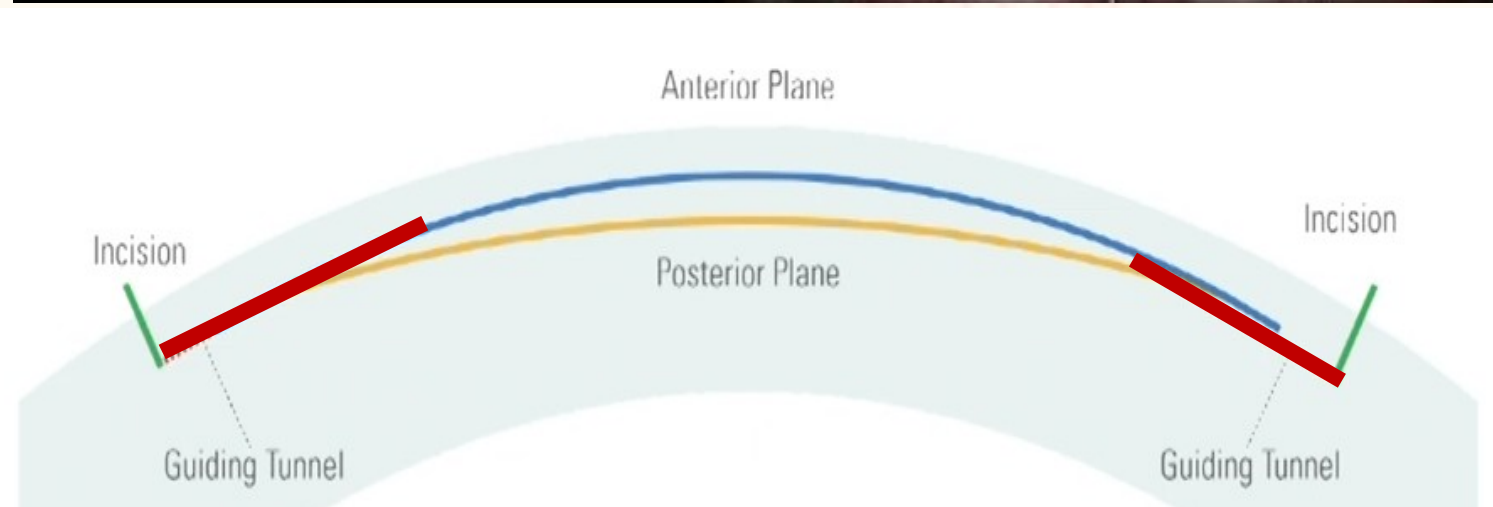
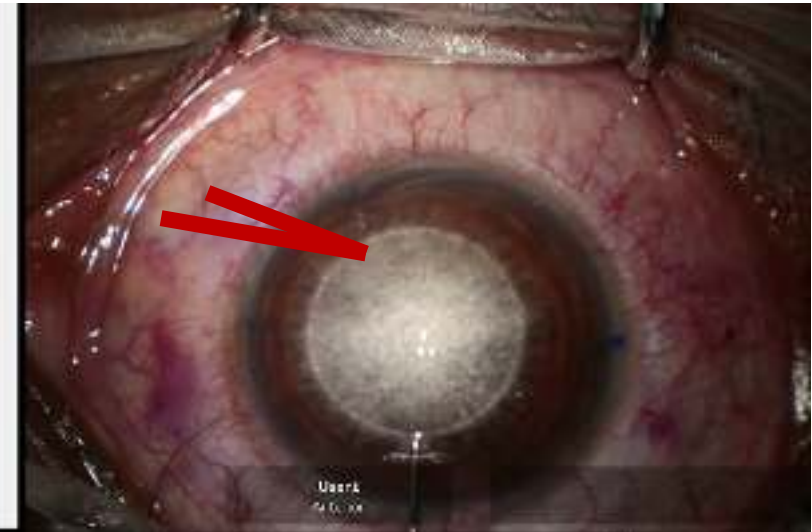
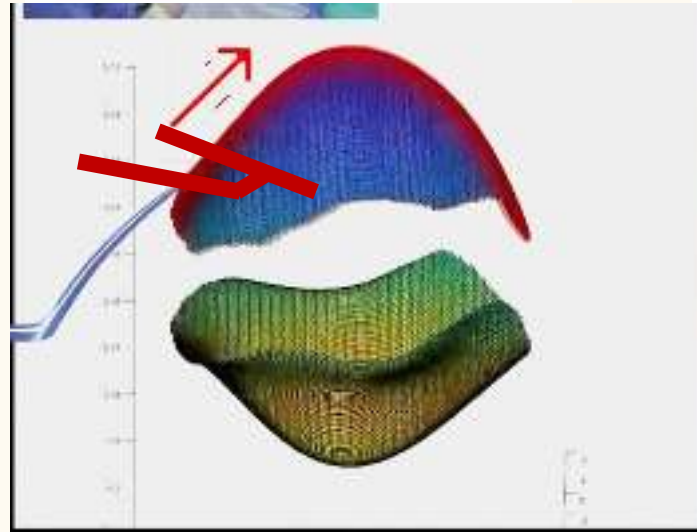
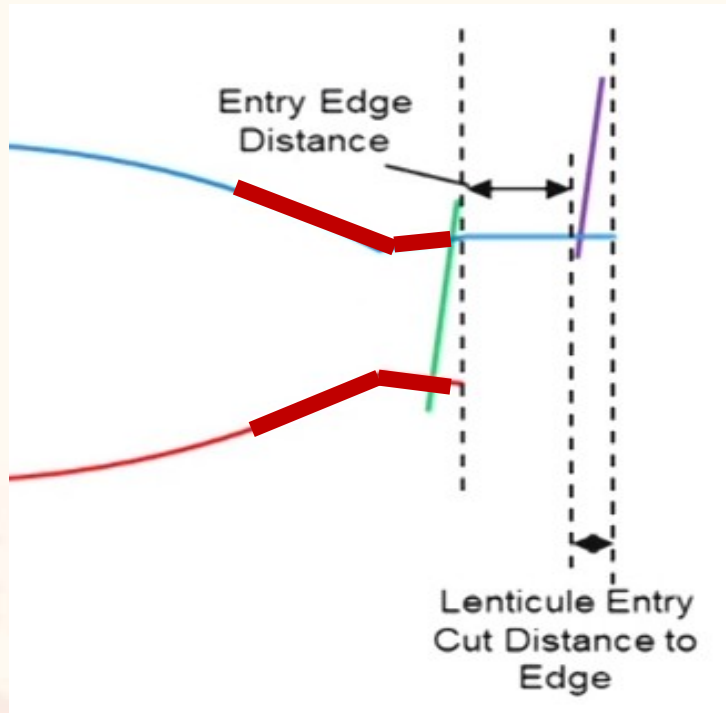


