

ZEISS IOLMaster 700

Replacing assumptions with measurements

- 1 Introduction: SW 1.80 & Total Keratometry (TK)
- 2 Total Keratometry (TK)
- 3 GUI - Measurement, Analyze
- 4 GUI - IOL Calculation
- 5 Print & Export Options
- 6 Websites

1 Introduction: SW 1.80 & Total Keratometry (TK)

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Total Keratometry (TK)

Replacing assumptions with measurements



- **Total Keratometry(TK®)** is a new measurement that combines telecentric keratometry and SWEPT Source OCT technology for the assessment of anterior and posterior corneal curvature.
- The purpose of TK is to replace standard keratometry, aiming to help to reduce outliers and improve refractive outcomes of IOL calculation in cataract surgery.
- TK is ULIB-compatible, therefore existing standard formulas and IOL constants may be applied.



Picture source: Carl Zeiss Meditec media database

Total Keratometry (TK)

Replacing assumptions with measurements



With Total Keratometry (TK)

- The posterior corneal surface can now be directly measured with SS-OCT and used in formulas onboard the ZEISS IOLMaster and Z CALC, without changing your clinical workflow.
- Thus, it is no longer necessary to use assumptions or nomograms of the posterior cornea.

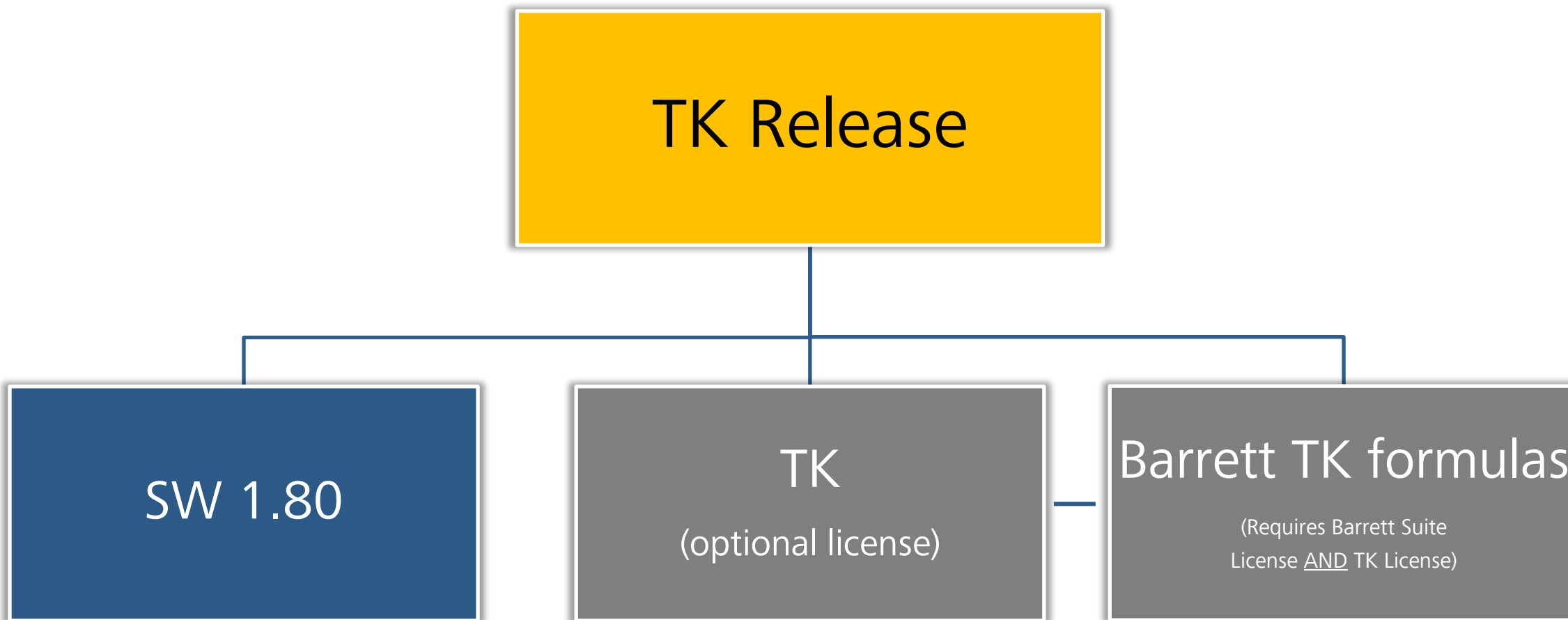
**This improves the results of toric IOL power calculations:
14% more patients within $\pm 0.5D$ cylinder (Haigis-T*).**

Source: Total Keratometry Compendium, Fabian and Wehner 2018

**Retrospective post-hoc analysis of 145 normal cataract eyes implanted with aspheric IOL, 6 weeks post-op.*



Picture source: Carl Zeiss Meditec media database



Contents of ZEISS IOLMaster Software 1.80 Update

Overview – Part 1



Picture source: Carl Zeiss Meditec media database

- **Measurement**
 - Enhanced Fixation / AL Check Scan
- **Analyse**
 - Display pupil offset (CW-Chord aka angle kappa)
- **IOL Calculation**
 - Target Refraction
 - Change of LVC Status
 - Support of non-constant toric IOL ranges
- **Settings**
 - Flexible print & export options
 - Reference Image
- **Bugfixes**
 - Minor bug fixes

Contents of Total Keratometry (optional license)

Overview – Part 2



- **Total Keratometry (TK)**
 - Added new measurement values:
 - **Total Keratometry:** TK (TK1, TK2, Δ TK, axis)
 - **Posterior Corneal Surface:** PCS (PK1, PK2, Δ PK, axis)
- **New Barrett TK formulas exclusive to ZEISS IOLMaster 700**
 - The **Barrett TK Universal II** and **Barrett TK Toric** formulas allows the use of actual posterior corneal surface values for IOL power calculation.
 - **Only available if Barrett Suite AND Total Keratometry licenses are both activated.**



Picture source: Carl Zeiss Meditec media database

Total Keratometry (TK)

Replacing assumptions with measurements



- ➔ **ZEISS IOLMaster 700**, no hardware or operating change
- ➔ Proven **Telecentric Keratometry** and **SWEPT Source OCT**
- ➔ Use with **trusted formulas on the ZEISS IOLMaster 700** and **existing IOL constants**
- ➔ Two **new Barrett TK formulas** for non-toric and toric IOL
- ➔ **Improves toric and non-toric IOL power calculation**

