



**ARTEMIS**

Augenklinik am Neumarkt  
Köln

#sehenbewegt

**APAO 2023 Kuala Lumpur**

# Add-On Presbyopia Correcting IOLs

**Omid Kermani, MD**

25.02.23

**Travel Support:**

**1stQ**

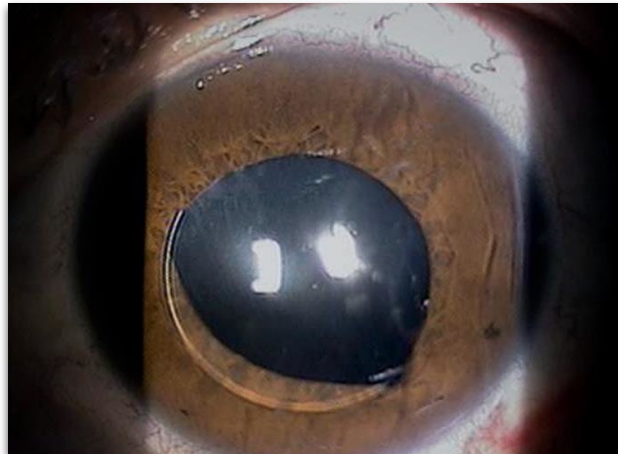
**Cristalens**

**Rayner**

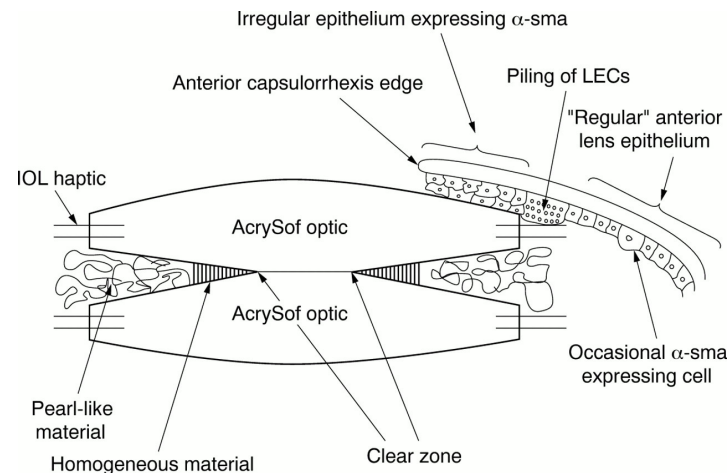
# Background: PiggyBack IOLs

## Problem:

- Sulcus diameter sizing
- Optic capture
- Secondary cataract (Elschnig pearls)
- Kissing optics (Newton rings)
- Interlenticular opacification ILO



June 2016 · Case Reports in Ophthalmology  
7(2):290-295



Eftheriadis et al. bjophthalmol-2001-July-85-7-830

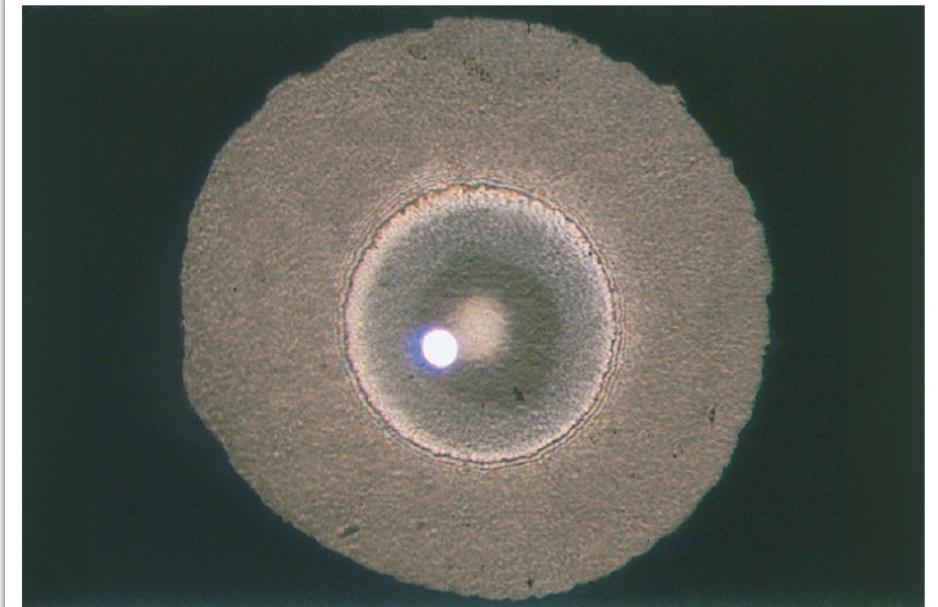
## CASE REPORTS

### Contact zone of piggyback acrylic intraocular lenses

Findl, Oliver MD<sup>a,\*</sup>; Menapace, Rupert MD<sup>a</sup>; Rainer, Georg MD<sup>a</sup>; Georgopoulos, Michael MD<sup>a</sup>

Author Information 

*Journal of Cataract & Refractive Surgery* 25(6):p 860-862, June 1999. | DOI: 10.1016/S0886-3350(99)00031-0



