HUMANOPTICS

TRIVA

RESILIENT PRESBYOPIA CORRECTION

MEETING NEW CHALLENGES

Rapidly advancing digitalization has placed new demands on vision. Maintaining an active social life increasingly requires the use of digital communication media across all generations. Mobile devices help to overcome distance barriers, stay in touch and shape our everyday lives.

Often the visual result following monofocal IOL implantation is insufficient. Changes in leisure activities and aesthetic standards of younger patients have also driven their desire for independence from glasses.

PERFORMANCE BEYOND THE PEAK

The TRIVA trifocal intraocular lens enables a continuous vision through extended focal areas, which in addition to excellent distance vision, produces good visual results in the near and intermediate ranges.

With an extended focal plateau from 36 cm up to a distance of 80 cm, the lens is optimized for viewing computer screens as well as tablets and smartphones.

RESILIENCE THROUGH SMART IOL DESIGN

TRIVA offers most of your patients an option that enables them to fulfil their wish to gain independence from glasses.

Through smart IOL design, the TRIVA is largely resilient to undesirable multifocal side effects.

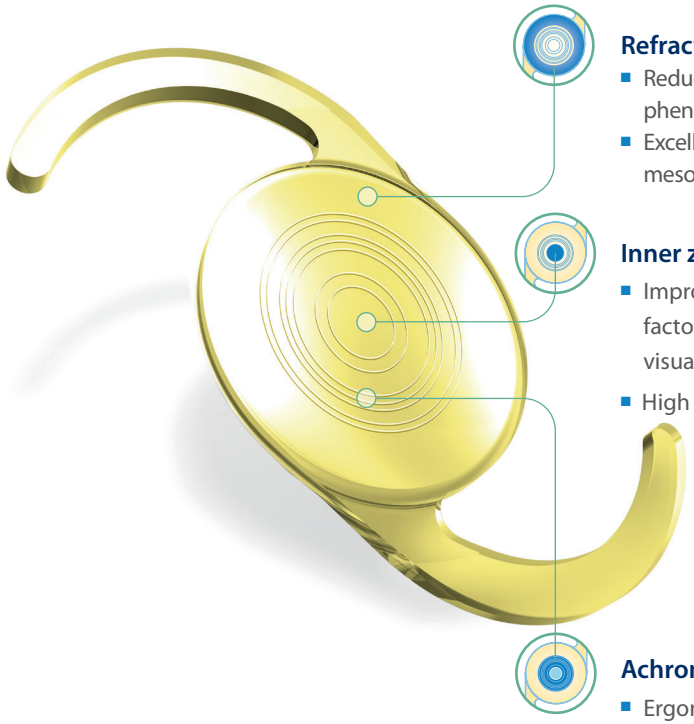
TRIFOCAL CONTINUUM

RESILIENT EFFECT

ROUTINE THROUGH EXPERIENCE

SMART TECHNOLOGY

SIMPLE. GOOD.



Refractive optic periphery

- Reduces the occurrence of photic phenomena
- Excellent distance vision even under mesopic conditions

- High monofocal percentage of the optic surface[1]

Inner zone

- Improved tolerance to physiological factors such as decentered pupils or visual axis[3, 4, 5]
- High performance stability[3]

- Wide inner ring zone[2]
- Aberration-free[3, 4, 5]
- Low refractive index[6]

Achromatic* central diffractive element

- Ergonomic near range
- Accounts for increased need for magnification in advanced age
- Comfortable intermediate vision at all digital viewing ranges
- To reduce halos and glare

- Extended focus range starting at 36 cm with a real near focal point
- Intermediate focus zone via extra addition
- Reduced DOE with full effectiveness

"The IOL exceeds my expectations and is a successful refinement of the DIFFRACTIVA. Patient satisfaction is remarkably high."