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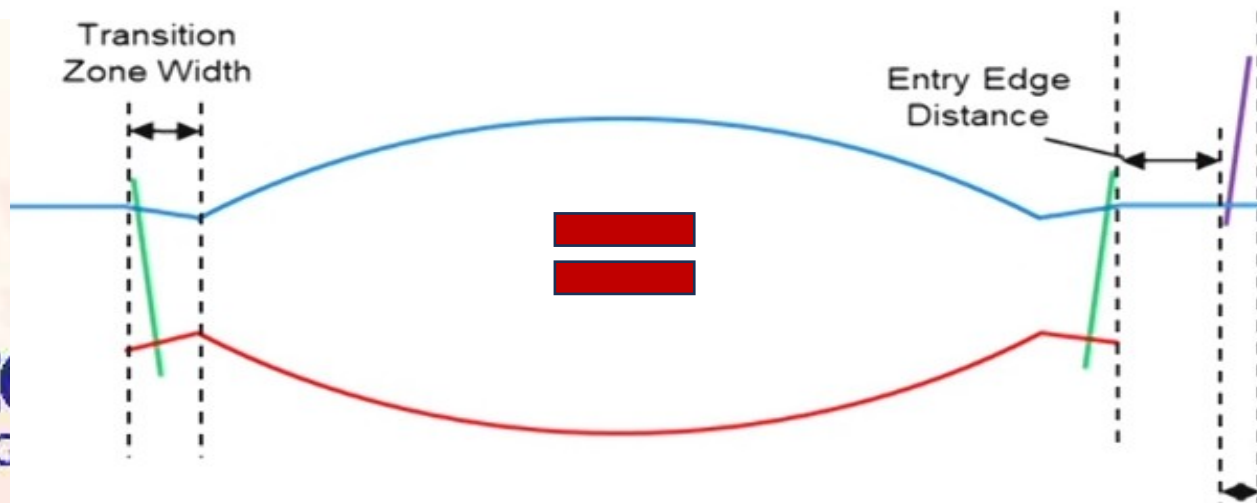
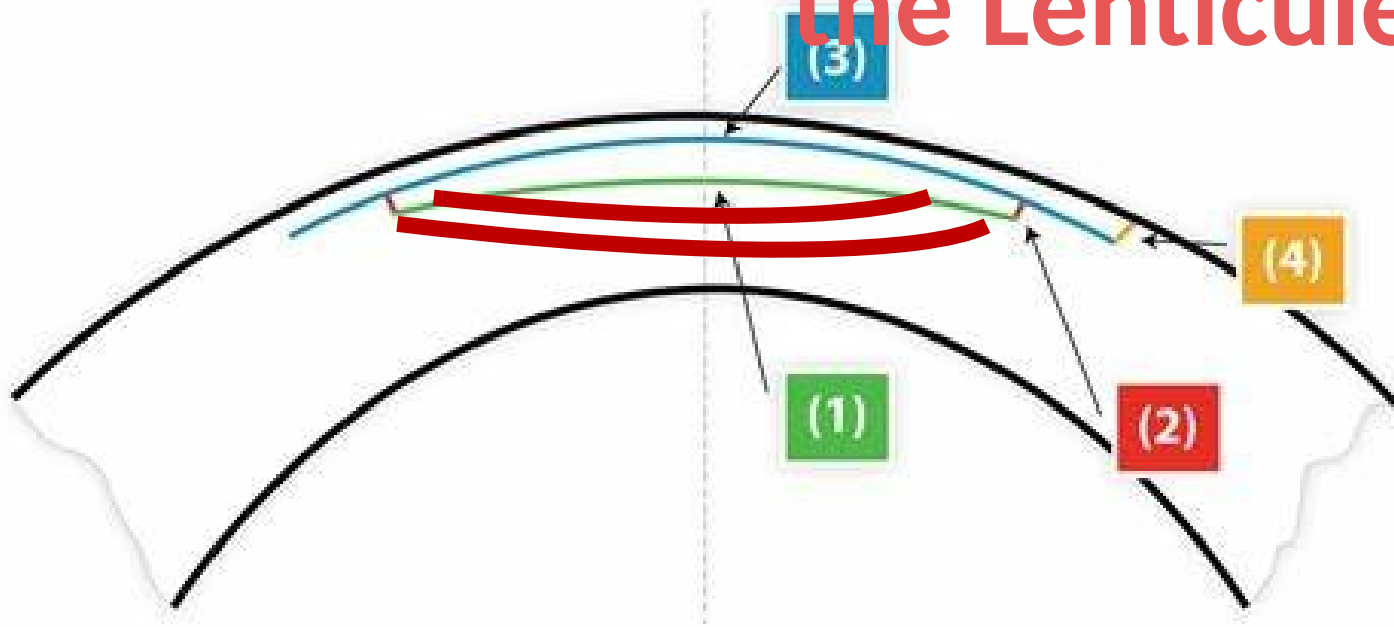
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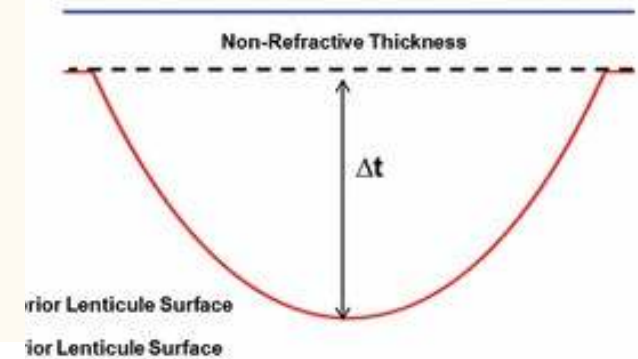
# LENTICULE EDGE GEOMETRY