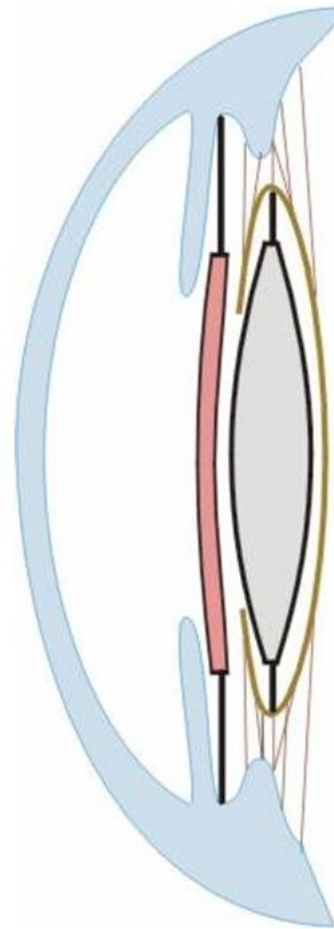
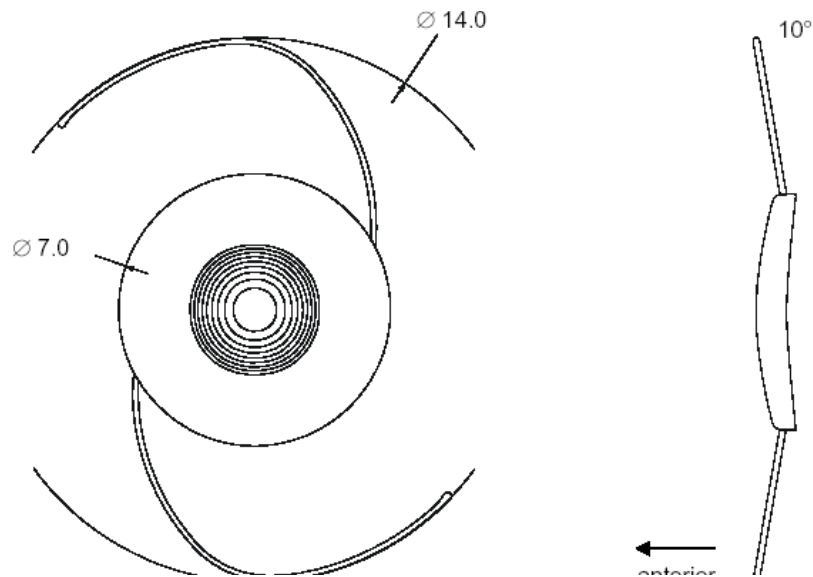
**Figure 1.** (Findl) Specular microscopic appearance of a contact zone with surrounding Newton rings in a nondilated eye with foldable, acrylic piggyback IOLs.

# Supplemental Multifocal Sulcus IOL

Primary target: Secondary MF IOL Implantation in Pseudophakic Monofocality

## • PCL + Add-On Sulcus IOL

- Haptic diameter >13.0mm
- Optic diameter  $\geq 6.0$ mm
- Angulation of haptics  $\geq 10^\circ$
- Hydrophylic material



## Dual intraocular lens implantation: Monofocal lens in the bag and additional diffractive multifocal lens in the sulcus

Georg Gerten, MD, Omid Kermani, MD, Karl Schmiedt, MD, Elham Farvili, MD, Andreas Foerster, MD, Uwe Oberheide, PhD

**PURPOSE:** To evaluate a new diffractive multifocal intraocular lens (IOL) as an additional (add-on) IOL for sulcus-based implantation.

**SETTING:** Augenklinik am Neumarkt, Köln, Germany.

**METHODS:** In this prospective study, cataract patients had phacoemulsification and IOL implantation. After phacoemulsification, an aspheric silicone monofocal IOL (MS 612 ASP-Y) with a power range of +4.00 to +27.00 diopters [D] was implanted in the capsular bag. This was followed by sulcus placement of an add-on multifocal IOL (MS 714 PB) with a +3.50 D diffractive element for near but zero refractive power for distance.

**RESULTS:** The study included 56 eyes of 30 patients. Three months postoperatively, the mean monocular uncorrected distance visual acuity was  $0.10 \log\text{MAR} \pm 0.11$  (SD) (median 1.00 decimal; 20/20 Snellen), with a remaining mean postoperative spherical equivalent of  $0.01 \pm 0.51$  D. The mean uncorrected intermediate visual acuity was  $0.20 \pm 0.15 \log\text{MAR}$  (median 0.63 decimal; 20/30 Snellen) with a luminance of 500 lux at 1 m. The mean uncorrected near visual acuity (Early Treatment Diabetic Retinopathy chart) was  $0.16 \pm 0.13 \log\text{MAR}$  (median 0.80 decimal; Jaeger 2). No major complications (eg, iris chafing, iris capture, lens epithelial cell ingrowth, glaucoma) were associated with the add-on IOL in the sulcus.

**CONCLUSIONS:** Combined implantation of an add-on diffractive sulcus IOL and a monofocal capsular bag IOL was safe and effective in improving far and near visual acuity in cataract surgery. Preliminary visual acuity results were similar to those in eyes with a single 1-piece diffractive multifocal IOL.

*J Cataract Refract Surg* 2009; 35:2136–2143 © 2009 ASCRS and ESCRS

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**RESULTS:** The study included 56 eyes of 30 patients. Three months postoperatively, the mean

first generation of bifocal IOLs relied on the refractive principle, their performance was very dependent on pupil size and, compared with monofocal IOLs, they had potential adverse optical effects, such as loss of contrast sensitivity and compromised visual acuity

IOL and its replacement by a monofocal IOL is a possible, although not desirable, solution. The concept of an additional functional diffractive optic is an alternative for uneventful reversibility of this complex refractive surgical procedure.

