VSY BIOTECHNOLOGY

Acriva UD

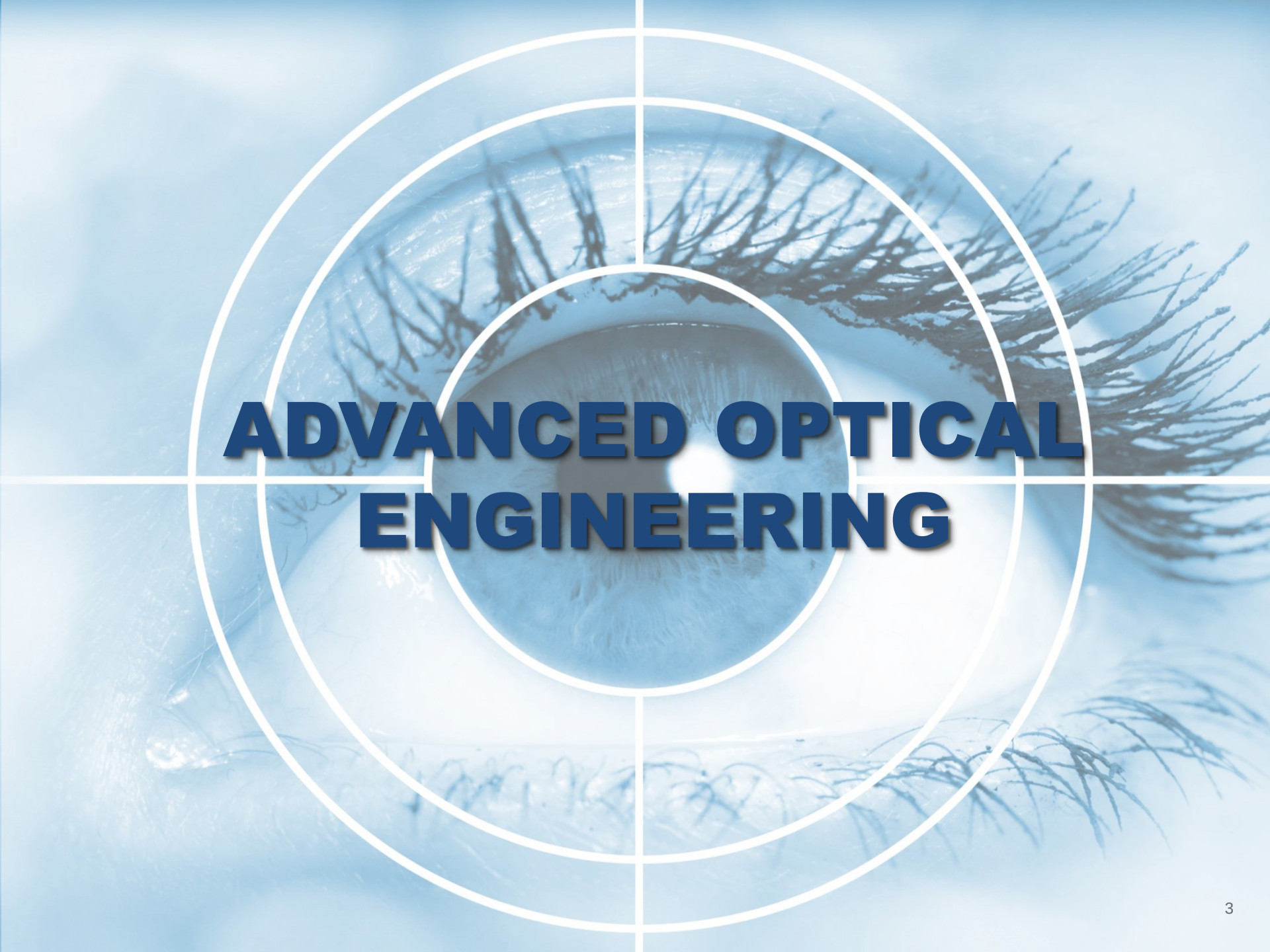
ULTRA DEFINITION INTRAOCULAR LENS

General Features of Acriva Line

General Features of Acriva Line

Acriva UD
ULTRA DEFINITION INTRAOCULAR LENS

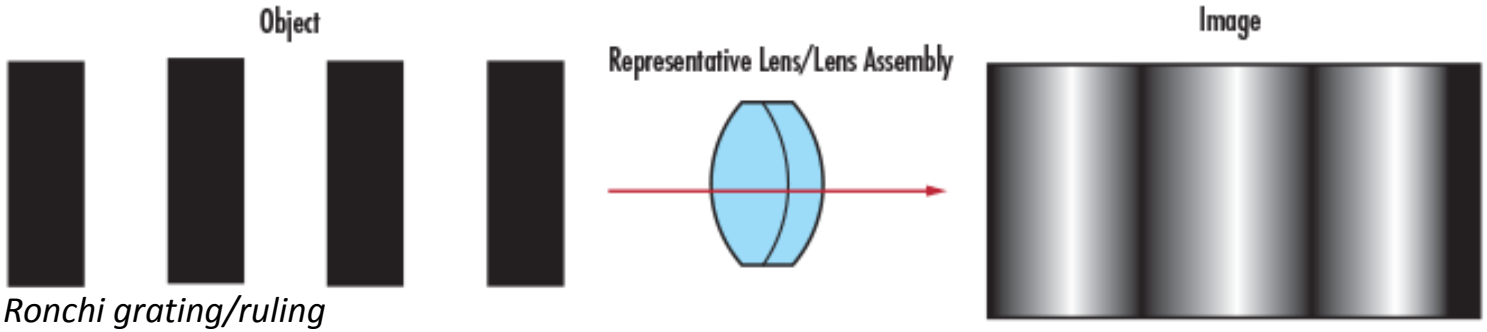
1. Advanced Optical Engineering
2. Efficient Photo Protection
3. Premium Material
4. 360° All Enhanced Square Edge
5. Wide Diopter Range
6. Different Haptic Platform


ADVANCED OPTICAL
ENGINEERING

Advanced Optical Engineering

➢ High MTF (Modulation Transfer Function)

MTF is a direct and quantitative measure of optic system quality which is based on contrast sensitivity.

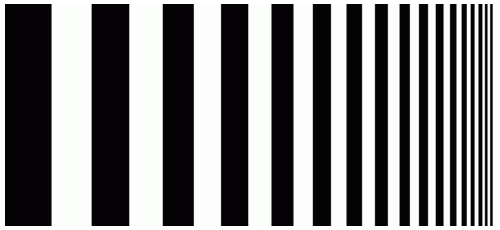


Ronchi grating/ruling

Contrast or modulation can be defined as how faithfully the minimum and maximum intensity values are transferred from object plane to image plane.

The best result through obstacles is

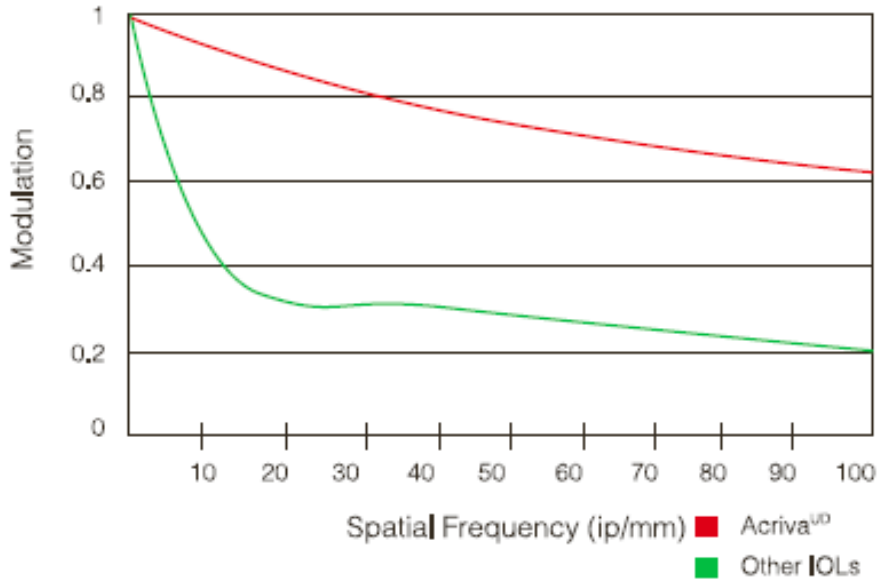
0.7 at 100 lpm.



Advanced Optical Engineering

➢ High MTF (Modulation Transfer Function)

According to international standards MTF result must be above **0.43** at 100 lpm.