1 Introduction: SW 1.80 & Total Keratometry (TK)

2 Total Keratometry (TK)

3 GUI - Measurement, Analyze

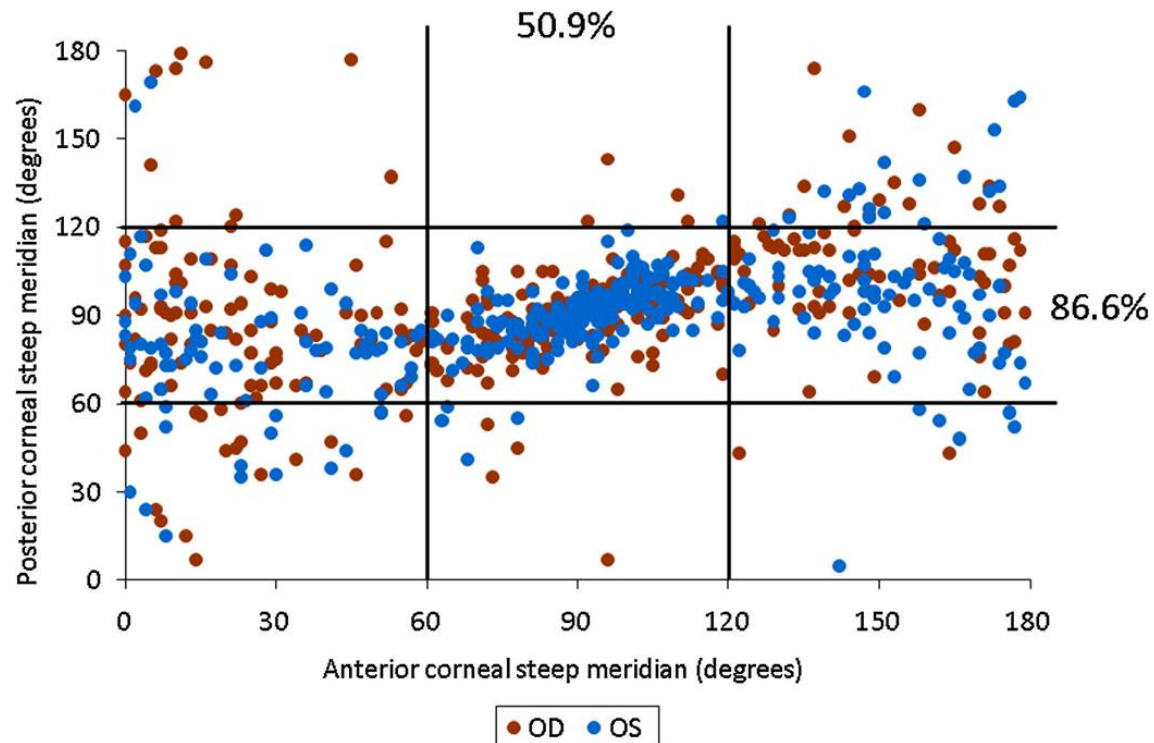
4 GUI - IOL Calculation

5 Print & Export Options

6 Websites

Background

Posterior corneal surface has an impact on total corneal power



- **EG. Koch et al.:** The anterior cornea axis can be considerably different to the posterior cornea axis, resulting in different total corneal astigmatism.

D. D. Koch, S. F. Ali, M. P. Weikert, M. Shirayama, R. Jenkins, und L. Wang, „Contribution of posterior corneal astigmatism to total corneal astigmatism“, *J Cataract Refract Surg*, Bd. 38, Nr. 12, S. 2080–2087, Dez. 2012

How do we handle this today?

Existing methods are not entirely satisfactory



Incorporate IOL power adjustment nomograms into formulas

Clinical Update

REFRACTIVE CATARACT

Toric IOL Calculations: Consider the Posterior Cornea

BY LINDA ROACH, CONTRIBUTING WRITER
INTERVIEWING AMAR AGARWAL, MD, DOUGLAS D. KOCH, MD, AND WILLIAM B. TRATTLER, MD

Evaluating a cataract patient's astigmatic error isn't just about the shape of the front of the eye anymore. Failure to include posterior corneal curvature in the presurgical calculations can bring unwanted refractive surprises for both doctor and patient. "Anybody who's doing relaxing incisions or toric IOLs needs to know about this, period," said Douglas D. Koch, MD, at Baylor College of Medicine in Houston.

Old assumptions. "Cataract surgeons base their astigmatic analysis on the cornea alone, recognizing that the lens will be removed. And, heretofore, everybody—myself included—sort of assumed that when there was some preoperative disparity between the refraction and the anterior corneal curvature, this disparity was due to lenticular astigmatism." Dr. Koch said

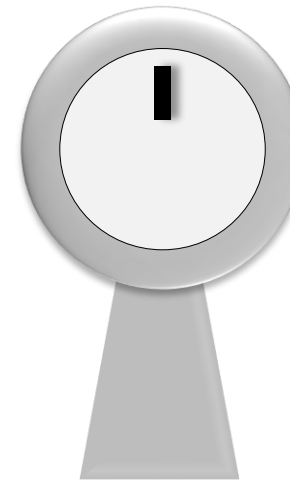
WTR and ATR Astigmatism		
Alcon SNA6Tx	WTR (D)	ATR (D)
0	≤ 1.69 (PCR1 if > 1.00)	≤ 0.39
T3 (1.03)	1.70 — 2.19	0.40 — 0.79
T4 (1.55)	2.20 — 2.69	0.80 — 1.29
T5 (2.06)	2.70 — 3.19	1.30 — 1.79
T6 (2.57)	3.20 — 3.79	1.80 — 2.29
T7 (3.08)	3.80 — 4.39	2.30 — 2.79
T8 (3.60)	4.40 — 4.99	2.80 — 3.29
T9 (4.11)	5.00 —	3.30 — 3.79

*Especially if specs have more ATR.

For WTR astigmatism, the nomogram shifts the threshold for selecting a toric IOL up 0.7 D. A toric IOL is not used until the anterior cornea has 1.7 D of WTR astigmatism. For ATR astigmatism, the nomogram shifts the threshold for selecting a toric IOL down 0.7 D. Thus, in an eye with 0.5 D of ATR astigmatism, a toric IOL is selected.

Models and nomograms are based on statistical measurements and might not compensate for outliers

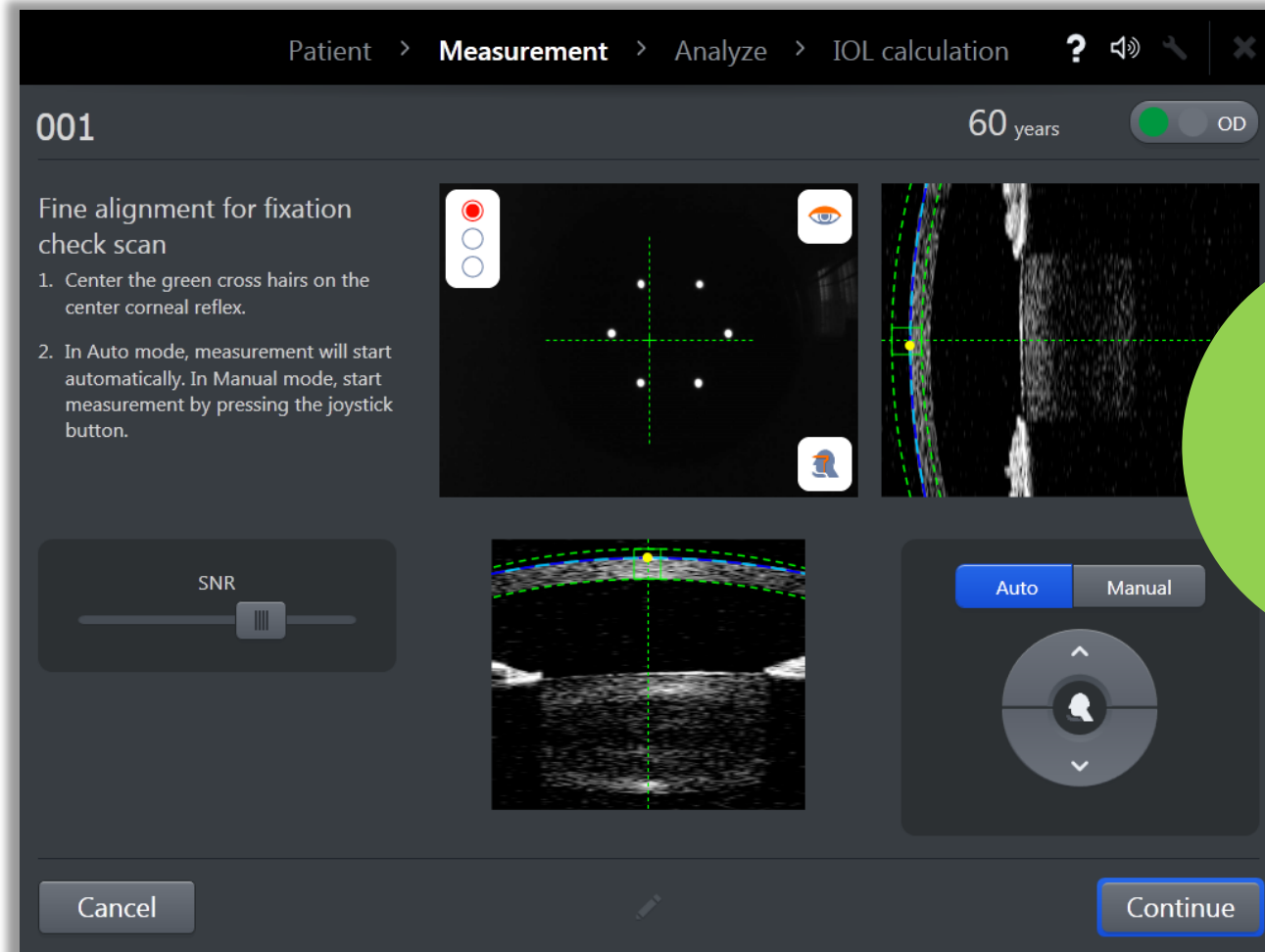
Comprehensive eye scanners



Other devices provide posterior measurements, but are not always compatible with trusted formulas and constants

Total Keratometry Measurement

No change to existing workflow



No change to measurement workflow < 45 sec!