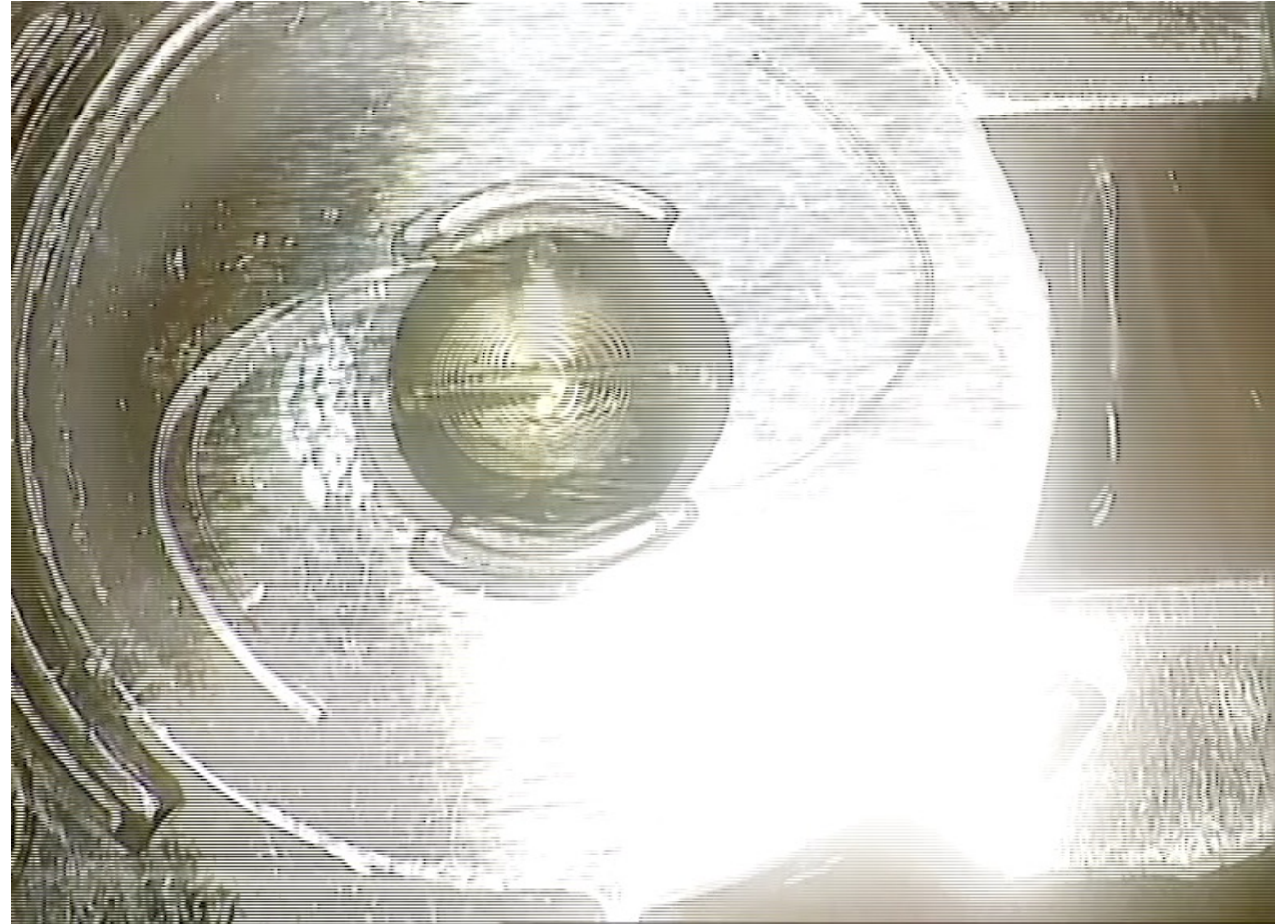
2136 © 2009 ASCRS and ESCRS  
Published by Elsevier Inc.

0886-3350/09/\$—see front matter  
doi:10.1016/j.jcrs.2009.07.014



# Secondary Implantation Additive MF Sulcus IOL

- Human Optics
- MS-DAY200
- Basic 0.0 D
- Near Add +3.5 D
- Diffractive bifocal
- 3-piece
- Silicone body
- Optic Ø 7.0 mm
- Polyprop. haptics Ø 14.0 mm
- PLI 2.8 mm