Dr. Jens Schrecker, MD, Klinik für Augenheilkunde, Rudolf-Virchow Klinikum Glauchau, Germany

1 HumanOptics Holding AG (2020). Technical documentation.

2 Garzón, N, et al. (2020). Influence of angle k on visual and refractive outcomes after implantation of a diffractive trifocal intraocular lens. J Cataract Refract Surg, 46:721-727.

3 Eppig, T, et al. (2009). Effect of decentration and tilt on the image quality of aspheric intraocular lens designs in a model eye. J Cataract Refract Surg, 35:1091-1100.

4 Grabner, G (2017). Best kept secrets Diffractiva Diff-aA. Cataract & Refractive Surgery Today Europe Jan; 52-53.

5 Kránitz, K (2017). Aberration profile of two multifocal IOLs and the effect of angle kappa on postoperative aberrations, Presented ESCRS, Lisbon.

6 Erie, J, et al. (2001). Analysis of postoperative glare and intraocular lens design. J Cataract Refract Surg, 27:614-621.

* See page 7

FUNCTIONALITY
ALL DAY LONG

The TRIVA enables progressive varifocal vision for most activities in daily life without glasses. Thanks to foci that are optimized for the distance range of computers and laptop screens or smartphone displays, patients enjoy the benefit of relaxed vision without eye fatigue.[7]

[7] Sheppard, AL, et al. (2018). Digital eye strain: prevalence, measurement and amelioration. BMJ Open Ophthalmology, 3:e000146. doi:10.1136/bmjophth-2018-000146.

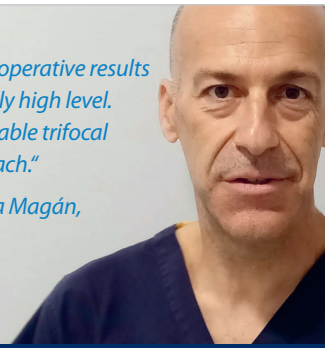
More than 2/3 ADULTS AGED 30–49 YEARS spend 5 or more hours per day using digital devices[7]

THE NUMBER OF PEOPLE 75 YEARS and up who actively use DIGITAL MEDIA has doubled in the past 6 years and is constantly increasing[7]

OVER 3/4 OF THE 65-75 AGE GROUP use digital devices[7]

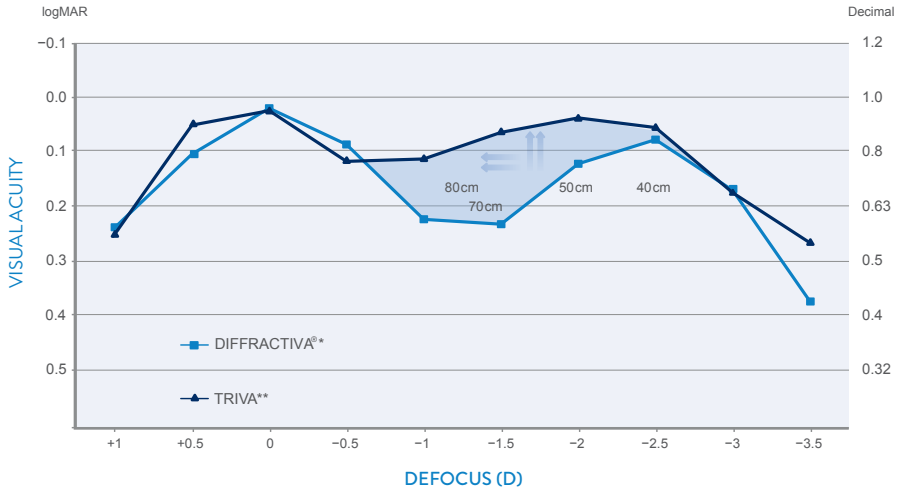
"Impressive post-operative results at an exceptionally high level. The TRIVA is a reliable trifocal treatment approach."