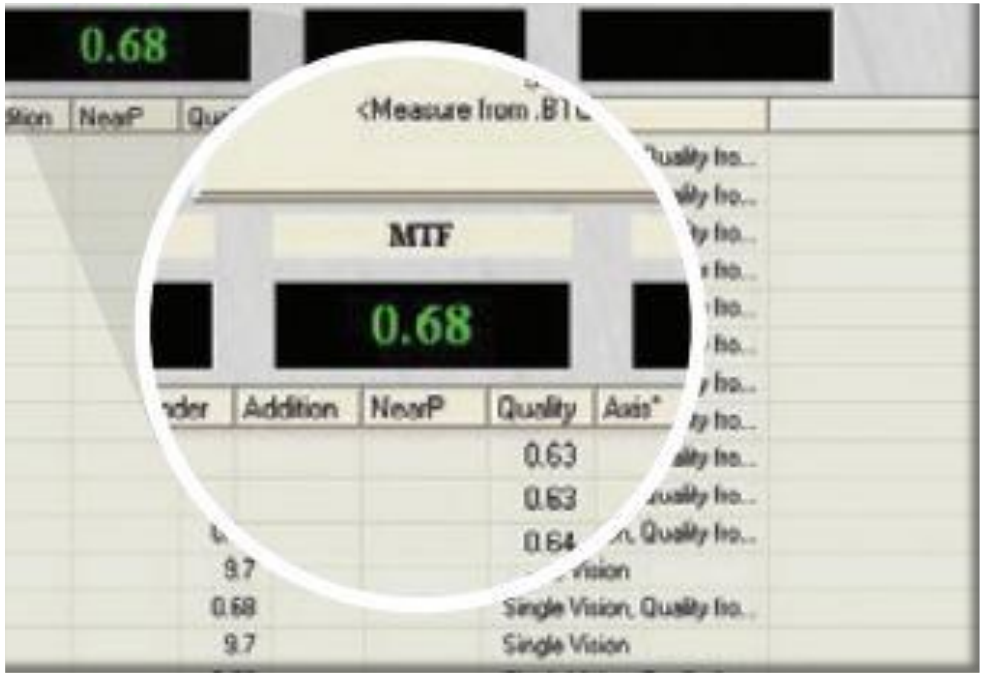


VSY Biotechnology established their own criteria for QC; Min MTF value must be above **0,60** which is far beyond international standards

Advanced Optical Engineering

➢ High MTF (Modulation Transfer Function)

Each IOL MTF value is manually controlled by QC department before delivery.



Advanced Optical Engineering

➢ Precise Production: IOL Power Calculation

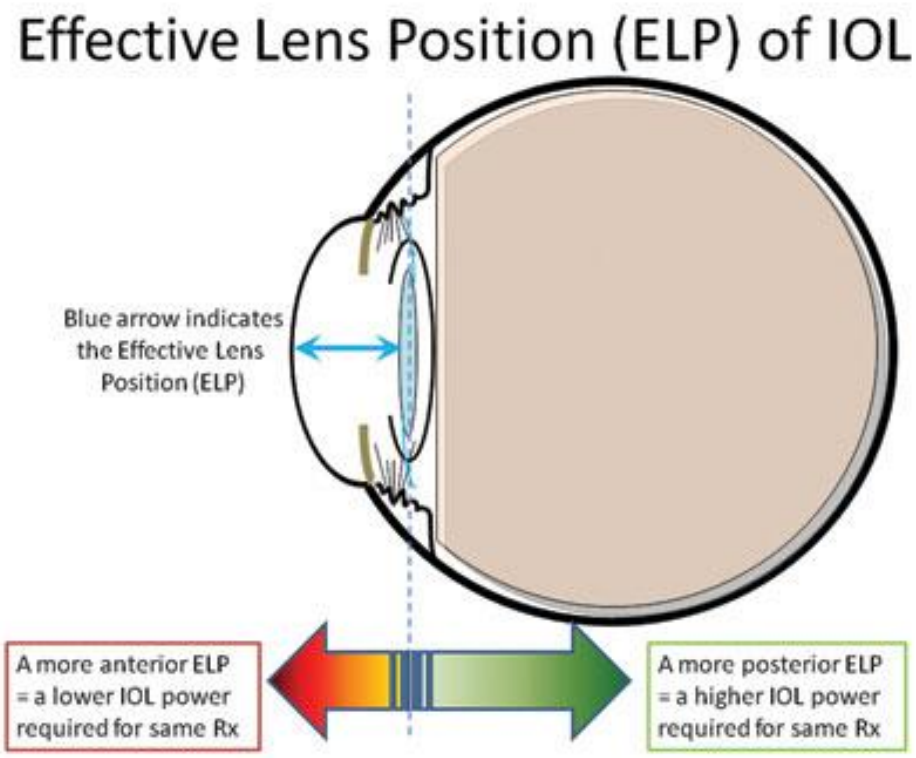
Refractive Surprise – Sources of Error

- **Post-op Effective Lens Position (36%)** Optimising IOL constant is the most important factor, (*Anstodemon, JCRS Jan. 2011)*
- **Error in post-op refraction (27%) -** IOL power calculations (Barrett, SRKT, Hoffer Q, Haigis, Holladay II…)
- **AXL Measurements (17%)**
- Pupil Size (8%) only if there is spherical aberration
- Keratometry (10%) ant. curvature with keratometer, topographers, post. curvature
- IOL Power – very small variability (desired outcome deviation = max 0.18D)
- Other sources of error = Corneal thickness, post surface asphericity, higher order, chromatic aberrations, change in corneal power

Advanced Optical Engineering

➢ Precise Production: IOL Power Calculation

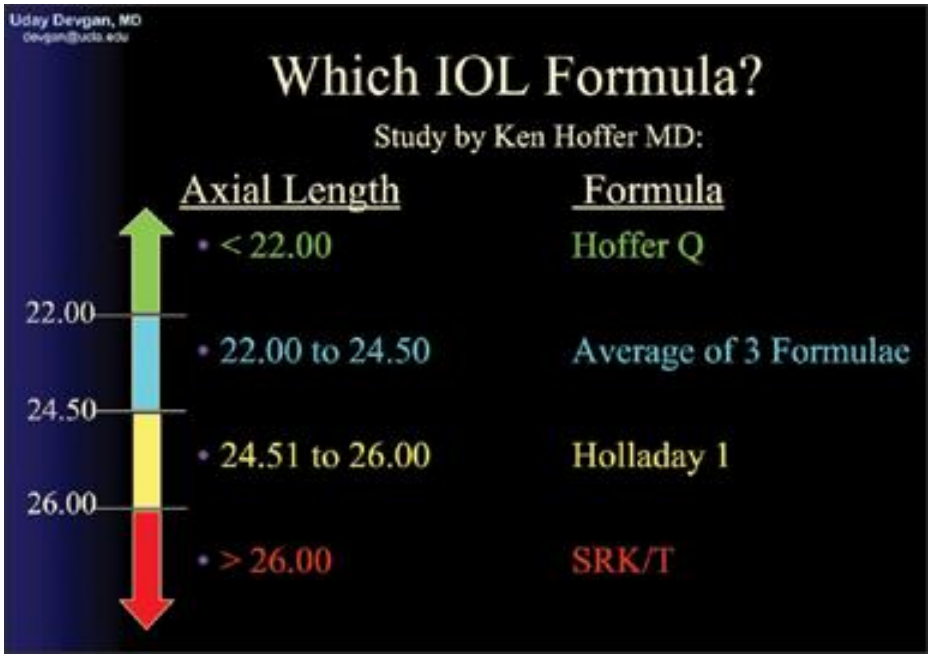
A good **positioning** of the lens is key to avoid post-op refractive errors



Advanced Optical Engineering

➢ Precise Production: IOL Power Calculation

The best-suited formula depends on the **axial length** of the eye.



Advanced Optical Engineering

Wang-Koch formulas (Optimized AL in eyes > 25.0 mm)

- **Holladay 1** optimized AL = 0.829 x IOLMaster AL + 4.27
- **SRK/T** optimized AL = 0.854 x IOLMaster AL + 3.72
- **HofferQ** optimized AL = 0.853 x IOLMaster AL + 3.58
- **Haigis** optimized AL = 0.929 x IOLMaster AL + 1.56

Advanced Optical Engineering

➢ Precise Production: IOL Power Calculation

Provide our **A-Constant** list to the surgeons as a starting point.

- The recommended A-constant is prepared as a guide for surgeons
- It is a starting point for IOL power calculation. It is suggested to create a more precise A constant with the clinical experiences gained through the surgical technique, measurement tools and post-operative results.