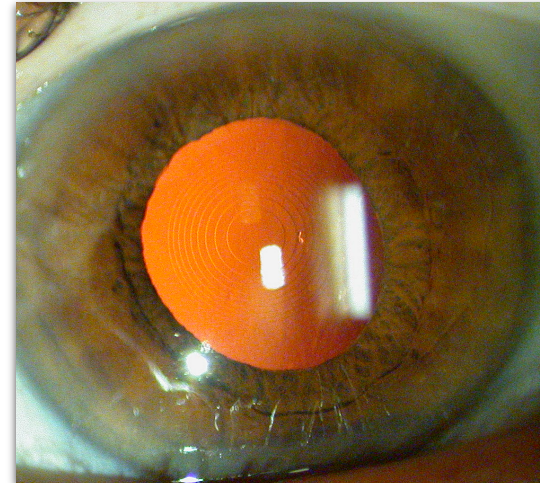
O. Kermani 2007 speed x 4

# First-In-Eye Study 2006-2008

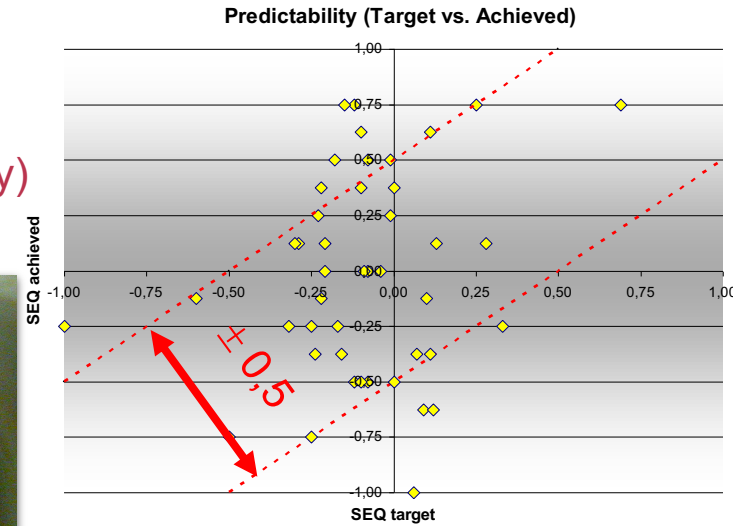
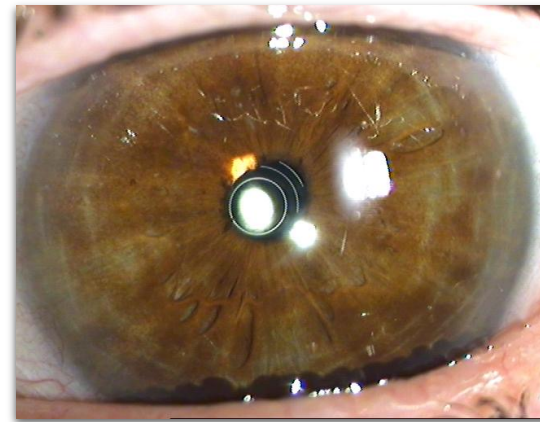
Bilateral Additive Diffractive Bifocal Sulcus IOL (Prospective Randomized Controlled Study)

- no IOL decentration
- no chronic IOP rise
- no iris pigment loss, no iris shaving
- no iris capture
- no inter-IOL deposits
- PCO rate 28% (YAG laser capsulotomy)
- 3% Pupil distortion
- 88% satisfied with UCNVA
- 92% satisfied with UCDVA
- 3% have significant night vision problems (halo/starburst)
- 97% would have the same procedure again

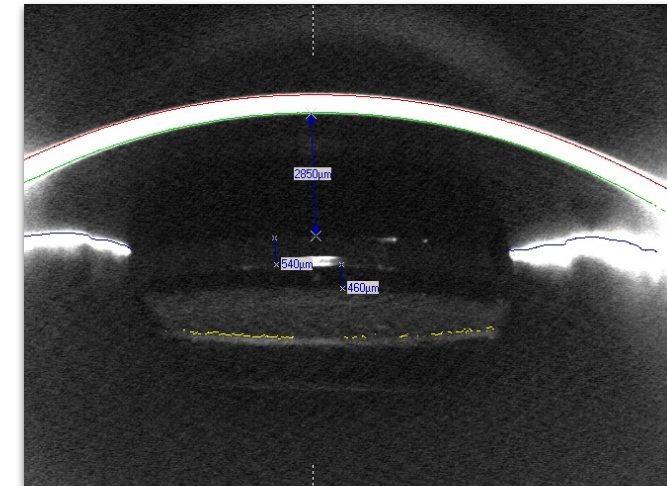
• D1



• M3



PCL +4.0 D to +27.0 D  
Pre: -15.0 D to +6.0 D





# Indications for Additive Presbyopia IOLs

Supplementary IOLs are implanted in the sulcus !

- **Types of Additive IOLs**
  - Multifocal
  - EDOF
  - Toric (mono/multifocal)
  - Monofocal
- **Add presbyopia correction to monofocal pseudophakia**
  - Secondary implantation
- **“Critical“ multifocal case**
  - Primary implantation
- **Refractive „touch-up“**
  - Secondary implantation

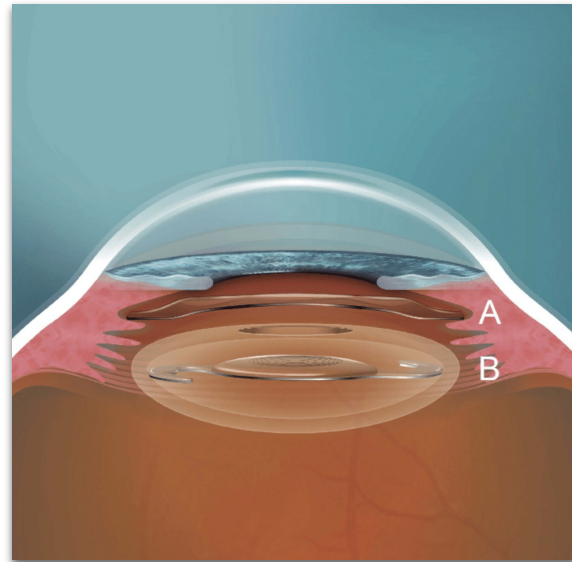


# MF IPCL & EDOF ICL

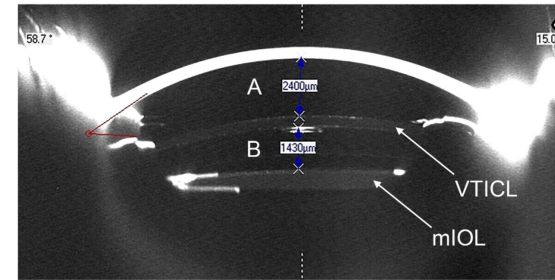
Not Cost-Effective !



Diffractive multifocal IPCL



Duncker et al. PCL+ICL



**Figure 3** Scheimpflug image (Pentacam® HR, Oculus) from a patient at the 90–270° meridian 3 months after VTICL implantation: (A) distance between endothelium and VTICL: 2400 μm and (B) vault between VTICL and mIOL: 1430 μm.  
**Abbreviations:** mIOL, multifocal intraocular lens; VTICL, Visian Toric Implantable Collamer Lens®.

Clinical Ophthalmology

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ORIGINAL RESEARCH

## A prospective pilot study using a low power piggy-back toric implantable Collamer lens to correct residual refractive error after multifocal IOL implantation

This article was published in the following Dove Press journal:  
 Clinical Ophthalmology

Gernot IW Duncker  
 Anna C Sasse  
 Tobias Duncker

Institute of Ophthalmology, Halle,  
 Germany

**Purpose:** To assess whether residual refractive error after in-the-bag multifocal intraocular lens (mIOL) implantation can efficaciously and safely be corrected with a piggy-back low power Visian Toric Implantable Collamer Lens® (VTICL, STAAR Surgical) placed in the ciliary sulcus.