Total Keratometry Measurement

Enabled by patented Cornea-to-Retina Scan based on SS-OCT



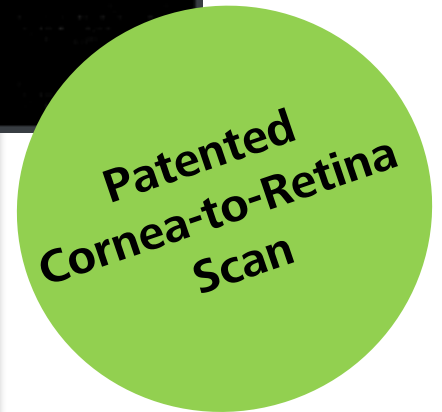
The screenshot displays the 'Analyze' screen for 'IOL calculation' in the 'Measurement' tab. The patient ID is 001 and the age is 60 years. The eye selected is OD (Right Eye). The main data table shows:

AL	18.33 mm	SD: 0 μm
SE	45.69 D	SD: 0.00 D

A warning note is present: "Note: OD: Fixation Check! Axial length values slightly inconsistent. Unstable fixation? OD: Axial length of right eye: 18.33 mm. - Note: short eye." The central image shows a Cornea-to-Retina Scan with a green dashed line indicating the optical axis. Below this, the Keratometry data is shown:

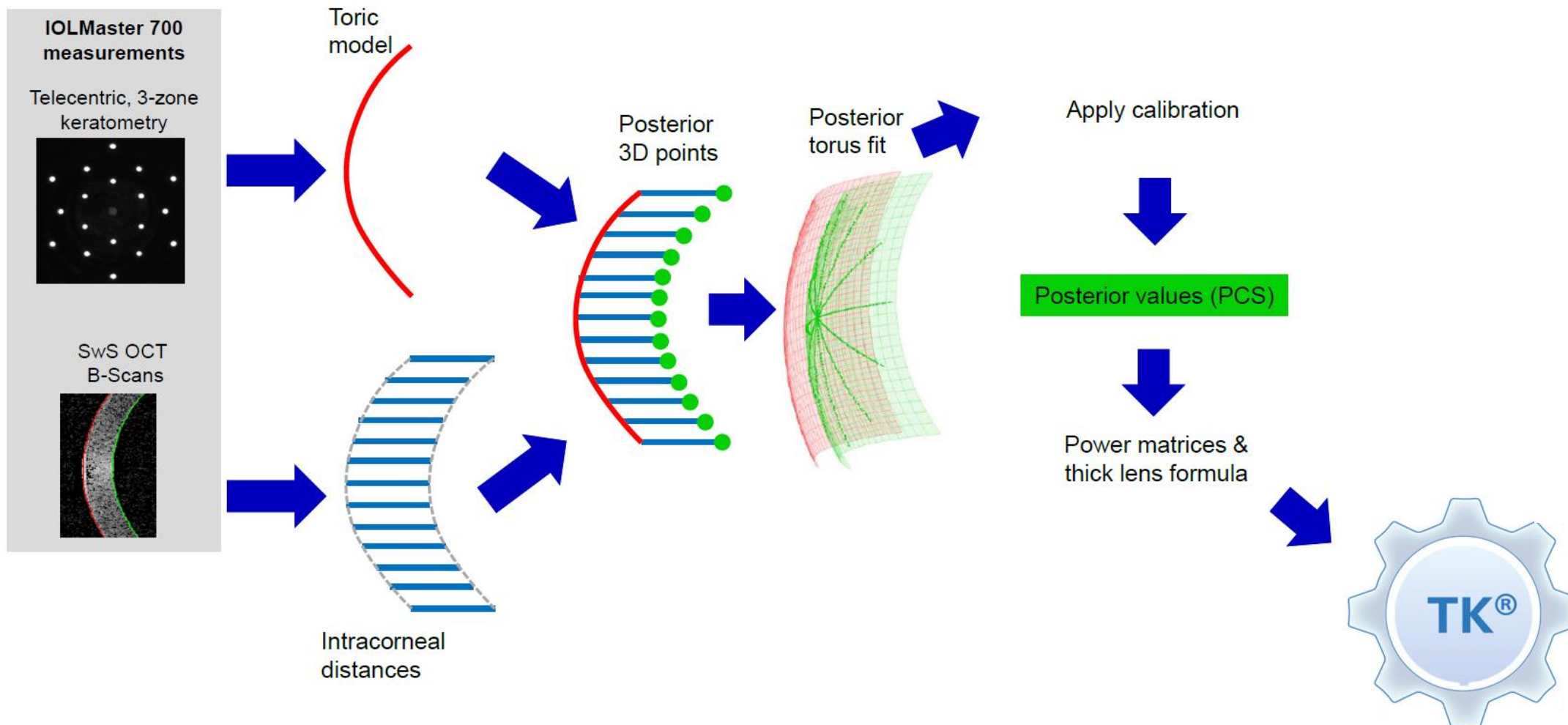
PK2	-5.95 D	79° SD: 0.00 D
ΔPK	+0.28 D	169°
ACD	2.64 mm	SD: 0 μm
LT	2.85 mm	SD: 0 μm
CCT	475 μm	SD: 0 μm
WTW	11.1 mm	

Additional scan results are shown with green checkmarks: Keratometry ✓ TK ✓, WTW ✓, Sclera ✓, and Fixation. The interface includes buttons for 'Composite', 'Single', 'Patient manager', 'Measure', and 'IOL calculation'. The 'Enhanced scan display' is currently turned 'On'.