Dr. Carlos Orduna Magán, Orduna Clinic, Madrid, Spain



EXPERTISE
FROM EXPERIENCE

MONOCULAR DEFOCUS CURVE, IN VIVO



* Monocular defocus curve, 6 months postoperatively [8]

** Monocular defocus curve, preliminary data analysis 3-6 weeks postoperatively

PRESBYOPIA CORRECTION AT A HIGH LEVEL

Indirect comparison of the monocular defocus curves of the mIOL DIFFRACTIVA®* and TRIVA** shows extended focal areas and clear gains over the entire intermediate range with the trifocal TRIVA.

Underlying technology of the DIFFRACTIVA®

- Multifocal IOL with near and far foci
- Near addition +3.5 D
- Diffractive element with 9 rings

Trifocal presbyopia correction with TRIVA

- Trifocal IOL with continuous visual acuity at all distances
- Near addition +3.5 D
- Further addition +1.75 D
- Reduced DOE with only 7 rings

[8] Dexl, AK, et al. (2014). Visual performance after bilateral implantation of a new diffractive aspheric multifocal intraocular lens with a 3.5 D addition. Eur J Ophthalmol, 24(1):35-43.

"The advantage of the reduced step design could have the potential beneficial effect of improved light efficiency under mesopic conditions."

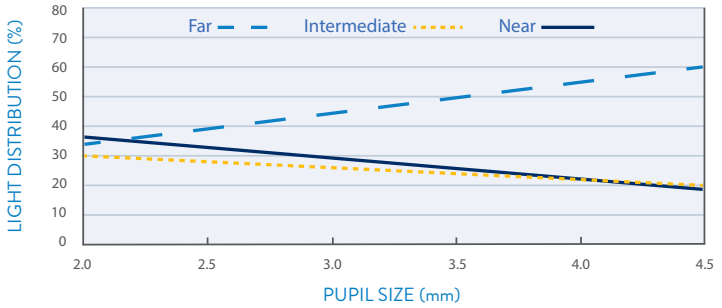
Dr. Carlos Orduna Magán,
Orduna Clinic,
Madrid, Spain

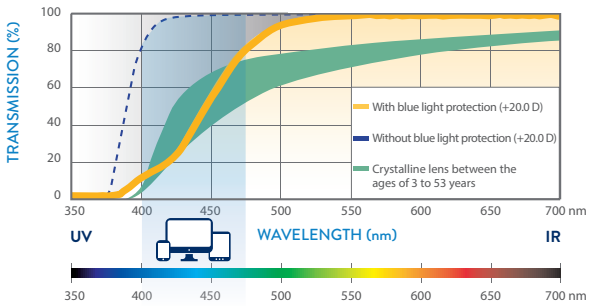
LIGHT DIRECTED, LIGHT HARNESSED

EFFICIENT LIGHT DISTRIBUTION INSPIRED BY THE NATURAL EYE

- The interaction of light intensity and the pupil, optimally regulates light distribution through the IOL. Patients benefit from ideal imaging conditions adapted to individual vision requirements
- Simultaneous effect for near, intermediate and far vision for all pupil sizes
- Under mesopic light conditions and with dilated pupils, distance focus is emphasized without affecting the efficacy of the near and intermediate vision

LIGHT DISTRIBUTION TRIVA-aAY





HIGH TRANSMISSION. OPTIMAL SPECTRUM.

- The material achieves a very high transmission level, which attests the excellent material quality and, which is a crucial determinant of optical quality of the IOL image quality.
- Blue light filter reduce the increased blue spectrum of digital LED light sources.

40%

OF THE LIGHT ENERGY

is allocated for the near and intermediate ranges even with dilated pupils

TRIFOCALITY

at any pupil diameter

[9] HumanOptics Holding AG. Instruction for use.

OUTSTANDING MATERIAL,
BEST IN CLASS TECHNOLOGY

HIGH ABBE NUMBER. ACHROMATIC PRINCIPLE.