**Patients and methods:** Twenty-four eyes of 23 patients (mean age: 57.5 years) with diminished uncorrected distance visual acuity (UDVA) of  $\geq 2$  lines due to residual refractive error after mIOL implantation were included in the study. VTICL size was calculated using the standard STAAR Visian ICL calculation software for phakic eyes. Postoperative study visits (1 day, 1 week, 3 months and 6 months after VTICL implantation) included UDVA, corrected distance visual acuity (CDVA), VTICL axis alignment, vault (space between mIOL and VTICL), IOP and documentation of adverse events.

**Results:** At 6 months, mean UDVA (logMAR) increased from 0.26 preoperatively to  $-0.01$  ( $P < 0.001$ ) while mean CDVA remained unchanged. Mean VTICL misalignment from the preoperative target axis was  $5.3^\circ$  and mean vault was  $1385 \mu\text{m}$ . In the initial phase of the study, 2 VTICL had to be exchanged due to oversizing.

**Conclusion:** Piggy-back low power VTICL can efficaciously correct residual refractive error after mIOL implantation and significantly increase UDVA. Advantages of this novel surgical approach include: VTICL availability in small diopter steps, no significant surgical-induced astigmatism, atraumatic and reversible procedure.

# Additive Presbyopia Correcting IOLs

Presently not available in the USA

- **AddOn® | 1stQ Germany**



Implanted > 20.000

- **Reverso® | Cristalens France**



Implanted > 5.000

- **Sulcoflex® | Rayner UK**

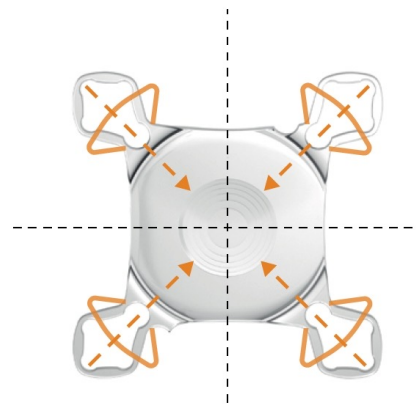
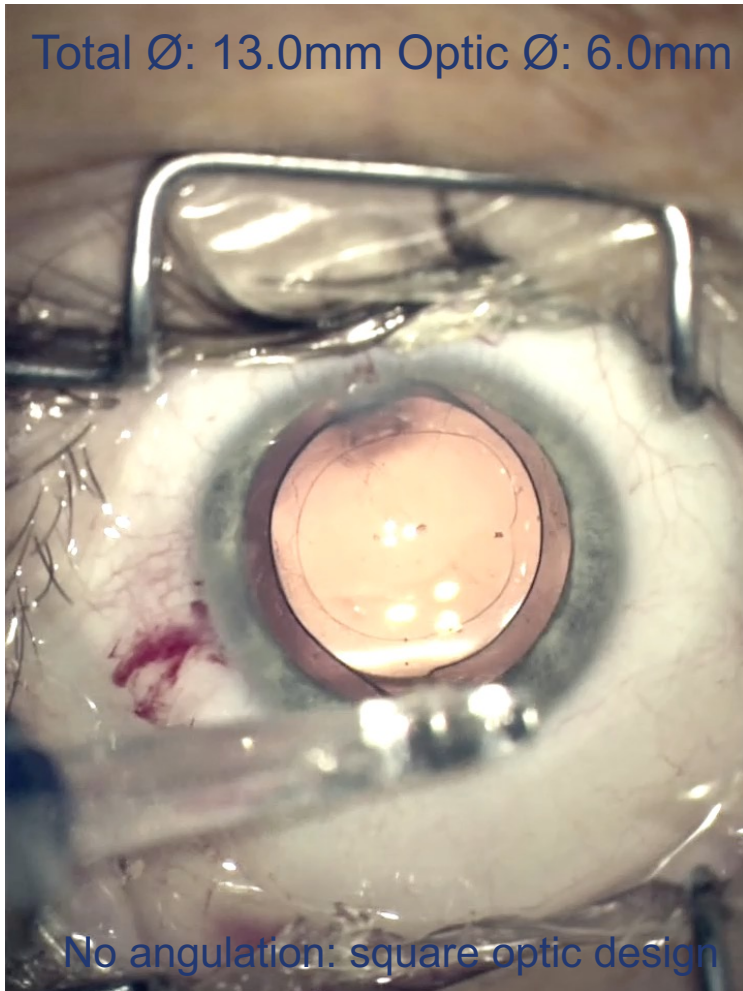


Implanted > 50.000

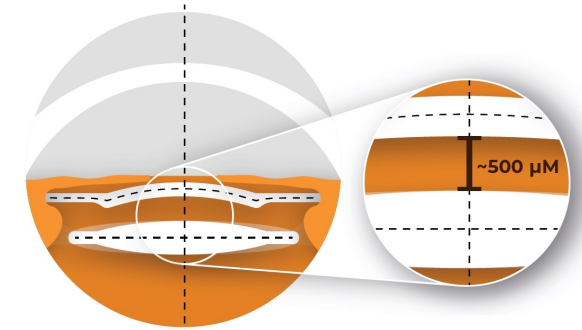


# AddOn<sup>®</sup> by 1stQ | Germany

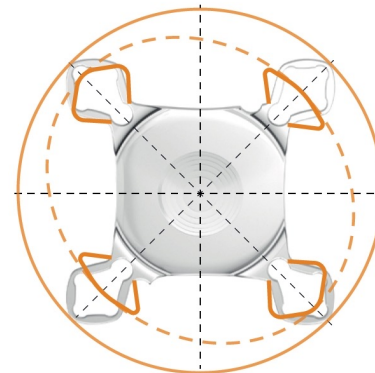
Case Example: High myopic toricity (other eye with amblyopia)