Download

02_A Constant Values.pdf

Annex: A Constant Values

Brand Name	Model Name	Ac A-Cons.	SRK-II	SRK-T	Haigis a0	Haigis a1	Haigis a2	Hoffer Q pACD	Sf
ACRIVA	Acriva UD613	118.0	118.6	118.4	0,95	0,4	0,1	5,19	1,43
	Acriva UDC625	118.0	118.6	118.4	0,89	0,4	0,1	5,11	1,33
	Acriva UDB625	118.0	118.6	118.4	0,89	0,4	0,1	5,11	1,33
	Acriva UDM611	118.0	119.0	118.7	1.15	0,4	0,1	5.32	1.58
	Acriva HAF	118.0	118.6	118.4	0,89	0,4	0,1	5,11	1,33
ACRIVA REVIOL	Acriva Reviol MF613	118.0	118.3	118.1	0,65	0,4	0,1	4,93	1,20
	Acriva Reviol MFB625	118.0	118.0	117.9	0,70	0,4	0,1	4,85	1,09
	Acriva Reviol MFM611	118.0	118.5	118.3	0,67	0,4	0,1	4,96	1,27
OCUVA	Ocuva A625	118.0	118.5	118.3	0,83	0,4	0,1	5,06	1,28
	Ocuva 625	118.0	118.5	118.3	0,83	0,4	0,1	5,06	1,28
	Ocuva AB625	118.0	118.5	118.3	0,83	0,4	0,1	5,06	1,28
	Ocuva B625	118.0	118.5	118.3	0,83	0,4	0,1	5,06	1,28
ACRIVA BB	Acriva BB UD613	118.0	118.6	118.4	0,95	0,4	0,1	5,19	1,43
	Acriva BB UDM611	118.0	119.0	118.7	1.15	0,4	0,1	5.32	1.58
ACRIVA REVIOL BB	Acriva Reviol BB MF613	118.0	118.3	118.1	0.65	0.4	0.1	4,93	1,2
	Acriva Reviol BB MFM611	118.0	118.5	118.3	0.67	0.40	0.10	4.96	1.27
ACRIVA BB Toric	Acriva BB T UDM611	118.0	118.9	118.6	1.10	0.4	0,1	5.28	1.56
ACRIVA REVIOL BB Toric	Acriva Reviol BB T MFM611	118.0	118.5	118.3	0.67	0.4	0.1	4.96	1.27
ACRIVA REVIOLTri-ED	ACRIVA REVIOL Tri-ED611	118.0	119.0	118.7	1.15	0.4	0.1	5.32	1.58
ACRIVA REVIOL Tri-ED TORIC	ACRIVA REVIOL Tri-ED TORIC 611	118.0	119.0	118.7	1.15	0.40	0.10	5.32	1.58
ACRIVA TRINOVA	ACRIVA TRINOVA	118.0	118.0	117.9	0.58	0.4	0.1	4.82	1.04
ACRIVA TRINOVA TORIC	ACRIVA TRINOVA TORIC	118.0	118.0	117.9	0.58	0.4	0.1	4.82	1.04

Advanced Optical Engineering

Acriva UD
ULTRA DEFINITION INTRAOCULAR LENS

➢ UD Aspheric Optic

UD
ULTRA DEFINITION

Mild negative asphercity

of Acriva UD concept slightly neutralizes corneal positive spheric aberration. Keeping " mild " positive aberration sourcing from cornea helps to maintain better depth of focus in vision.

Clinical benefit of UD optic

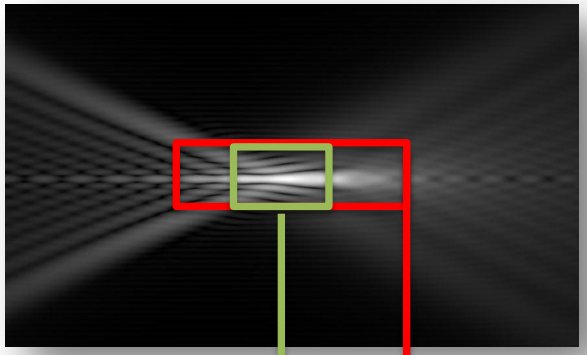
- Improved contrast sensitivity in dim light
- Preserving depth of vision
- Lower sensitivity to decentration

Just like young healthy eyes!

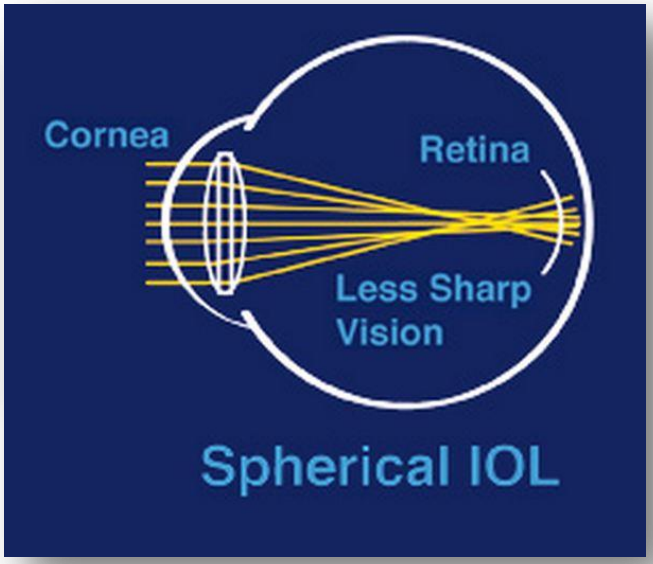
Advanced Optical Engineering

➢ UD Aspheric Optic

Corneal SA + Spheric IOL Aberration



Optical Focus Acceptable Range
Depth of Focus



Astigmatism-like aberration

Night Time Driving Problems

Aberration longitudinal focus out of the focus (defocus) brain can not resolve blurred vision