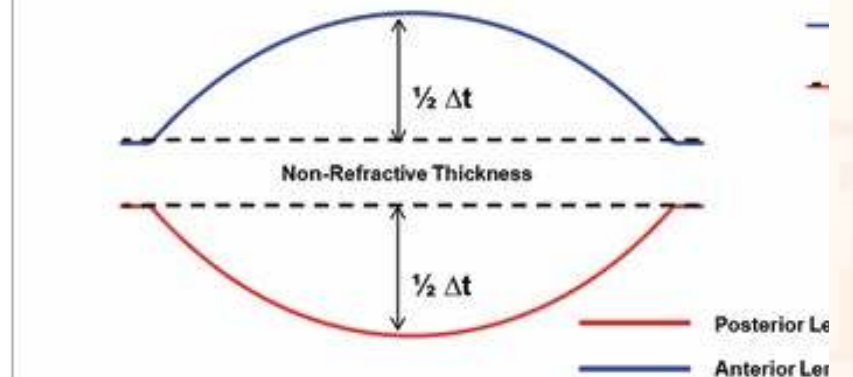
# Distribution of increasing Myopic Correction in the Lenticule



**Plano Convex Lenticule:**  
Correction only to Posterior Surface

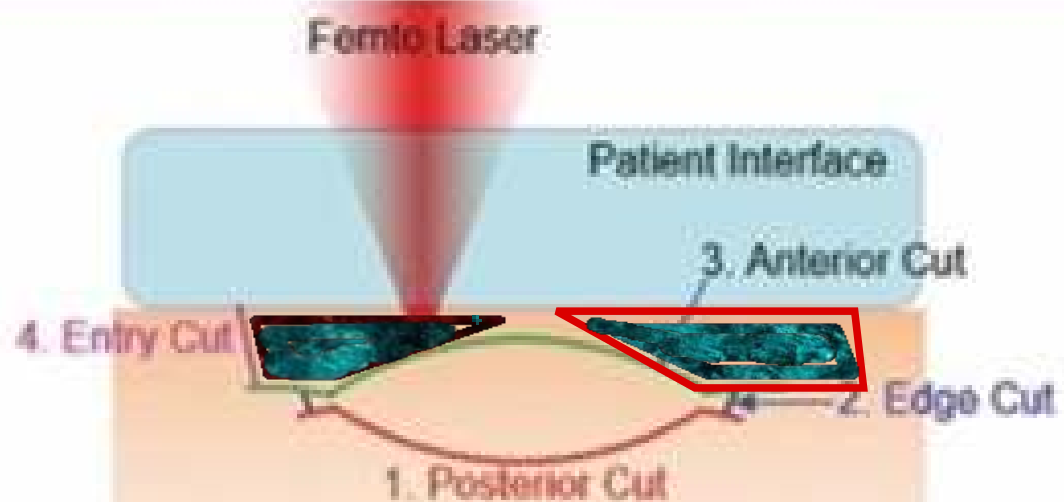


**A Biconvex Lenticule:**  
Equal Curvature to both Surfaces

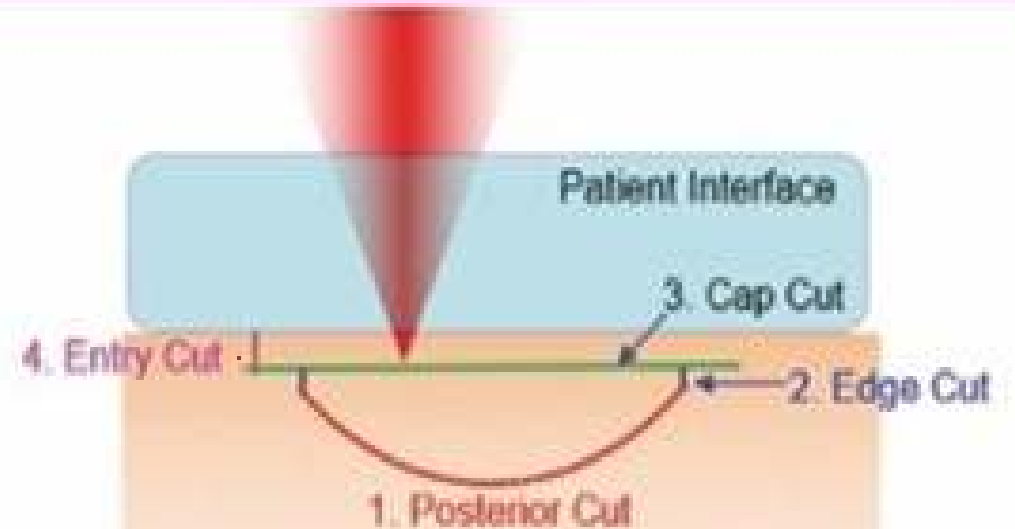