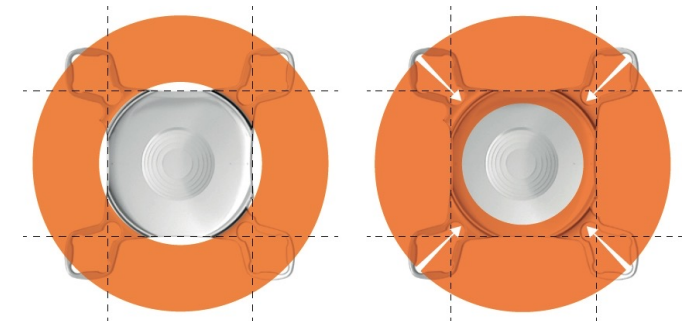
High rotational stability <sup>3,4</sup>  
• Non-torque design



Maintaining IOL clearance <sup>5,7</sup>  
• Convex-concave optic



Adaptive design for Sulcus variations <sup>1,2</sup>  
Spectacle independence through trifocal optic <sup>8-12</sup>



Maintaining iris function <sup>3, 5-7</sup>  
• Square design

# Reverso® by Cristalens | France

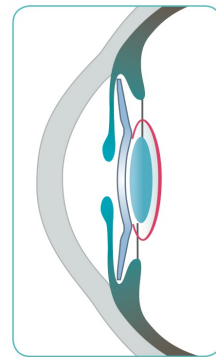
Case Example: Secondary implantation following RLE post Hyperopia LVC

Total Ø: 13.8mm Optic Ø: 6.5mm

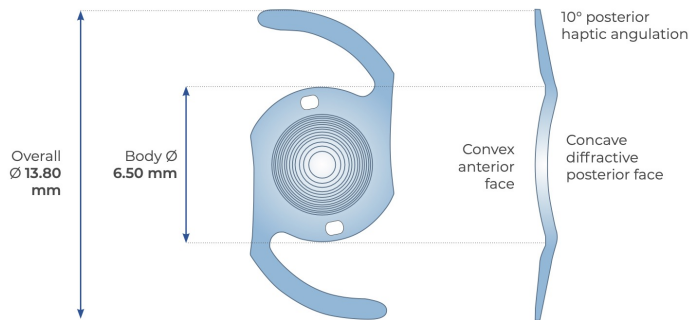
10° angulation of J-Loops

## DESIGN THAT FITS TO THE SULCUS

► For safe implantation that respects the patient's anatomy and ensures optimum performance.

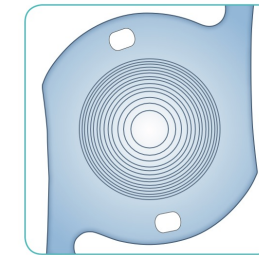


- ✓ Non invasive surgery with incision from **1.8 to 2.2 mm**.
- ✓ **Rounded haptics** respecting the sulcus' anatomy.
- ✓ **10° posterior haptic angulation** with a **6.50 mm** body diameter and a **360°** round edge to avoid pupillary capture or any irritation of the iris.
- ✓ An overall diameter of **13.80 mm** adapted to the sulcus size.
- ✓ A **concave posterior surface** ensuring space in between the two IOLs and perfectly centered in relation to the IOL in the capsular bag.



## SAFE AND CONFIDENT MULTIFOCALITY

► Choosing a multifocal lens should not be a dilemma. Because it is never too late to change your mind, you can now correct presbyopia at any time.

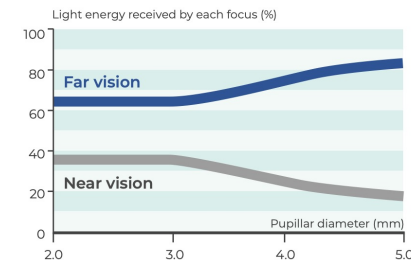
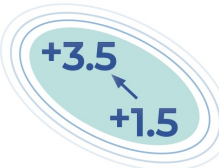


Every cataract surgery in which the crystalline lens is replaced by a monofocal implant inevitably results in **postoperative presbyopia**.

Thanks to Cristalens' hydrophilic piggy-back Reverso® IOL, **spectacle independence is now a reality**, even after implanting a monofocal lens.

The Reverso® IOL was developed internally at Cristalens by the R&D team, making it the **1<sup>st</sup> diffractive multifocal hydrophilic lens** available to be implanted in the ciliary sulcus in front of a monofocal lens located in the capsular bag.

For a bifocal implant, near vision distance is determined by the addition. With an addition choice from **+1.5D to +3.5D** offering a sight distance between 90 cm and 35 cm, the Reverso® IOL enables functional vision **adapted to each patient's lifestyle**.



► **Energy distribution** is adjusted to the pupillary diameter so that the addition for near vision does not compromise the quality of distance vision.

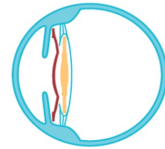
► So as to **avoid halos in low light conditions**, 60-80% of light energy is attributed to far focus sight and 20-40% to near focus sight.

The Reverso® IOL does not cause any additional spherical aberration. Therefore the lens located in the capsular bag corrects its own spherical aberrations and the corneal aberrations.

# Sulcoflex® by Rayner | UK

Case Example: Critical case family member !