Advanced Optical Engineering

➢ UD Aspheric Optic

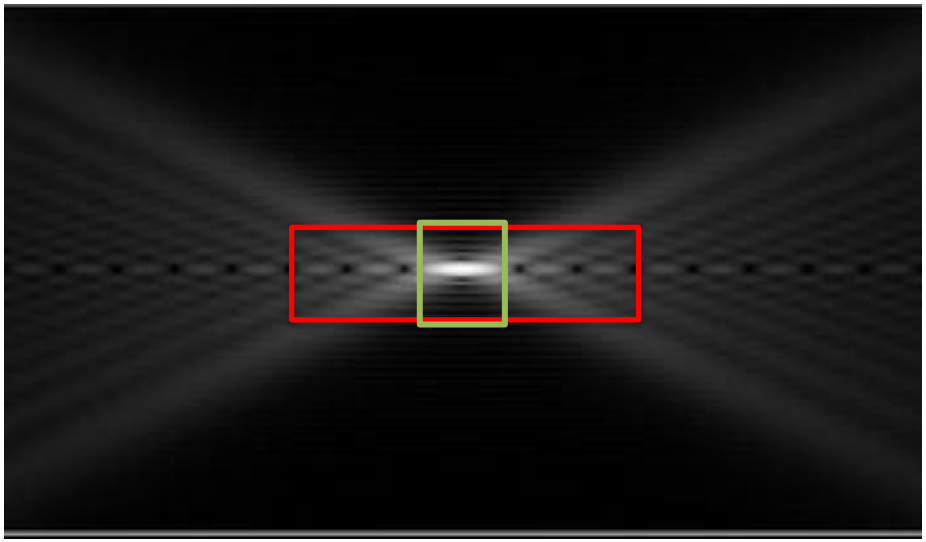
Tecnis = -0,26 µm

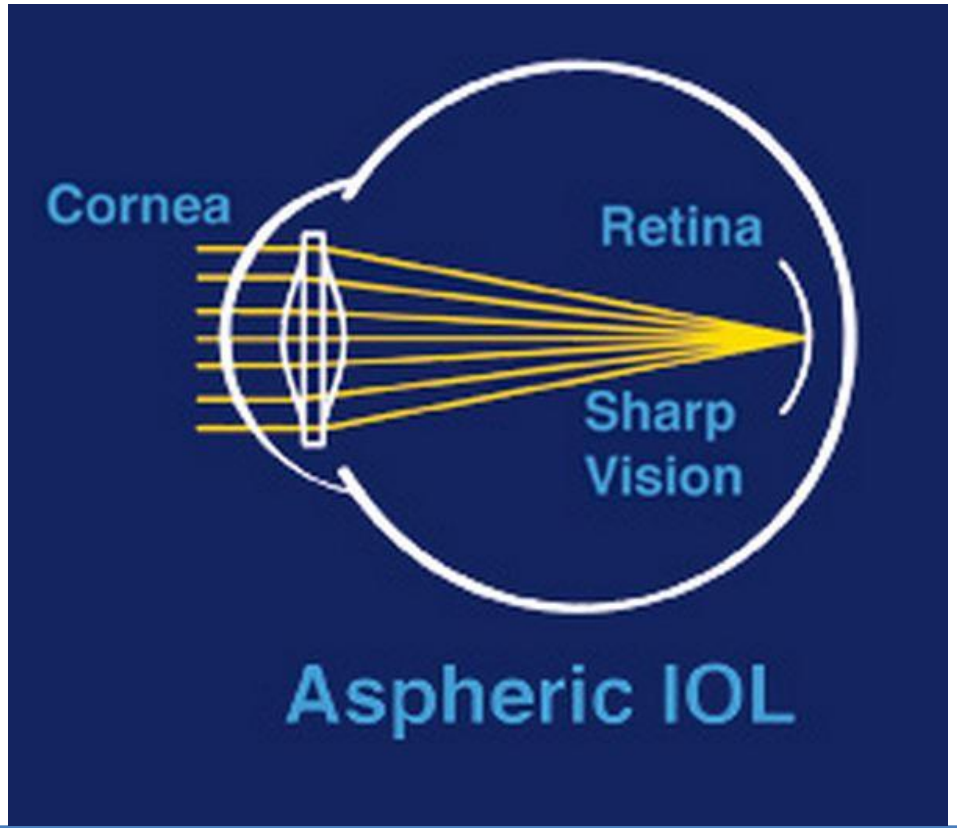
Alcon AcrySof= -0,20 µm

HOYA iSert= - 0,18 µm

Strong Negative Aspheric IOLs

Targeting to neutralize all corneal SA





Optical Focus : sharp but no depth of focus

No aberration but sensitive de decentration and no depth of focus

Advanced Optical Engineering

Acriva UD
ULTRA DEFINITION INTRAOCULAR LENS

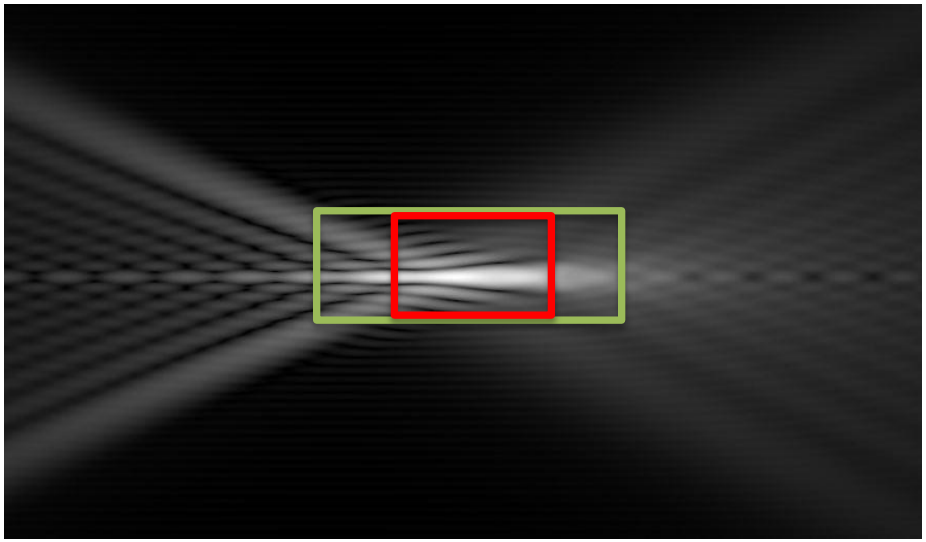
BAUSCH+LOMB

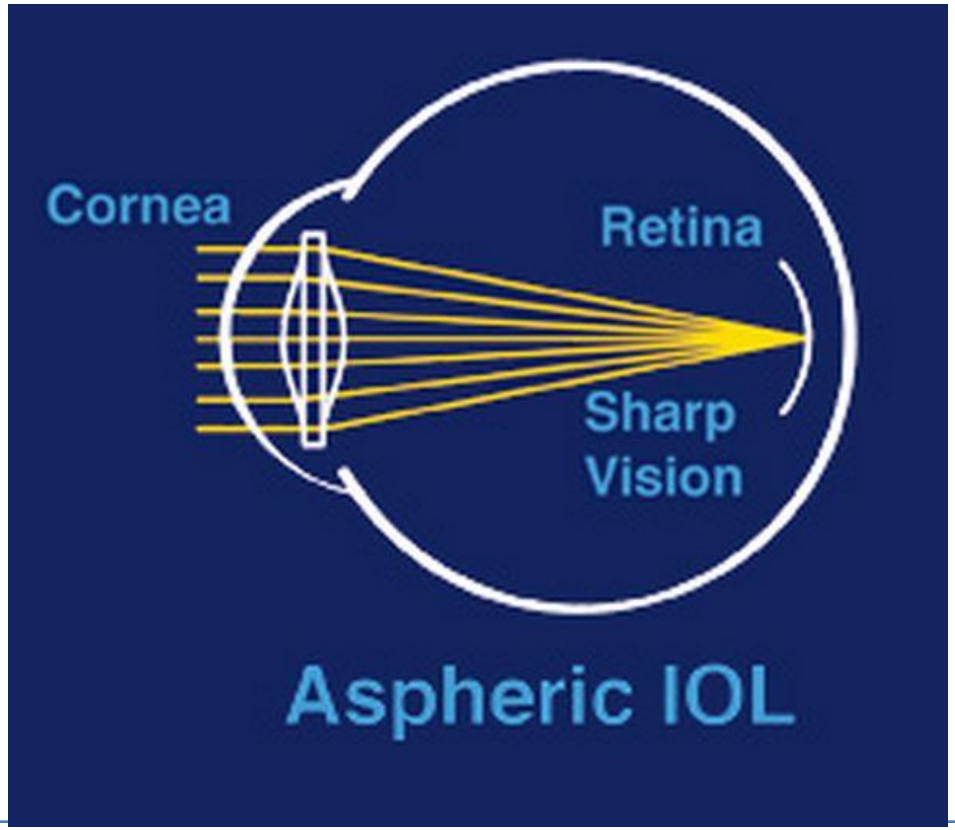
ZEISS

➢ UD Aspheric Optic

Neutral Aspheric IOLs - Zero Aberration Control

Corneal SA is NOT corrected





Optical Focus of zero aberration control IOLs

Defocus area + tolerant to decentration
Depth of focus preserved
But decreased Contrast Sensitivity at dim light