# Lenticule Design And Corneal Nerves

## ELITA™ Biconvex Lenticule

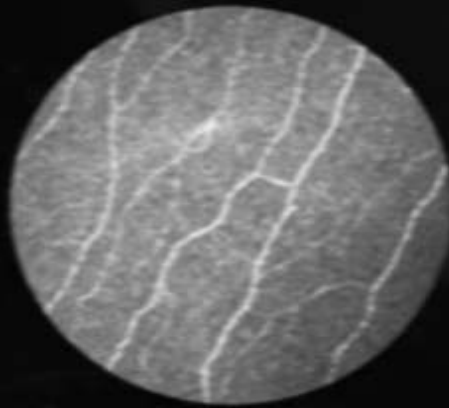


## Plano-Convex: LASIK & Other KLEX

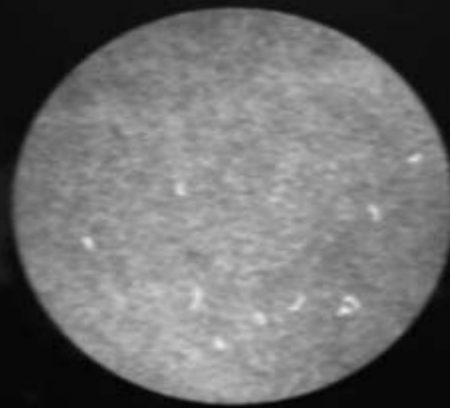


**Preserve More Peripheral Corneal Nerve Fibers = Less Dry Eye  
More Biomechanical Stability**

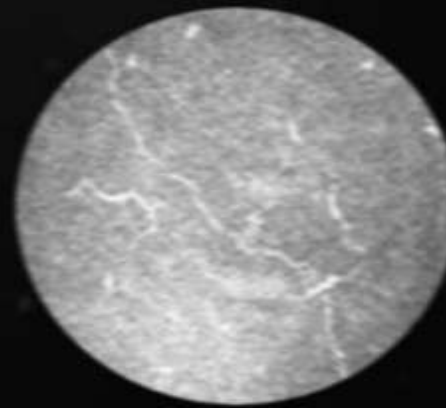
OTHER COMPARITIVE  
LENTICULE  
EXTRACTION  
TECHNIQUES  
CAP 110 Microns