## Sulcoflex® Supplementary IOLs



### 6.5mm round-edged optic, designed to:

- Reduce the risk of pupillary block and photic effects
- Reduce risk of optic-iris capture<sup>1</sup>
- Minimise edge glare
- and associated dysphotopsia<sup>1</sup>



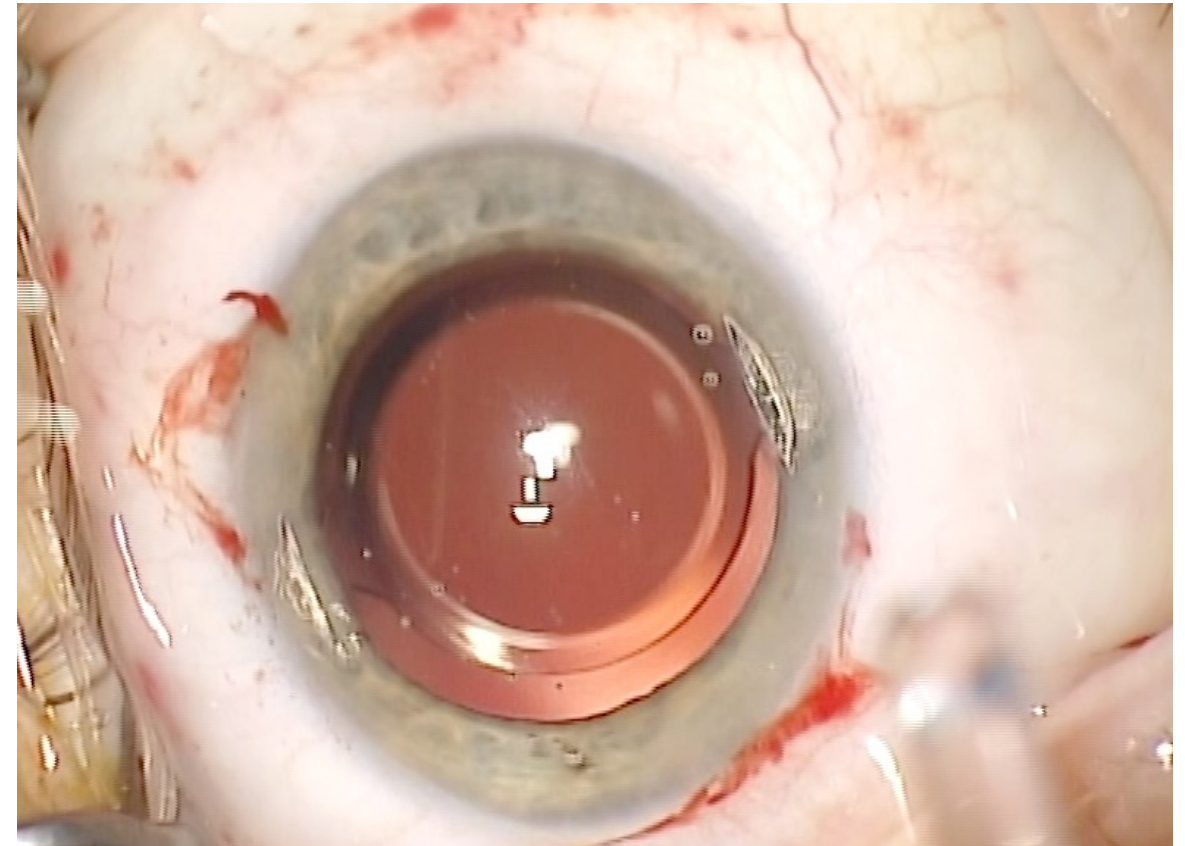
### Rayacryl Material for:

- Good uveal Biocompatibility<sup>7</sup>
- Superb optical clarity – no vacuoles or glistenings<sup>8</sup>

### 14.0mm overall length with undulating haptics:

- Designed for stable fixation in the ciliary sulcus
- Unique undulating round edge haptic design with 10° angulation
- Excellent centration compared to capsular bag fixated multifocal IOLs<sup>5</sup>
- Reduced risk of uveal contact and abrasion<sup>1</sup>
- Reduced Pigment Dispersion Syndrome<sup>1</sup>
- Smooth undulating haptics to minimise the risk of adverse tissue reaction in the sulcus

Total Ø: 14.0mm Optic Ø: 6.5mm



10° angulation of J-Loops

SULCOflex  
TRIFOCAL

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8. Rayner data on file.

### Sulcoflex Aspheric 700L

- ✓ -10.0 D to + 10.0 D
- 0.5 D increments

### Sulcoflex Toric 710T

- ✓ SE: -7.0 D to +7.0 D
- 0.5 D increments
- ✓ CYL: 1.0 D to 6.0 D
- 0.5 D increments