VSY BIOTECHNOLOGY

Advanced Optical Engineering

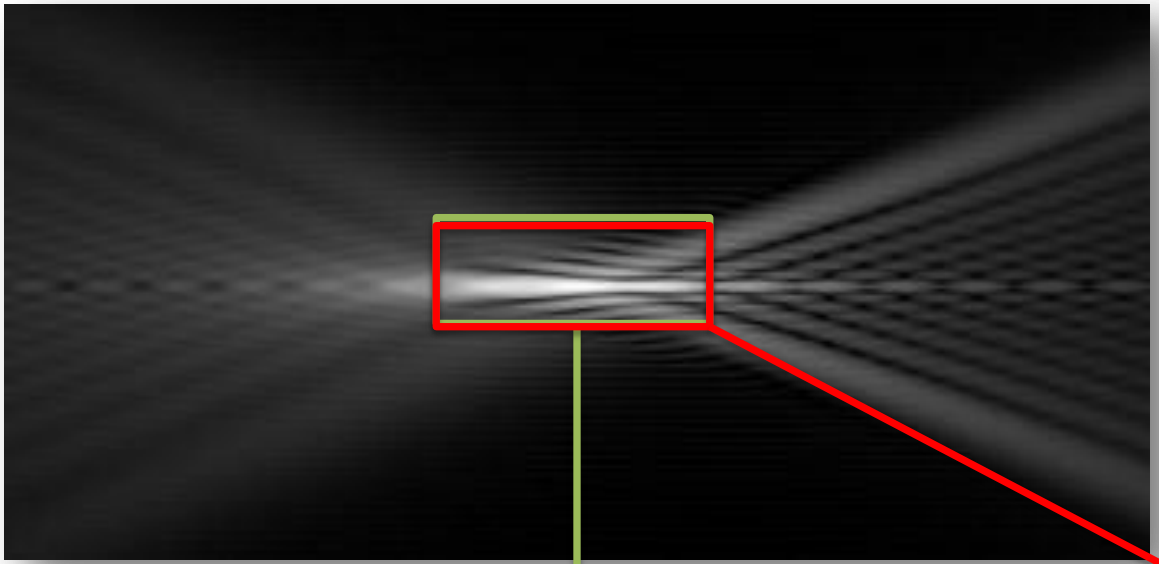
➢ UD Aspheric Optic

Acriva= -0,165 µm

AcrivaUD Aspheric Optic

Mild Negative Asphericity – Slight Corneal SA

UD ULTRA DEFINITION



1. Tolerant to decentratation
2. Enhanced Depth of focus vision
3. Good Contrast Sensitivity

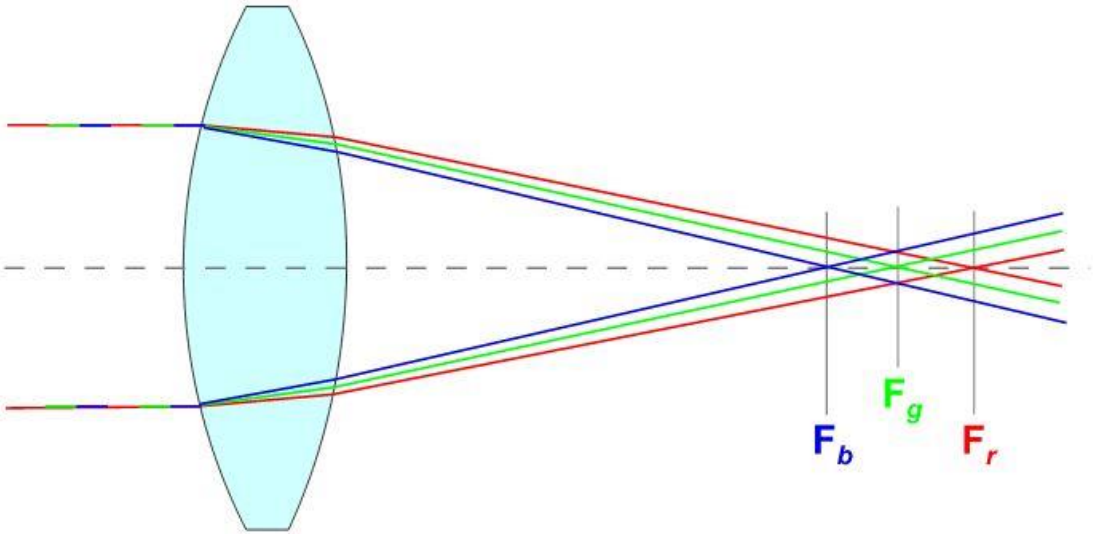
at dim light

Optical Focus
Acceptable Range
Depth of Focus

Same as young
healthy young eye!

Advanced Optical Engineering

➢ Chromatic Aberration Control



Chromatic Aberration is a type of distortion in optical system formed by different wavelengths of light to have different focal points.

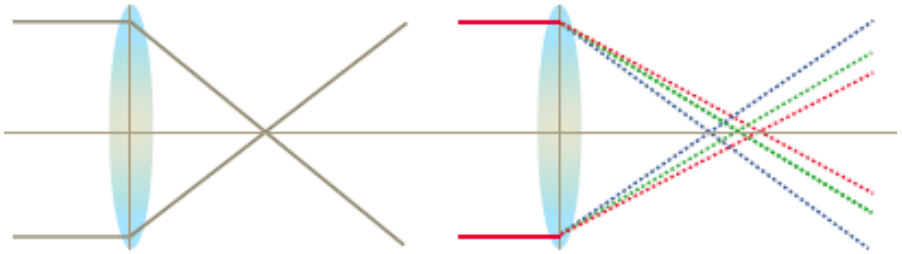
Advanced Optical Engineering

➢ Chromatic Aberration Control

The higher the **Abbe Number** is the lower the chromatic aberration is.

The Abbe number (V value) characterises an optical material's chromatic dispersion.[6] It is defined as: $V_d = (n_d - 1)/(n_F - n_C)$ where n_d, n_F, n_C are a material's refractive index at 587, 486 and 656 nm, respectively. Materials with lower chromatic dispersion generally have larger Abbe numbers (the denominator in the definition of V_d is smaller). Refractometers

Higher Abbe Number



Lower Abbe Number

Advanced Optical Engineering

➢ Chromatic Aberration Control

One of the Highest Abbe Number in the Market:

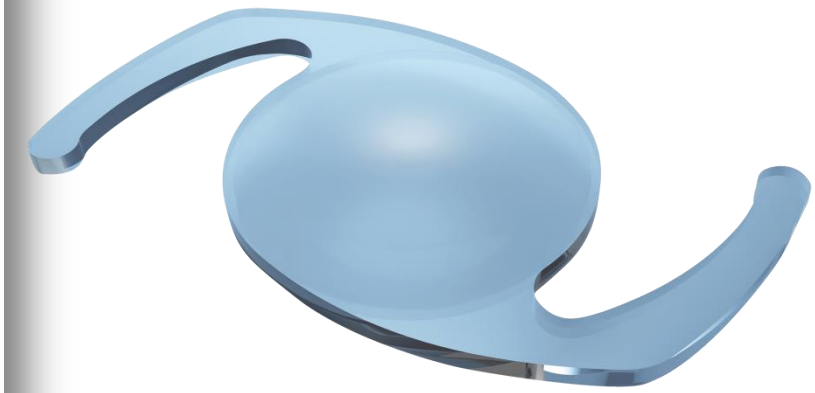
Clear Vision Abbe number of Acriva is : **58**

Table 1 Refractive indices and Abbe numbers for different lenses and optical materials

Intraocular lens	Index of refraction	Abbe number
Alcon acrylic*	1.55	37
AMO acrylic†	1.47	55
AMO silicone‡	1.46	42
Hoya acrylic§	1.51	43
Crystalline lens[2]	1.40	47

*AcrySof SA60AT or SN60AT, Alcon Laboratories, Fort Worth, TX, USA.
†Tecnis ZA9003, Advanced Medical Optics, Santa Ana, CA, USA.
‡Tecnis Z9002, Advanced Medical Optics.
§Hoya YA60BB, Hoya, Tokyo, Japan.

Br J Ophthalmol 2007;**91**:1225–1229. doi: 10.1136/bjo.2007.118745



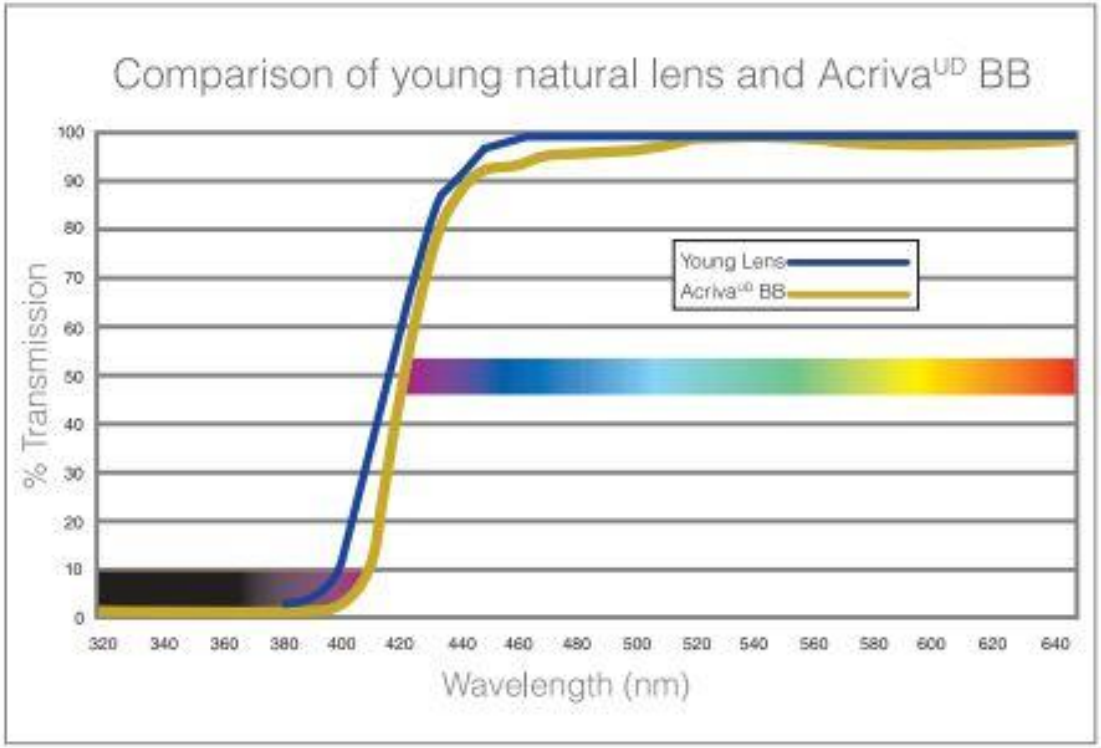

EFFICIENT
PHOTOPROTECTION

Efficient Photoprotection

➢ Natural Chromophores

Acriva BB contains 3-hydroxykynurenine which is found in our natural crystalline lens.