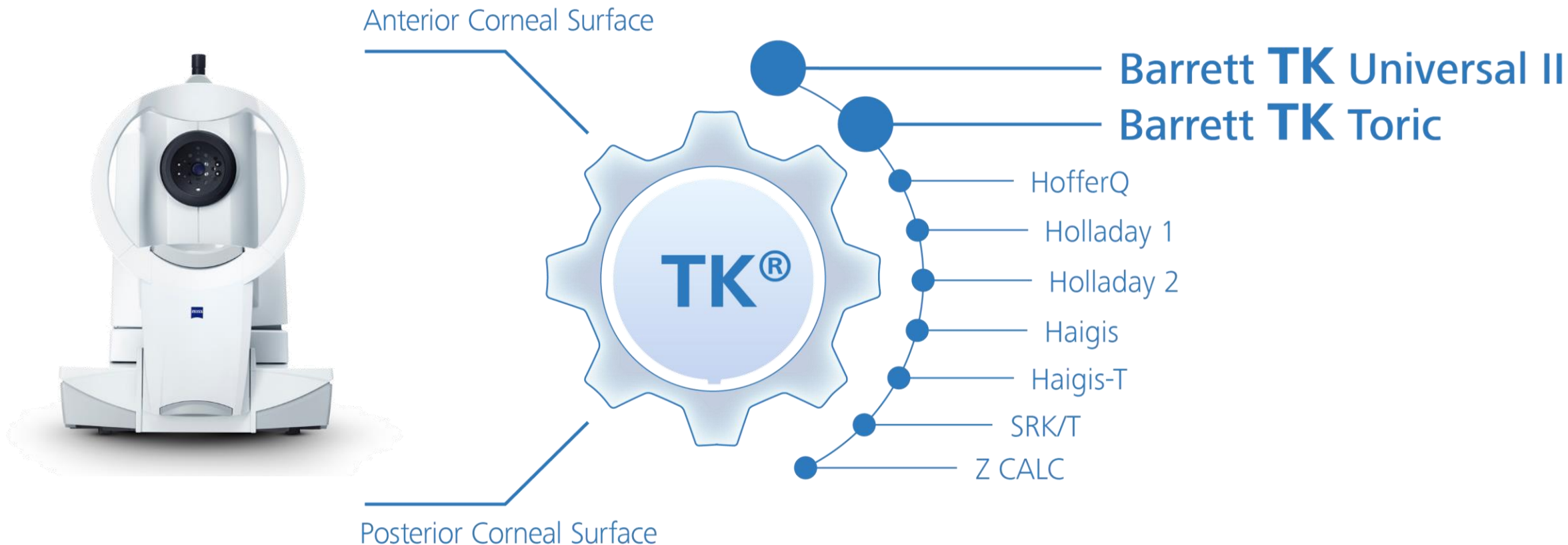
Total Keratometry Measurement

Measurement principle



Total Keratometry Measurement

Measuring total corneal power



Measuring the Posterior Corneal Surface with the ZEISS IOLMaster 700

Enhanced biometric measurement for individualized surgical planning

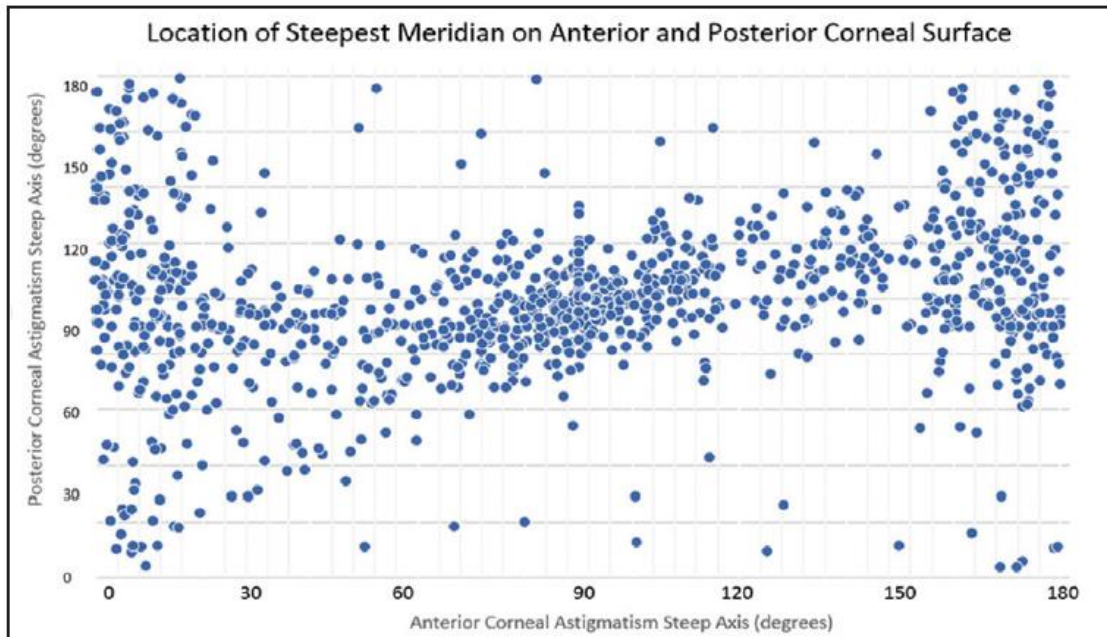
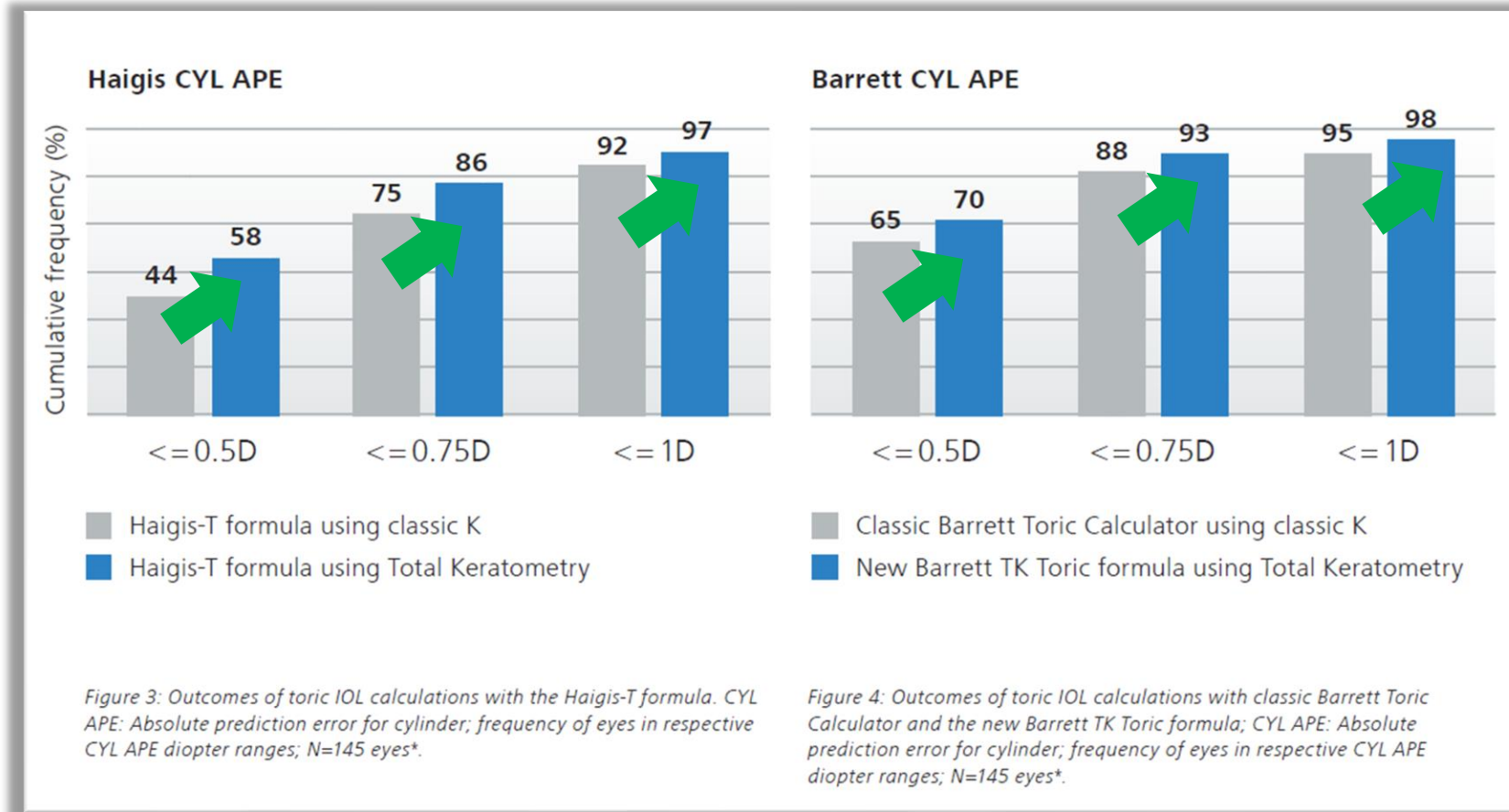


Figure 1. Distribution of orientation of the steep axis of astigmatism on the anterior and posterior corneal surfaces.

- This first description of posterior corneal astigmatism measurement by the ZEISS IOLMaster 700
 - Found the average magnitude of posterior corneal astigmatism and proportion of vertical orientation of steep axis was lower than previous estimates.
- **The ZEISS IOLMaster 700 appears capable of providing enhanced biometric measurement for individualized surgical planning.**

Remarkable IOL Calculation Results Observed

Improve toric IOL calculation



Improve toric IOL calculation.

Source: Total Keratometry Compendium

Fabian and Wehner 2018

* Retrospective post-hoc analysis of 145 normal cataract eyes implanted with aspheric IOL, 6 weeks post-op.

Total Keratometry Post-Laser Vision Correction?

First post-SMILE cases promising



CASE OF THE MONTH

Outcomes of post-SMILE Cataract Surgery with Multifocal IOL Implantation: The Benefit of Total Keratometry for Power Calculation

Sri Ganesh, MBBS, MS, DNB and Sheetal Brar, MBBS, MS, FPRS, FC

CASE HISTORY

A 54-year-old man presented in January, 2018 with complaints of diminished vision and poor night vision 5 years after undergoing SMILE for correction of myopia. Prior to SMILE, his refraction was -9.5 @45 OD and -10.0 @-0.50 @115 OS, and his best spectacle corrected visual acuity (BSCVA) was 6/6 OU. Uncorrected distance visual acuity (UDVA) after SMILE was 6/6 OU.

On examination, he had a grade 2 nuclear sclerotic cataract OD and grade 1 nuclear sclerotic cataract OS. Refraction was -2.75 @30 OD and -2.0 @140 OS. UDVA was 6/24 OD and 6/12 OS. BSCVA was 6/9 OD and 6/7.5 OS. The patient stated that he wanted a multifocal IOL implant to reduce his dependence on glasses after cataract surgery.