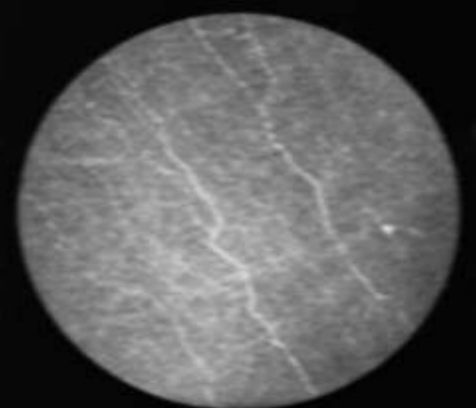
PRE-OP



POST-OP  
1 MONTH

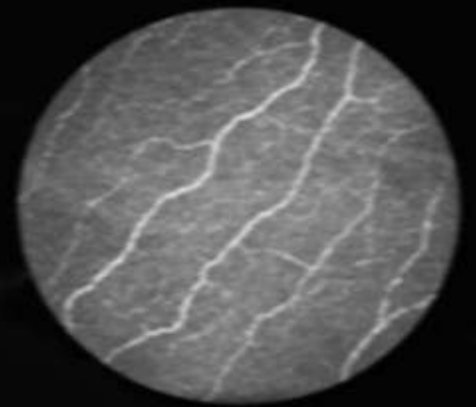
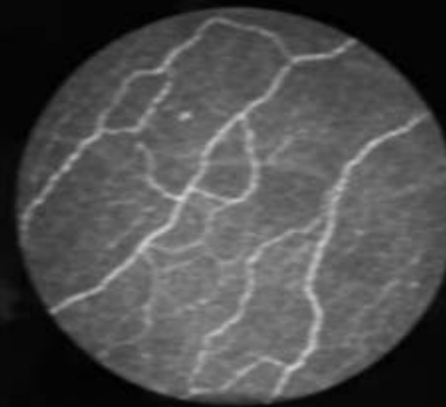
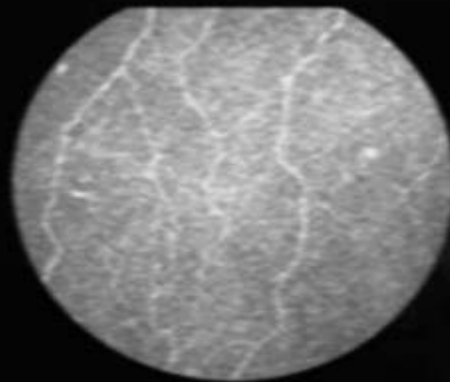
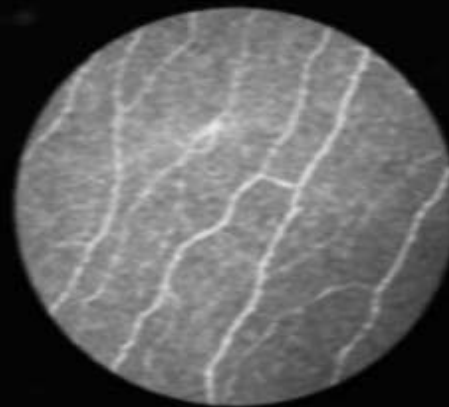