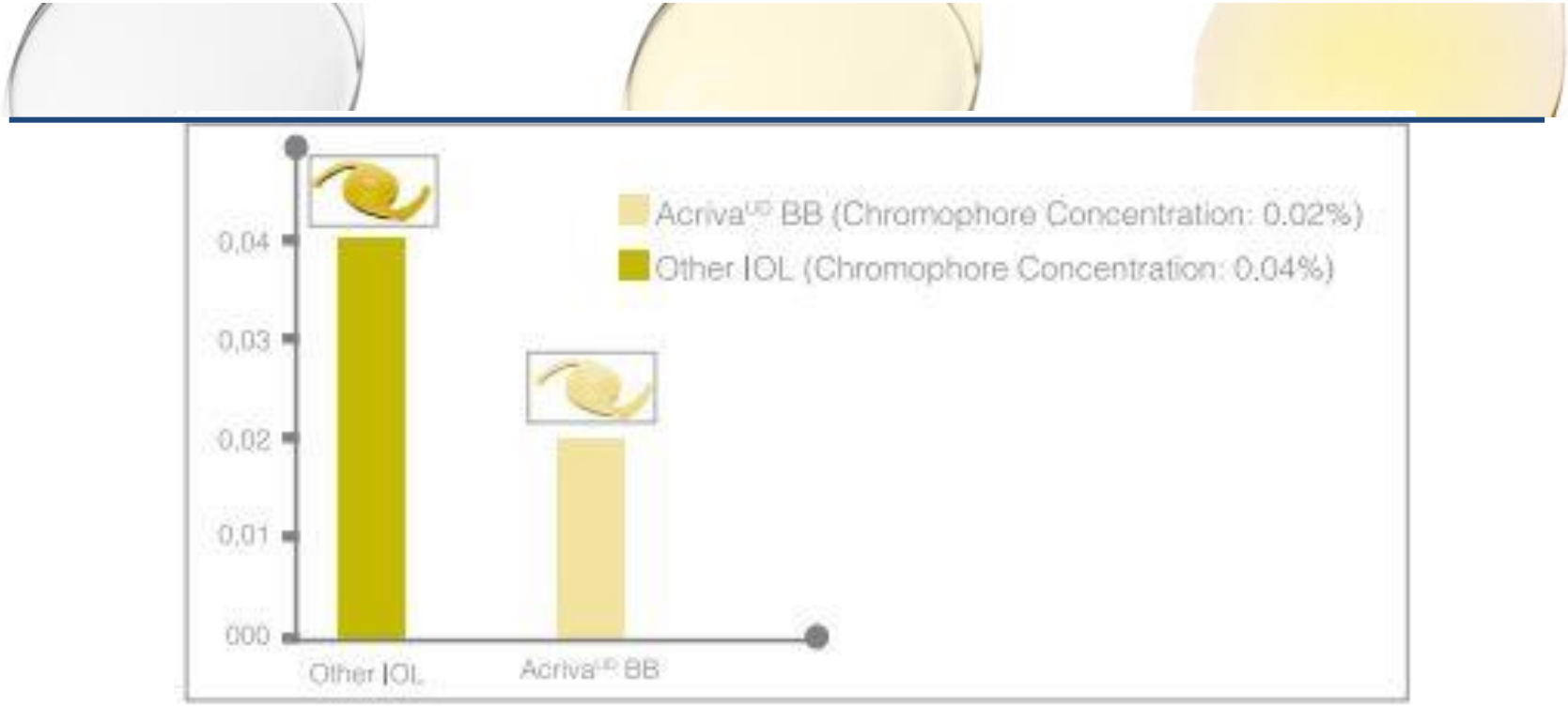
This natural chromophore possesses the same light transmission than the natural lens'.



Efficient Photoprotection

➢ Ideal Concentration

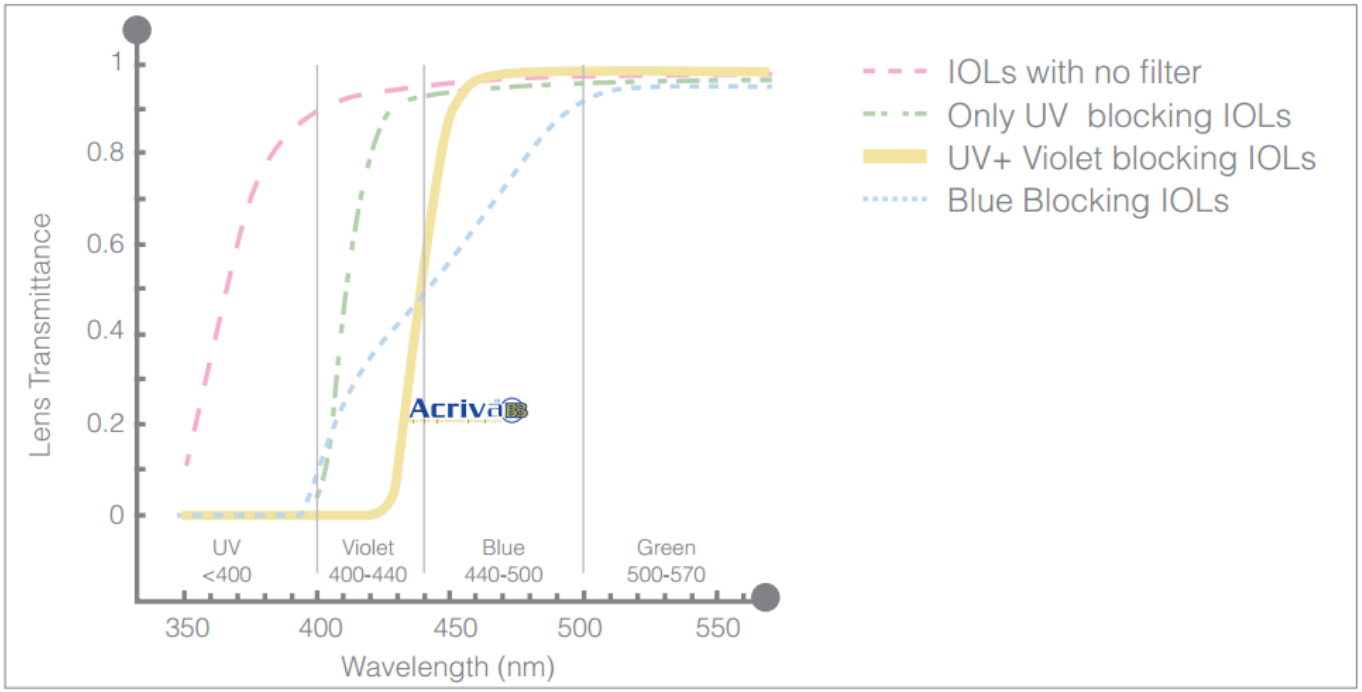
Chromophore concentration of Acriva BB is 0,02% which doesn't affect negatively to color perception of the patient. Natural chromophore and its lower concentration provide a higher contrast sensitivity under low light condition.



Efficient Photoprotection

➢ Optimal Filtration Range

Excellent photoprotection from potential damage of the UV and Violet spectrum without blocking blue light