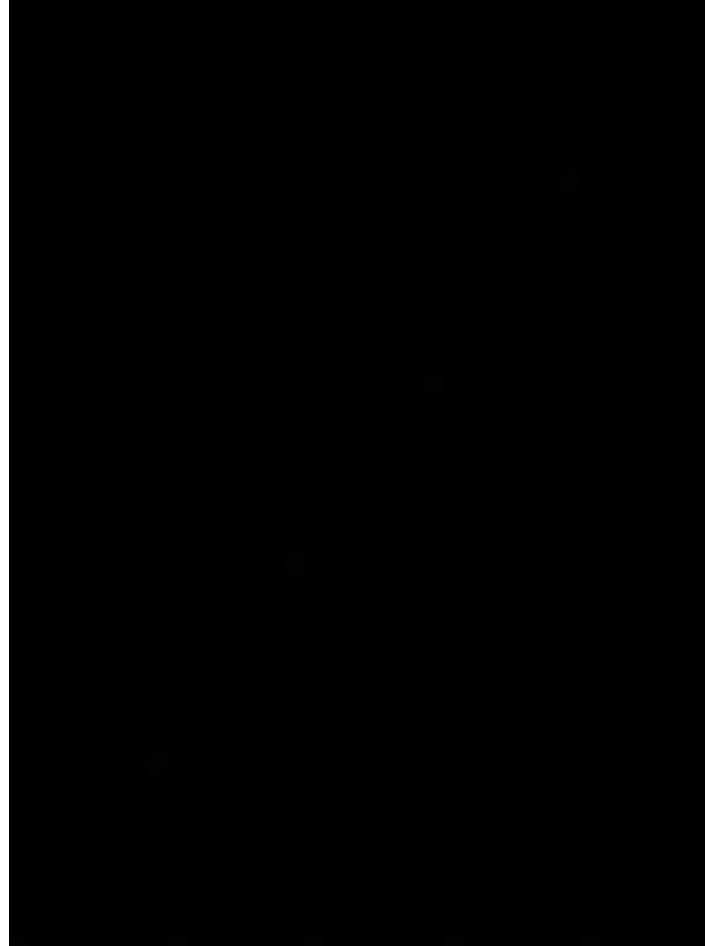
### Sulcoflex Trifocal 703F

- ✓ -3.0 D to +3.0 D
- 0.5 D increments
- ✓ -1.0 D to +1.0 D
- 0.25 D increments



# Explantation Or Exchange Always Possible !

Case example: Touch-Up refraction needs +1.0D (LVC because of dry eye not appropriate)



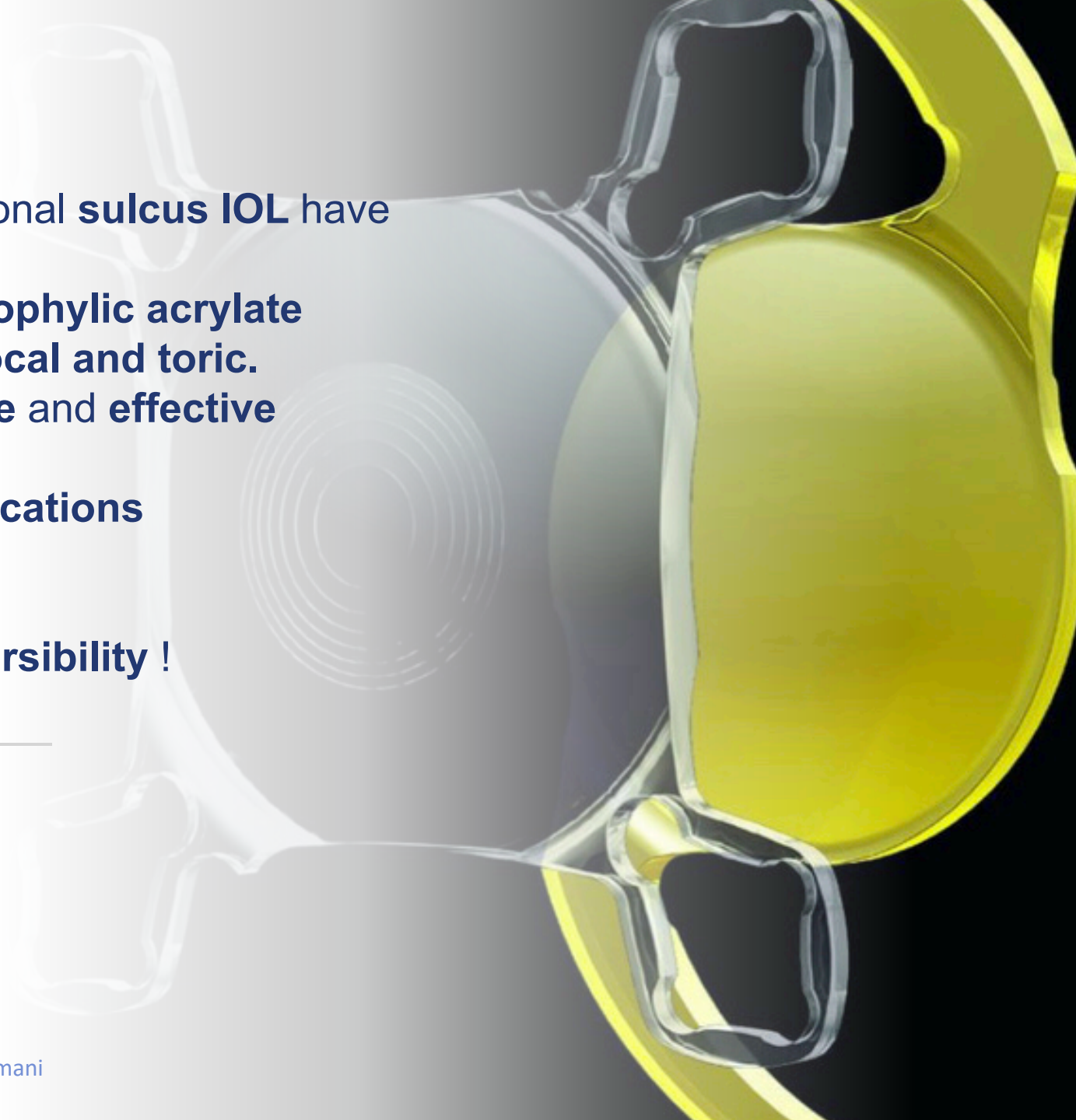
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**Additive [supplementary] functional sulcus IOL** have a special **angulated** design, are made of **single-piece hydrophylic acrylate** and can be **monofocal, multifocal and toric**. If applied correctly, they are **safe and effective** and can be used for a variety of **primary and secondary indications** in refractive cataract surgery.

The main advantage is the **reversibility** !

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# Thank You

[mail@kermani-vision.de](mailto:mail@kermani-vision.de)