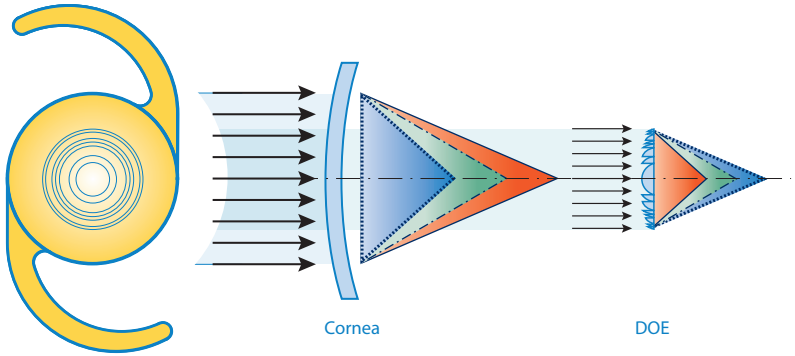
Its high Abbe number attests to the excellent material quality of the TRIVA,

- associated with fewer chromatic aberrations [10]
- and higher image quality

The achromatic effect of the combined diffractive-refractive optical element contributes to a brilliant image quality [4]:

- The central diffractive area of the optic counteracts the chromatic aberration of the cornea
- The aberration-free refractive optical periphery maintains the natural depth of field effect of the cornea

COMBINED DIFFRACTIVE-REFRACTIVE PRINCIPLE OF ACTION [11]:



Simplified schematic illustration

[10] Zhao, H, Mainster, M (2007). The effect of chromatic dispersion on pseudophakic optical performance. Br J Ophthalmol. 91(9):1225–1229.

[11] Fluder, G. (2020). Design of a hybrid refractive-diffractive telescope for observations in UV. Experimental Astronomy, 50(2-3), 159-168.

100 percent
PATIENT
SATISFACTION

CONVINCING
PERFORMANCE
EXCELLENT
IOL
MATERIAL

TRIVA

TRIPPLE ADVANTAGE

RELIABLE REFRACTIVE RESULTS

For satisfied patients

- Stable refractive results thanks to wide defocus zones
- Based on the clinically proven DIFFRACTIVA®
- About two decades of experience in presbyopia correction
- Personal application service for your support
- Training programs for your refractive team

RESILIENT TRIFOCALITY

For satisfied surgeons

Smart optic technology for less photic phenomena

- Fewer steps in the diffractive element
- The optimized IOL principle requires just a small part of the optic surface [1]

Aberration-free optic design demonstrates increased performance stability

- High tolerance to adverse effects such as decentration [3]
- Less Kappa angle impact [2, 5]
- Less dependent on the spherical aberration of the cornea

Physiological material

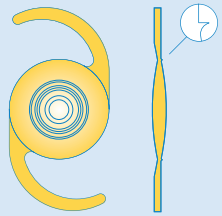
- Glistening-free with excellent uveal biocompatibility
- Low refractive index for less scattering of light [6]

RECOMMENDED CONSTANTS

suggested as starting point for IOL power calculation

Please note, constants should be individualized subsequently per surgeon to enable highest precision and best predictability!

Haigis	Hoffer Q (pACD)	Holladay (surgeon factor)	Holladay 2	SRK/T	Barett LF/DF	ESTIMATED MANUFACTURER A-CONSTANT5
$a_0 = 1.561$ $a_1 = 0.4$ $a_2 = 0.1$	5.813	sf = 2.113	5.199	119.554	2.17/–	Optical 118.4



TRIVA-aAY YELLOW

Type

Trifocal posterior chamber IOL, one-piece, foldable, in preloaded SAFELOADER® (SL) autoloading container

Diameter (optic/total)

6.0/12.5 mm

Diopter range

10.0 to 30.0 D in 0.5 D steps

Material

Hydrophilic glistening-free acrylic, UV-absorber, blue light protection

Optic features

Central diffractive aspheric anterior surface with a refractive, optic periphery, aberration-free, 360° lens epithelial cell barrier

Addition at IOL plane:
+1.75 D / +3.5 D

Haptic design

C-loop

V1.0/2020-11