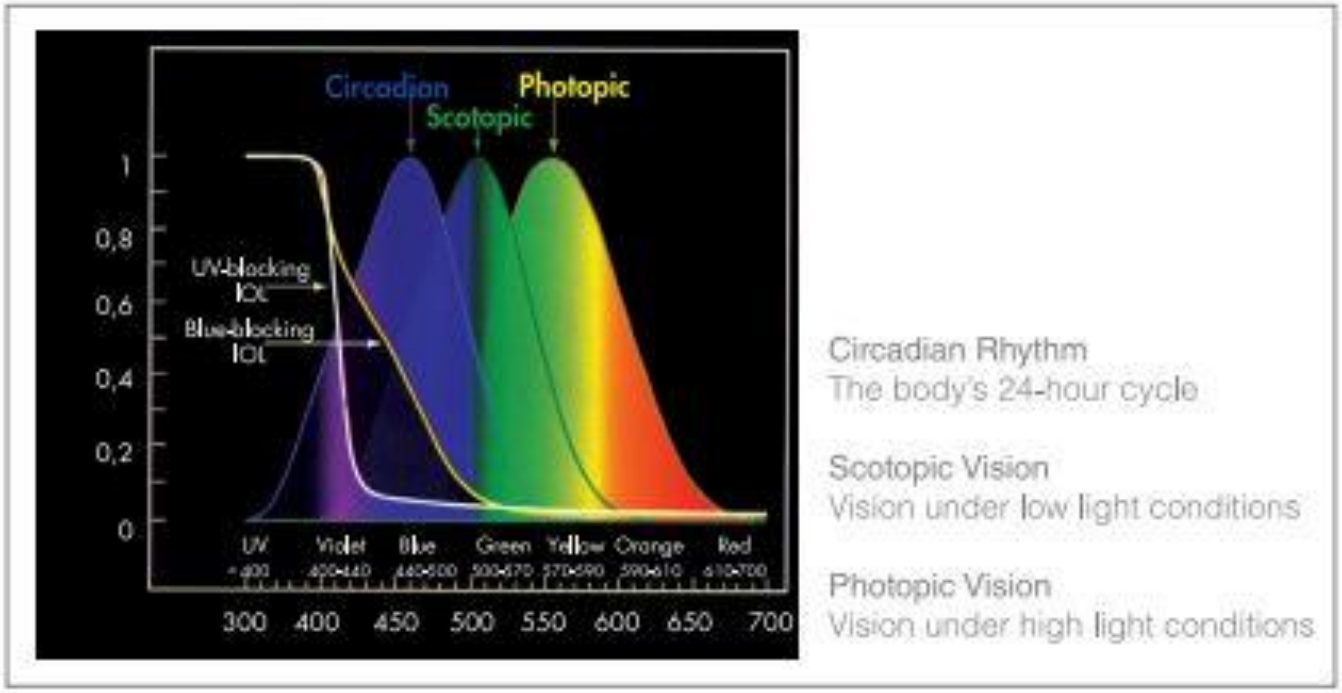


Acriva BB ensures 90% blue light transmission at 460 nm while most known IOLs only transfer 45% blue light transmission

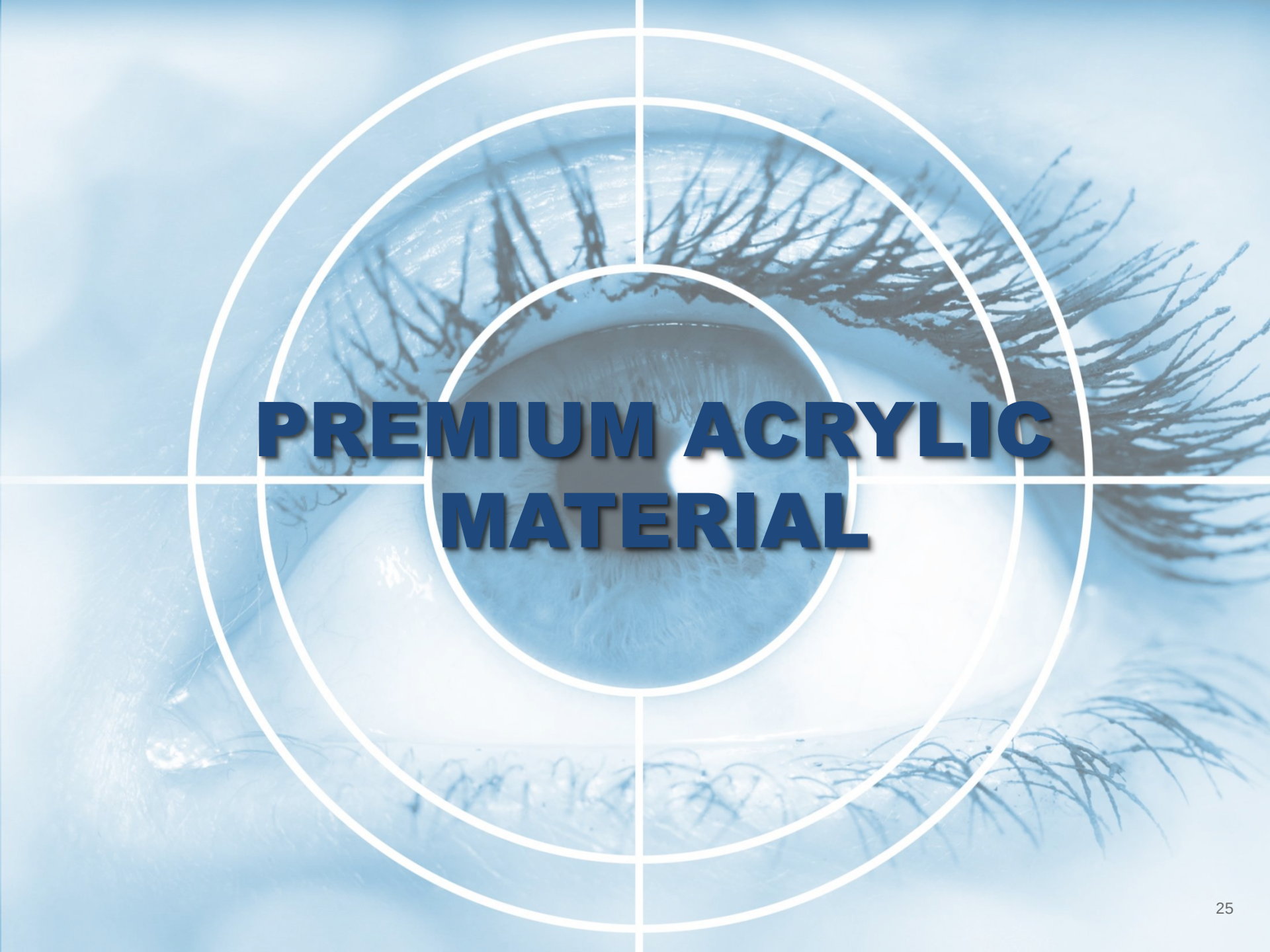
Efficient Photoprotection

➢ Optimal Filtration Range

Balanced Photoprotection of UVA and Violet Filtration mimics natural crystalline lens.



Disorganization of the circadian rhythm is more common in older adults and people with amnesia, depression and dementia.


PREMIUM ACRYLIC
MATERIAL

Premium Acrylic Material

Acriva UD
ULTRA DEFINITION INTRAOCULAR LENS

➢ Hydrophobic Surface

All Acriva line are produced with a third-generation Acrylic:
Combination of hydrophilic & hydrophobic copolymer

2-Oxiethylmethacrylate hydrophobic monomer 25%
2-Hydroxymethacrylate hydrophilic monomer 75%

VSY BIOTECHNOLOGY

Premium Acrylic Material

Acriva UD
ULTRA DEFINITION INTRAOCULAR LENS

➢ Hydrophobic Surface

Hydrophobic Benefits
- Delayed PCO
- High Biocompatibility
- Low inflammatory Response
- Limited bioadhesion

HydrophilicBenefits
- No Glistening
- No vacuoles
- Foldability (Distorsion Resistant)
- Injectability (Suitable for MICS)
- Instantaneous Unfolding in the Eye
- Limited Glare Effects

Premium Acrylic Material

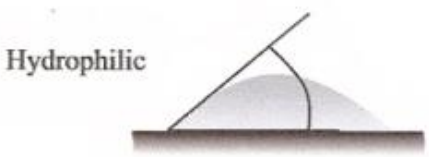
➢ Hydrophobic Surface Behavior: Proved

REPUBLIC OF TURKEY
GAZI UNIVERSITY
OFFICE OF DEAN OF SCHOOL OF SCIENCES AND LETTERS

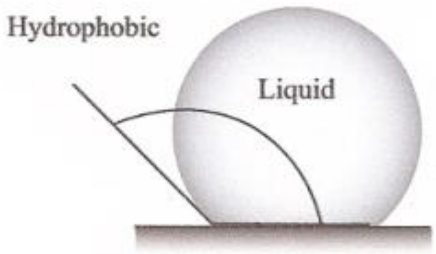
Contact Angle Measurements of
Intra-Ocular Lenses (IOL)

Figure 3 shows average contact angles of ACRIVA UDB 625 Aspheric IOL and ALCON ACRYSof IQ Natural Aspheric IOL. The performed analysis concluded that in both cases the contact angles of ACRIVA UDB 625 Aspheric IOL and ALCON ACRYSof IQ Natural Aspheric IOL are comparable as shown in Figure 3.