POST-OP  
3 MONTH



POST-OP  
6 MONTH

ELITA SILK  
CAP 110 Microns



**RAPID REGENERATION OF CORNEAL NERVES**

**WITH ELITA SILK AS COMPARED TO OTHER LENTICULE EXTRACTION PROCEDURES**



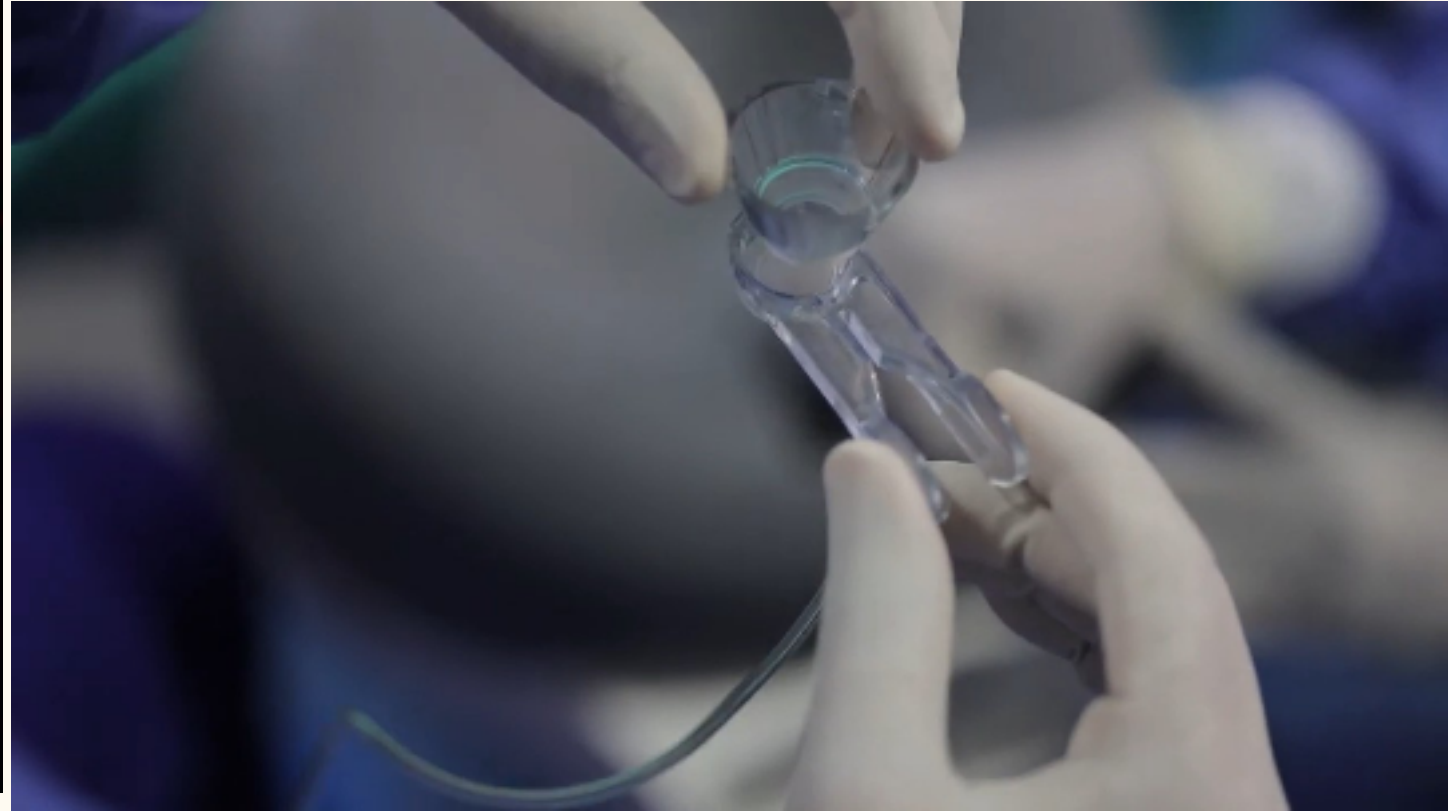
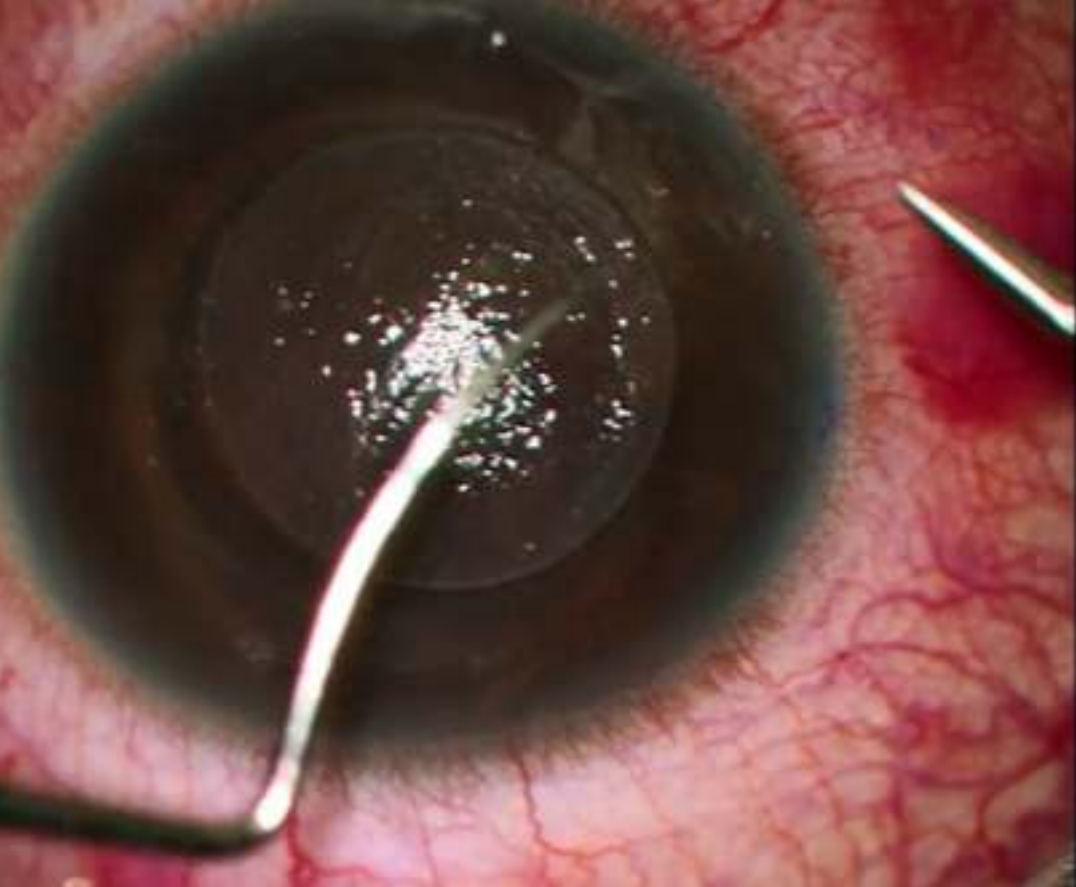
# Lenticule Removal Competitive Summary