Preoperative diagnostic assessments included Scheimpflug imaging with the Pentacam (Ocular) for topography and corneal aberrometry along with the IOLMaster 700 (Carl Zeiss Meditec) for biometry. Zernike analysis showed positive spherical aberration of 0.677 microns OD and 0.532 microns OS.

Surgery was planned for implantation of the AT LISA tri 839MP IOL (Carl Zeiss Meditec) and a plano target OU. IOL calculations were performed using multiple methods, and the results are summarized in Table 1.

We calculated the prediction errors for formulas incorporated in the IOLMaster 700 and Barrett's True K post

Calculative method	Recommended IOL power (D)	
	OD	OS
Barrett Universal II with TK ¹	+19.54	+18.45
Barrett Universal II with TK	+19.80	+18.00
ASCRS IOL calculator results		
Market formula	+19.81	+18.63
Modified Market	+20.40	+20.32
Barrett True-K post refractive surgery formula with clinical history	+19.70	+19.49
Shammas	+20.66	+20.11
Hageitl	+19.49	+18.96
Poinel-Holladay	+20.01	+19.45

Table 1. IOL calculations

refractive surgery formula and we found that the prediction error with the Barrett Universal II and Total Keratometry (TK) was lowest amongst the three (Table 2). Hence, this formula was chosen with this lens. The patient underwent surgery with implantation of a -19.0 D IOL OD and -18.0 D IOL OS.

FORMULA	OD IOL Power (D)	Residual refraction (D)	OS IOL Power (D)	Residual refraction (D)
Barrett True-K post refractive surgery formula with clinical history	+19.5	+0.18	+19.0	+0.14
Barrett Universal II with TK	+19.0	+0.02	+18.0	+0.11
Holladay EKR WITH BARRETT II	+19.0	-0.09	+18.0	-0.08

Table 2. Predicted residual refractions for implantation of the AT LISA tri 839MP

Postoperatively, manifest refraction was 0.00 \pm 0.62 @130 OD and -0.50 @160 OS. In binocular testing, UDVA was 6/6p and uncorrected near visual acuity was N6. Intermediate vision was checked at 60 cm with ETDRS charts and was -0.1 LogMAR, which is excellent. The patient was extremely satisfied with the outcome and reported minimal halos at 2 weeks, which are expected to get better with neuroadaptation.

DISCUSSION

When patients with a history of corneal refractive surgery to treat myopia need cataract surgery, they often want to maintain reduced spectacle dependence, but these have been challenges to meeting this goal. Both LASIK and PRK induce higher order aberrations (HOAs) and may create a multifocal cornea with subsequent loss of contrast and reduction in visual quality.¹ Thus, there has been concern about further reduction in image contrast with implantation of a diffractive multifocal IOL.¹

SMILE has been shown to induce less HOAs than the excimer laser procedures.^{1,2} Therefore, patients who have a history of myopic SMILE may be more suitable candidates for a multifocal IOL compared to patients with prior LASIK or PRK. Furthermore, newer optic designs for myopia-correcting IOLs, including trifocal and extended-depth-of-focus IOLs, provide better contrast sensitiv-

ity than earlier generation bifocal implants along with a fuller range of functional uncorrected vision. The AT LISA tri 839MP IOL chosen for this patient is a diffractive trifocal IOL. Studies show that patients implanted with the AT LISA tri 839MP have good image quality, functional uncorrected vision at all distances, and contrast sensitivity under photopic and mesopic conditions that is within the normal range.^{3,4}

Visual outcomes with any IOL, however, are sensitive to residual refractive error. Achieving a good refractive outcome is particularly important with a multifocal IOL, and in fact, blurred vision associated with residual astigmatism has been identified as a leading cause for patient dissatisfaction after multifocal IOL surgery.^{5,6} Achieving the refractive target after cataract surgery in eyes with a history of corneal refractive surgery is challenging using standard keratometers or corneal topographers because these devices measure only anterior corneal curvature and extrapolate the posterior corneal curvature based on normal relationship between anterior and posterior corneal curvatures. This relationship, however, is changed after refractive procedures that remove corneal tissue (PRK, LASIK, SMILE), thus creating errors in estimating the true corneal power.^{7,8}

Various methods have been introduced for estimating the true corneal power in eyes that have undergone myopic PRK and LASIK, and formulas with demonstrated effectiveness are included in the American Society of Cataract & Refractive Surgery IOL calculator (http://iolsoc.org/). No single formula, however, has been found to outperform the others, and as seen in this case, their use generates a range of suggested IOL powers that leaves surgeons with the dilemma of deciding which to choose.

Use of the IOLMaster 700 is a new method power coming with using telecentric 3-OCT technology, it thickness and anterior cornea to give replacing assumption remains, the first data provide reliable data cases of surgically s-

Total Keratometry is a new method power coming with using telecentric 3-OCT technology, it thickness and anterior cornea to give replacing assumption remains, the first data provide reliable data cases of surgically s-

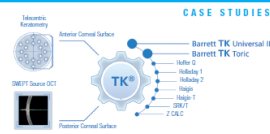


Figure 1. IOLMaster 700 with Total Keratometry - a new method for direct measurement of total corneal power

II formula for non-toric IOLs and the Barrett TK True-K formula for toric IOLs - and they will be integrated into the IOLMaster 700 with the latest software revision. Using the IOLMaster 700, surgeons can therefore obtain all of their preoperative biometry measurements and perform the IOL power calculation with a single device, avoiding any need for using third-party software or online calculators.

CONCLUSION

This case describes our first experience performing cataract surgery in a post-SMILE patient. Using the IOLMaster 700 for biometric measurements, including Total Keratometry, and IOL calculation, and by choosing the AT LISA tri 839MP IOL, we were able to achieve excellent refractive and functional outcomes. Despite these very encouraging results, thorough counseling to establish realistic expectations about the potential for a less than perfect outcome remains a critical component of the preoperative discussion for all cataract surgery patients.

Dr. Ganesh is Chairman and Managing Director at the Nethradhama Super Speciality Eye Hospital, Bangalore, India. He is a consultant for Carl Zeiss Meditec. Dr. Brar is a senior consultant at the Nethradhama Super Speciality Eye Hospital.

FORMULA	OD		OS	
	IOL Power (D)	Residual refraction (D)	IOL Power (D)	Residual refraction (D)
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Table 2. Predicted residual refractions for implantation of the AT LISA tri 839MP

“Using the IOLMaster 700 for biometric measurements, including Total Keratometry and IOL calculation, and by choosing the AT LISA tri 839MP IOL, we were able to achieve excellent refractive and functional outcomes.”

Ganesh, Sri. Outcomes of post-SMILE Cataract Surgery with multifocal IOL implantation. CRSTE 2018.

What Do Doctors Say?



Graham Barrett, MD, Perth, Australia



"I am very impressed with the results I have obtained with the IOLMaster 700."

"TK has the potential to reduce refractive surprises to a minimum."