Download



Contact angle measurement demonstrates hydrophobic behavior of material



Premium Acrylic Material

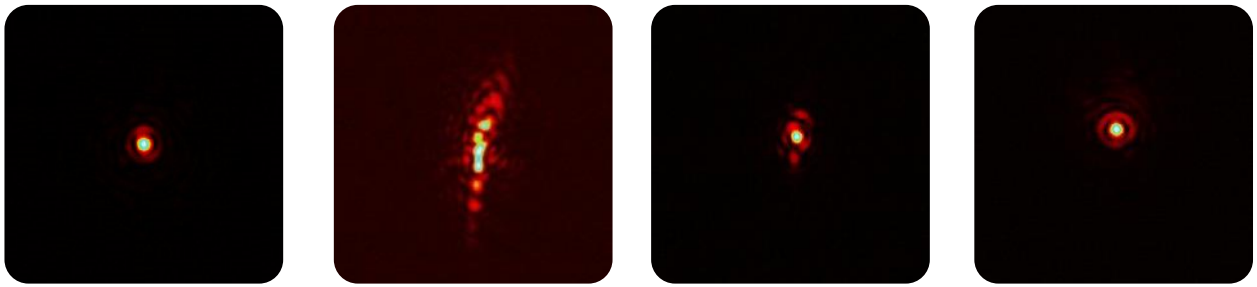
➢ Flexibility

The elastic co-polymer structure acts like a memory sensor. The Acriva^{UD} material quickly resume their initial shape in a hour.

➔ Much quicker unfolding character than hydrophobic competitors.

Point Spread Function Test
Light distribution after folding & unfolding the lens

Acriva UD
ULTRA DEFINITION INTRAOCULAR LENS



before folding | 1 min. later | 15 min. later | 60 min later

Other IOLs

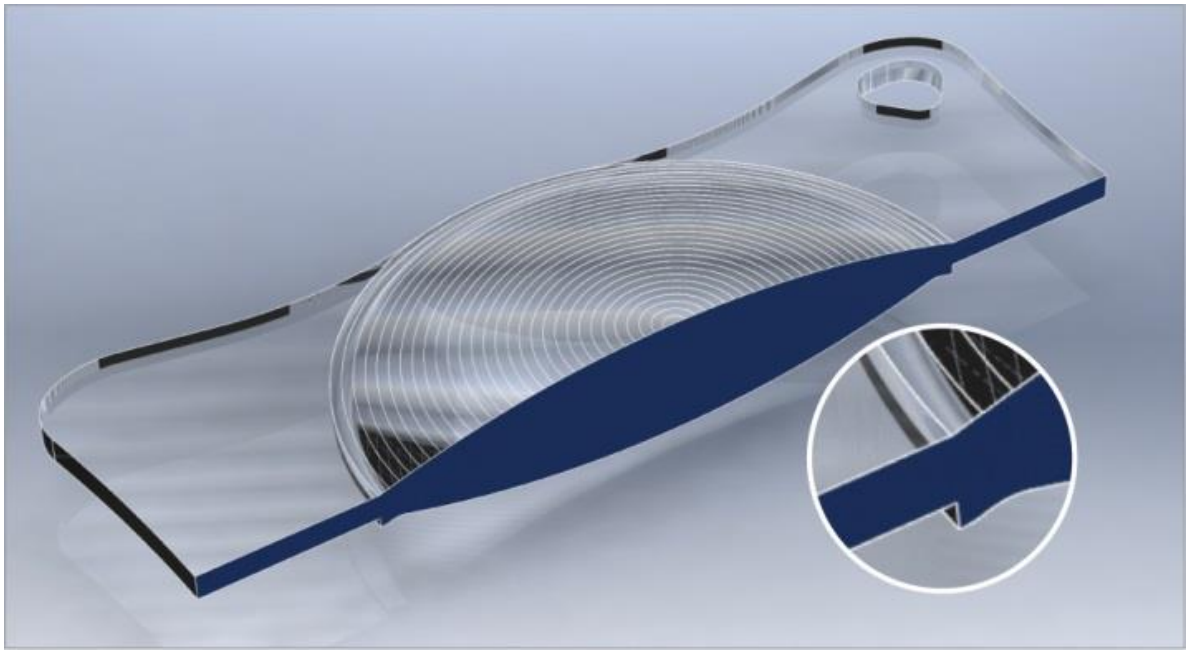
Before folding | Still disturbed


360° All Enhanced
Square Edge

360° All Enhanced Square Edge

➢ Real PCO Barrier

All Acriva^{UD} IOL series have all square **360° Enhanced Square Edge** technology. The innovative edge is specially designed to decrease the risk of cell proliferation.



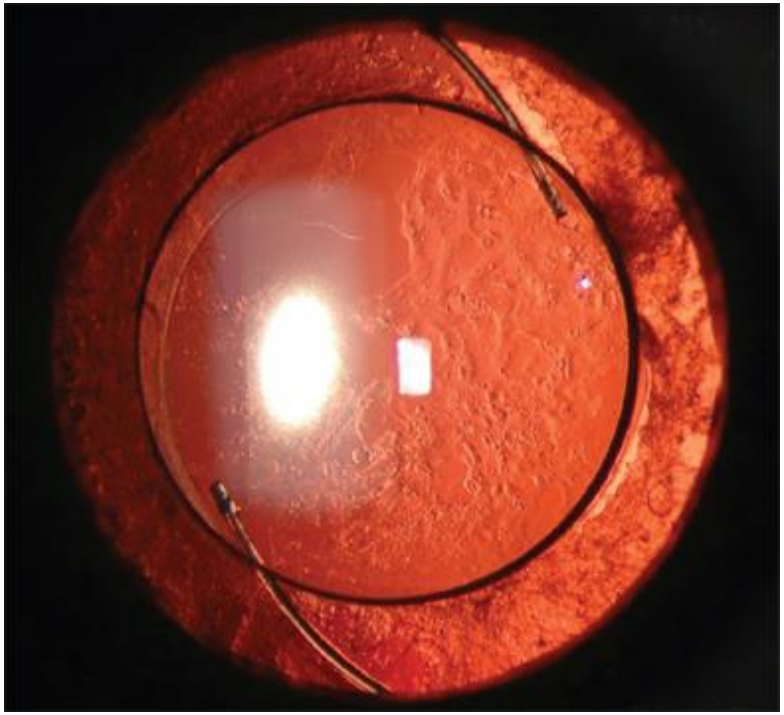
This innovative edge design greatly reduces the **PCO** risk by ensuring posterior capsule contact to the rear surface of the lens for optimal sealing effect.

Dual prevention!

Enhanced Square Edge and Premium Material together play important roles

360° All Enhanced Square Edge

➢ Real PCO Barrier



"2% YAG rate in 6 months period"[1]

"No eye in our study had an inflammatory reaction postoperatively. By the 6-month follow up, only 3.3% had PCO that necessitated Nd-YAG laser treatment"[2]

"18 eyes were required Nd:YAG capsulotomy in 200 eyes after 12 months post operation"[3]

1. Refractive lensectomy to correct hyperopia with Acriva[UD] Reviol Multifocal IOL implantation. P.Stodulka., Free Paper Session, Vienna, ESCRS 2011.
2. Comparison of clinical outcomes with 2 small-incision diffractive multifocal intraocular lenses. Can I., Ceran B.B., Soyugelen G., Takmaz. T. 38:60-67 J Cataract Refract Surg 2012.
3. Visual Outcomes at 12 Months in Patients Following Implantation of a Diffractive Multifocal Intraocular Lens. Baykara M., Akova Y. A., Aslan O.S., Cinhuseyınoglu N., Takmaz T., Gucukoglu A., Usta Y.B. Opthhalmol Ther. 10.1007/s40123-015-0032-4, 2015.


Wide Diopter Range

Wide Diopter Range

Monofocal

0.0 D to 32.00 D (0.50D increments)

Special Production
-20.00D to 0.00 D and 32.50D to +45.00D

Multifocal

0.0 D to 32.00 D (0.50D increments)

Special Production
-20.00D to +45.00D

Trifocal

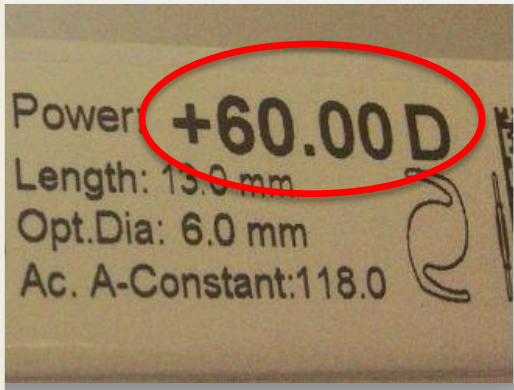
0.0 D to 32.00 D (0.50D increments)

Toric

Spheric 0.0 D to 32.00 D (0.50D increments)
Cylindiric +1.00 D to +10.00 D

Wide Diopter Range

Even extreme diopters may not be impossible for VSY Production Team…




Different Haptic Platform

Different Haptic Platforms

Acriva UD
ULTRA DEFINITION INTRAOCULAR LENS

UD 613

UDB 625

UDM 611

HAF

Acriva UD BB
Blue Filter Ultra Definition Intraocular Lens

BB UD 613

BB UDM 611


THANK YOU!