Additional Features 9, 10, 15, 19, 23

	<div>Johnson &amp; Johnson VISION</div>	<div>ZEISS</div>	<div>ziemer OPTHALMOLOGY</div>	<div>SCHWIND eye-tech-solutions</div>
APPLANATION	Flat	Curved	Flat	Curved
AUTOMATIC PUPIL DETECTION				
CYCLOTORSION COMPENSATION	No	Yes	No information	No information
CENTRATION ADJUSTMENTS	No	Yes	No information	No information
POST-DOCKING ADJUSTMENTS	No	Yes	No information	No information
CONNECTED OR	No	Yes	No information	No information
VIDEO RECORDING	No	Yes	No information	No information

\*Automated method dependent on IOLMaster iris registration to be released soon as a software upgrade





**Two pieces of patient interface**  
**Scleral suction**  
**IOP rise 50 mmhg (higher than curved**  
**cones)**

- **MORE STABLE**
- **LESS SUCTION LOSS**
- **MORE SUBCONJUNCTIVAL HGE**

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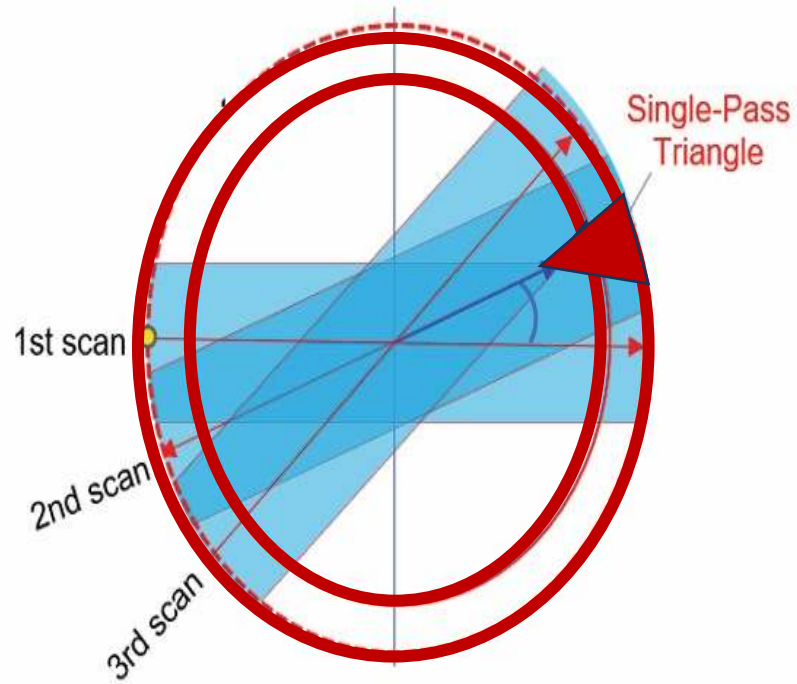
# Applanating Patient Interface Allows

Repositioning the lenticule manually after docking

Compensation for cyclotorsion on presurgical corneal marking



# Radial Laser Pattern



Radial scan pattern indicating lenticule cutting passes on NFS.





# ELITA™ SILK™

## Weaknesses

- ✗ Not mobile
- ✗ Lacks built-in microscope or bed
- ✗ Limited procedure applications (ring, Keratoplasty and cataract)
- ✗ No automated post-docking centration and cyclotorsion
- ✗ More difficult docking

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Johnson & Johnson VISION

**SiLK**

Smooth Incision Lenticular Keratomileusis



Figure 6: Johnson & Johnson Vision's ELITA™

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