Han Bor Fam, MD, Singapore



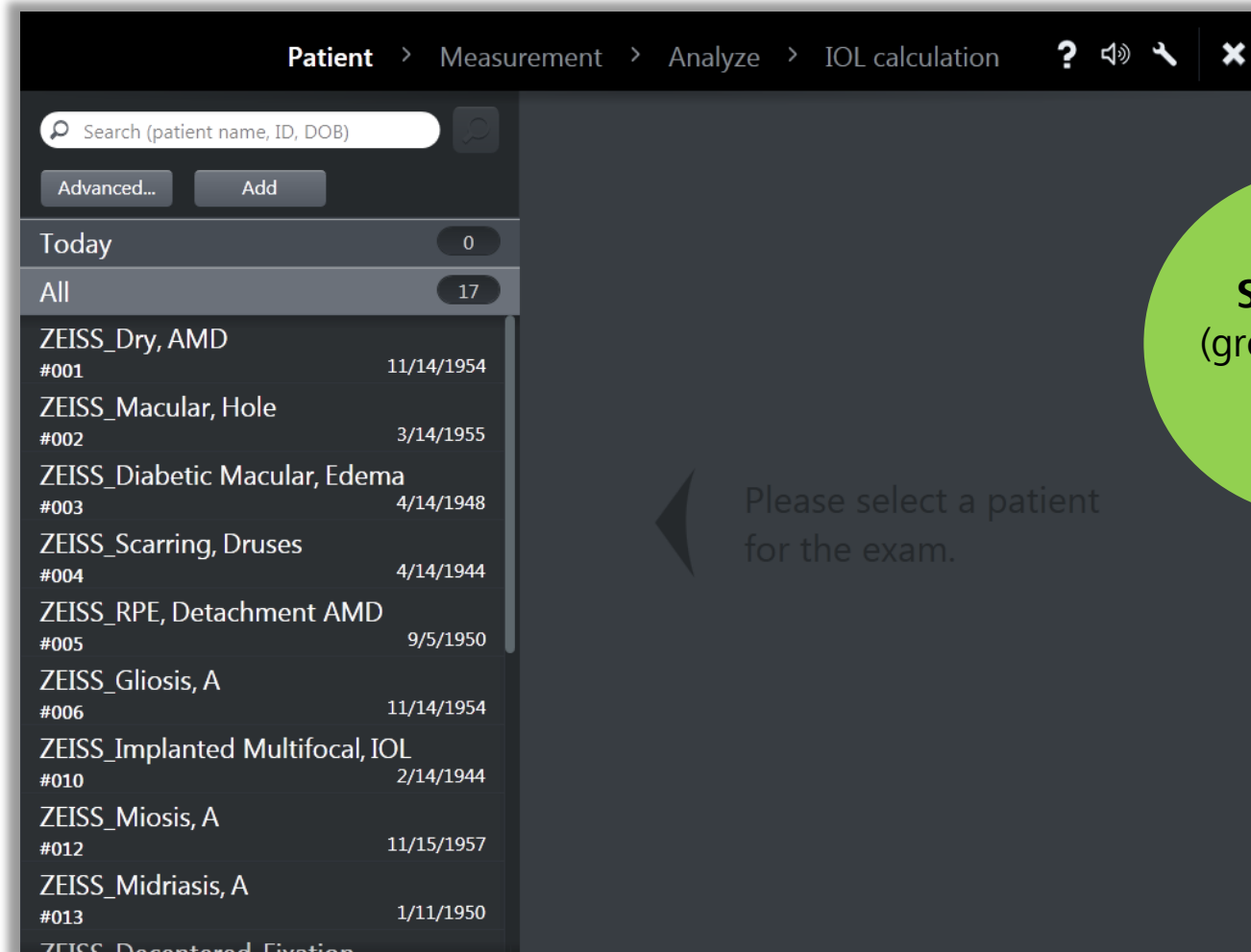
"For toric and non-toric, The TK value improves the overall outcome."

"It tightens consistency, it reduces the outliers and enhances the overall outcome."

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ZEISS IOLMaster 700 SW 1.80

Customized user Interface for your personal preference



Same GUI
(grey interface optional)



ZEISS IOLMaster 700 SW 1.80

Enhanced Fixation / AL Check Scan throughout the entire measurement process



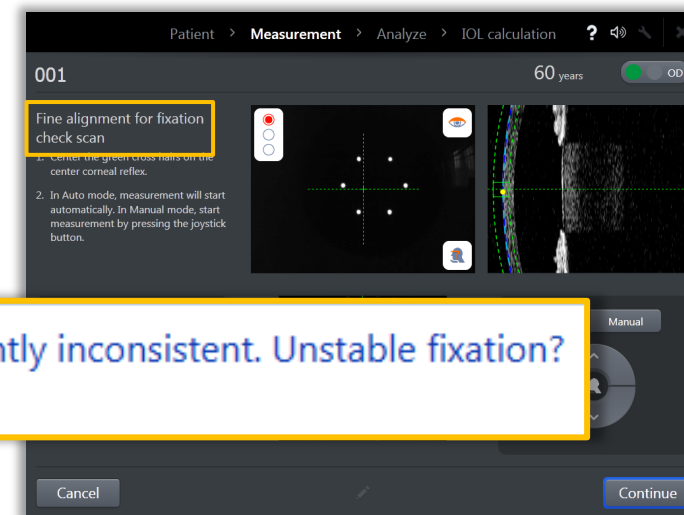
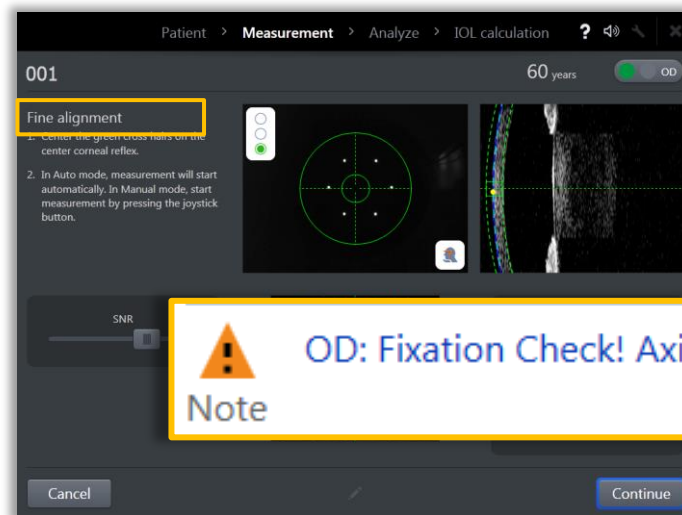
- Axial length measurement is taken from **different time points** in the measurement process and will be compared to further ensure the patient was fixating.

1. Anterior segment OCT scan (ie. during fine alignment scan)

- Axial length measurement **#1 taken**

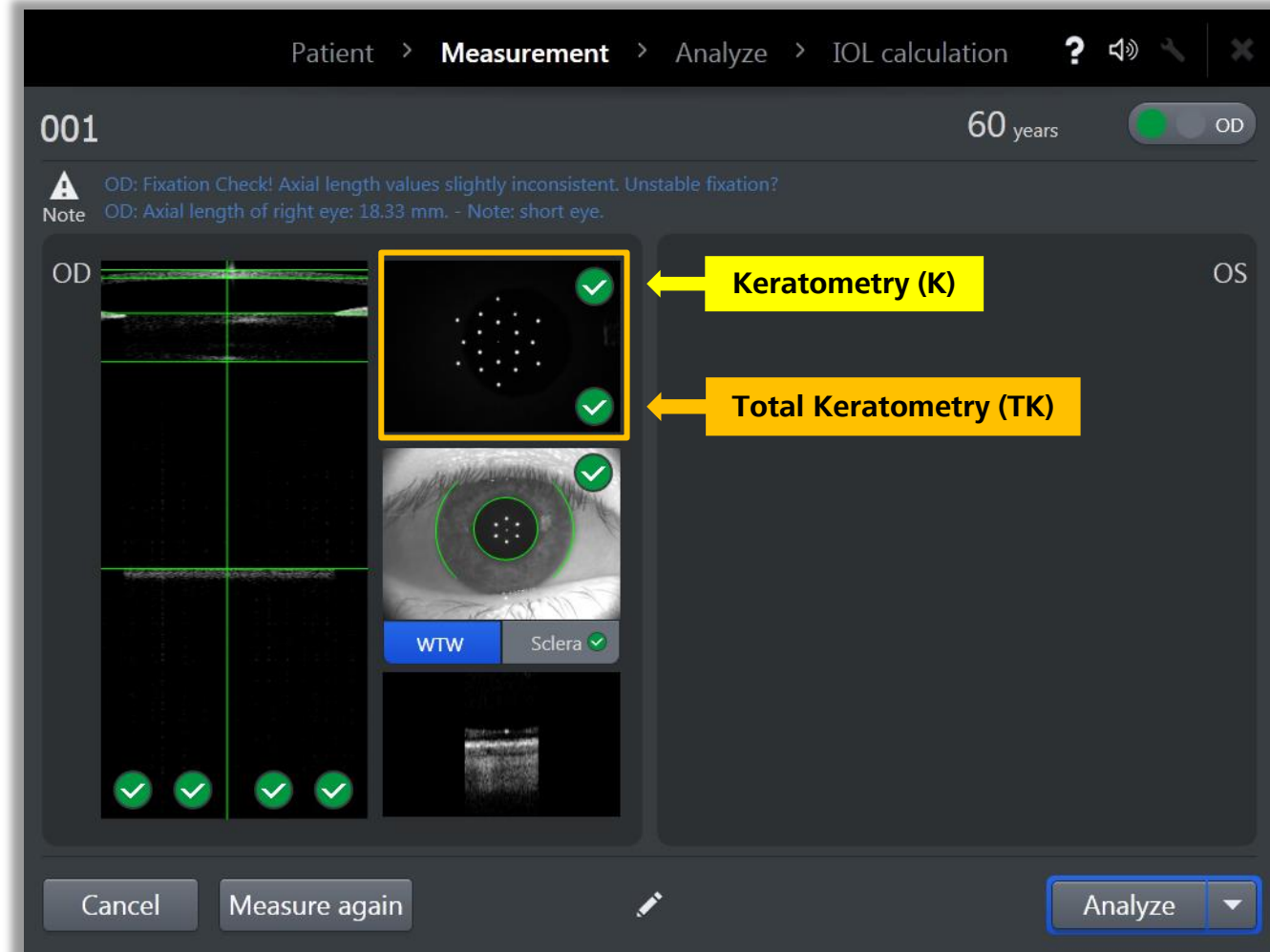
2. Retina OCT scan (ie. during fixation check scan)

- Axial length measurement **#2 taken**



ZEISS IOLMaster 700 SW 1.80 & TK

Evaluate your measurements with intuitive quality checks



ZEISS IOLMaster 700 SW 1.80 & TK

Easily evaluate quality of your measurements



Patient > Measurement > **Analyze** > IOL calculation ? 🔊 ↶ ✕

001 60 years **OD** OS

Note
⚠️ OD: Fixation Check! Axial length values slightly inconsistent. Unstable fixation?
OD: Axial length of right eye: 18.33 mm. - Note: short eye.

AL	18.33 mm	SD: 0 μm
SE	45.69 D	SD: 0.00 D
K1	44.55 D	169° SD: 0.00 D
K2	46.90 D	79° SD: 0.00 D
ΔK	+2.35 D	79°
TSE	46.02 D	SD: 0.00 D
TK1	44.85 D	169° SD: 0.00 D
TK2	47.25 D	79° SD: 0.00 D
ΔTK	+2.40 D	79°
PSE	-5.81 D	SD: 0.00 D
PK1	-5.68 D	169° SD: 0.00 D
PK2	-5.95 D	79° SD: 0.00 D
ΔPK	+0.28 D	169°
ACD	2.64 mm	SD: 0 μm
LT	2.85 mm	SD: 0 μm
CCT	475 μm	SD: 0 μm
WTW	11.1 mm	

B scan CCT ✓ ACD ✓ LT ✓ AL ✓

Keratometry ✓ TK ✓

WTW ✓ Sclera ✓ Fixation

Composite Single Enhanced scan display On

Patient manager Measure IOL calculation

The screenshot displays the 'Analyze' screen of the ZEISS IOLMaster 700 SW 1.80 & TK software. The interface is dark-themed with white and blue text. At the top, a breadcrumb trail shows 'Patient > Measurement > Analyze > IOL calculation'. The patient ID '001' and age '60 years' are shown, along with eye selection buttons for 'OD' (selected) and 'OS'. A large 'Note' section contains a warning icon and text: 'OD: Fixation Check! Axial length values slightly inconsistent. Unstable fixation? OD: Axial length of right eye: 18.33 mm. - Note: short eye.' Below the note is a large B-scan image. To the left of the B-scan is a list of measurement parameters with their values and standard deviations. Below the B-scan are three smaller images: 'Keratometry' (highlighted with an orange box), 'WTW' (blue box), 'Sclera' (green box), and 'Fixation'. At the bottom, there are buttons for 'Composite', 'Single', 'Enhanced scan display' (set to 'On'), 'Patient manager', 'Measure', and 'IOL calculation'.

ZEISS IOLMaster 700 SW 1.80 & TK

Conveniently view all keratometry data on one screen – K, TK & PK



The screenshot displays the 'Analyze' screen for 'IOL calculation' in the 'Measurement' tab. The patient ID is '001' and the age is '60 years'. The eye is set to 'OD' (Right Eye). A note indicates: 'OD: Fixation Check! Axial length values slightly inconsistent. Unstable fixation? OD: Axial length of right eye: 18.33 mm. - Note: short eye.' The data table is as follows:

AL	18.33 mm	SD: 0 μm
SE	45.69 D	SD: 0.00 D
K1	44.55 D	169° SD: 0.00 D
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ΔPK	+0.28 D	169°
ACD	2.64 mm	SD: 0 μm
LT	2.85 mm	SD: 0 μm
CCT	475 μm	SD: 0 μm
WTW	11.1 mm	

The interface also shows a B-scan image with a green dashed line indicating the measurement path. Below the B-scan are three smaller images: 'Keratometry' (with a green checkmark), 'WTW' (with a green checkmark), and 'Sclera' (with a green checkmark). The 'Fixation' image shows a fixation target. At the bottom, there are buttons for 'Patient manager', 'Measure', and 'IOL calculation', along with a printer icon and a status bar showing 'Enhanced scan display' is 'On'.

ZEISS IOLMaster 700 SW 1.80 & TK

Conveniently view all keratometry data on one screen – K, TK & PK



Patient > Measurement > Analyze > IOL calculation

001 60 years OD OS

Note
OD: Fixation Check! Axial length values slightly inconsistent. Unstable fixation?
OD: Axial length of right eye: 18.33 mm. - Note: short eye.

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B scan CCT ✓ ACD ✓ LT ✓ AL ✓

Keratometry ✓ TK ✓ WTW ✓ Sclera ✓ Fixation

Composite Single Enhanced scan display On

Patient manager Measure IOL calculation

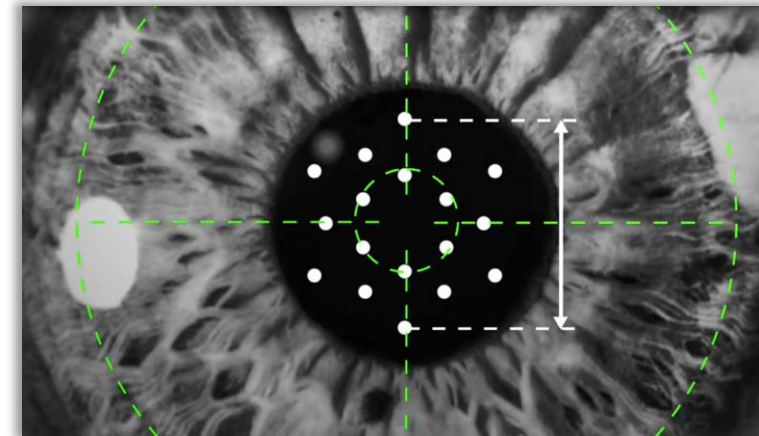
Check individual cylinder and axis

Telecentric Keratometry

Unique optical system to the ZEISS IOLMaster



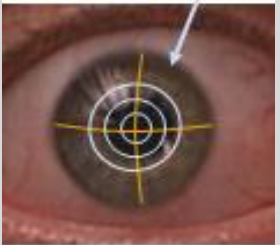
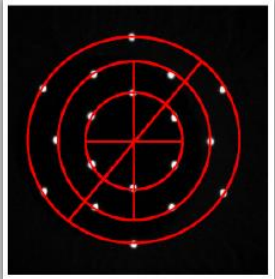
- The IOLMaster is the only optical biometer on the market that uses a smart optical configuration that allows telecentric and thus **distance-independent** keratometry.
 - **'Motion independent'** keratometry
 - **Independent of focus** (easy & comfortable to use)
 - **Direct radius measurement** (constant spot distance)
 - **Visual assessment** of dots for tear film integrity
- Robust, precise and repeatable keratometry measurements
- NOW, the IOLM combines unique telecentric keratometry measurement of the anterior corneal surface with measurement of the posterior corneal surface in order to calculate **Total Keratometry (TK)**.



3-zone Telecentric Keratometry

For improved repeatability & reproducibility



IOLM700			<ul style="list-style-type: none">• 3-zone Telecentric Keratometry• 18 points	<ul style="list-style-type: none">• *1.5mm• *2.5mm• *3.5mm	<ul style="list-style-type: none">• SE, K1, K2, ΔK, axis• TSE, TK1, TK2, ΔTK, axis• PSE, PK1, PK2, ΔPK, axis
----------------	---	--	--	--	---

** Approximate values, depending on corneal radii*

- **Average of all 18 points are used**
 - “3-zone consistency” (Improved repeatability and reproducibility due to improved consistency checks – less outliers)
 - “3 zone correlation” (additional correlation in 3 zones for improved repeatability)

Chang-Waring Chord (Angle Kappa)

Evaluate the axis symmetry of the eye



- The IOLMaster offers the option to view the pupil offset in:
 - Cartesian coordinates (x,y) **or**
 - Polar coordinates (CW-Chord)
- Easily set preference in *Advanced settings > Parameters, units > Chang-Waring Chord*

The screenshot displays the IOLMaster software interface during an analysis phase. The top navigation bar shows 'Patient > Measurement > Analyze > IOL calculation'. The patient ID is '001' and the age is '60 years'. The eye being analyzed is the right eye (OD).

On the left, a list of measurements is shown:

ΔK	+2.35 D	79°
TSE	46.02 D	SD: 0.00 D
TK1	44.85 D	169° SD: 0.00 D
TK2	47.25 D	79° SD: 0.00 D
ΔTK	+2.40 D	79°
PSE	-5.81 D	SD: 0.00 D
PK1	-5.68 D	169° SD: 0.00 D
PK2	-5.95 D	79° SD: 0.00 D
ΔPK	+0.28 D	169°
ACD	2.64 mm	SD: 0 μ m
LT	2.85 mm	SD: 0 μ m
CCT	475 μ m	SD: 0 μ m
WTW	11.1 mm	
Ix	+0.2 mm	
Iy	+0.0 mm	
P	5.2 mm	
CWC	0.2 mm	@121°

The 'CWC' value is highlighted with a yellow box. A note on the right side of the interface reads: 'Note: OD: Fixation Check! Axial length values slightly inconsistent. Unstable fixation? OD: Axial length of right eye: 18.33 mm. - Note: short eye.'

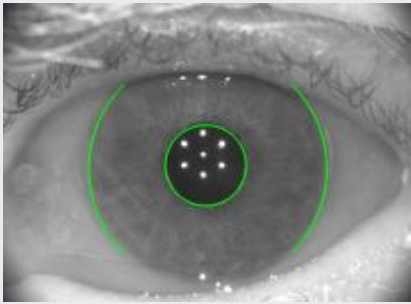
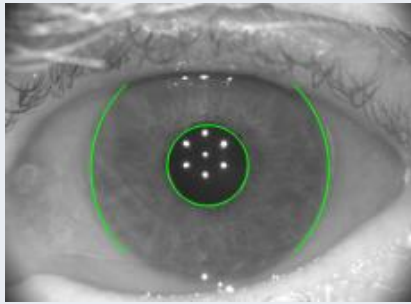
The main display area shows a B-scan image with a green dashed line indicating the optical axis. Below the B-scan, there are three smaller images: 'Keratometry' (TK), 'WTW' (highlighted in blue), and 'Sclera'. The 'WTW' value is 11.1 mm. The 'Fixation' image shows a fixation target.

At the bottom, there are buttons for 'Patient manager', 'Measure', and 'IOL calculation'. The 'Enhanced scan display' is set to 'On'.

Angle Alpha and Angle Kappa

Evaluate the axis symmetry of the eye



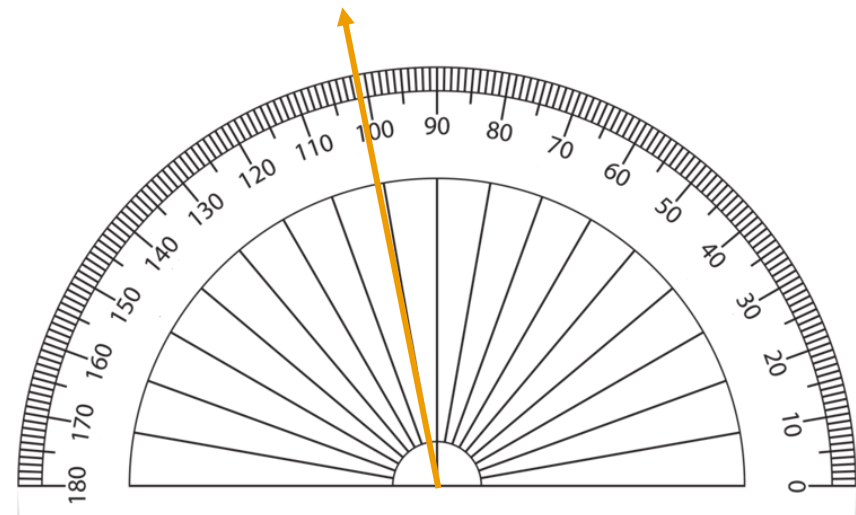
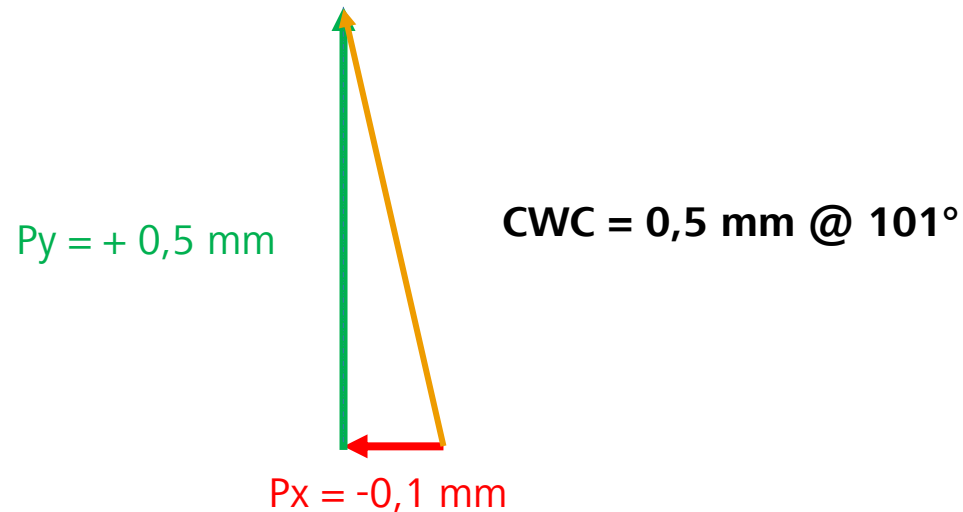
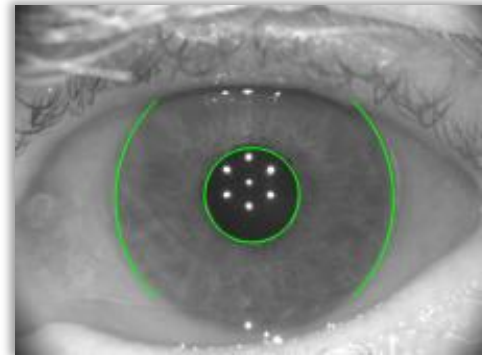
Angle alpha	Angle kappa (CW-Chord)																								
<table border="1"><tr><td>WTW</td><td>11.1 mm</td></tr><tr><td>Ix</td><td>+0.2 mm</td></tr><tr><td>Iy</td><td>+0.0 mm</td></tr><tr><td>P</td><td>5.2 mm</td></tr><tr><td>Px</td><td>+0.1 mm</td></tr><tr><td>Py</td><td>-0.1 mm</td></tr></table>	WTW	11.1 mm	Ix	+0.2 mm	Iy	+0.0 mm	P	5.2 mm	Px	+0.1 mm	Py	-0.1 mm	<table border="1"><tr><td>WTW</td><td>11.1 mm</td></tr><tr><td>Ix</td><td>+0.2 mm</td></tr><tr><td>Iy</td><td>+0.0 mm</td></tr><tr><td>P</td><td>5.2 mm</td></tr><tr><td>Px</td><td>+0.1 mm</td></tr><tr><td>Py</td><td>-0.1 mm</td></tr></table>	WTW	11.1 mm	Ix	+0.2 mm	Iy	+0.0 mm	P	5.2 mm	Px	+0.1 mm	Py	-0.1 mm
WTW	11.1 mm																								
Ix	+0.2 mm																								
Iy	+0.0 mm																								
P	5.2 mm																								
Px	+0.1 mm																								
Py	-0.1 mm																								
WTW	11.1 mm																								
Ix	+0.2 mm																								
Iy	+0.0 mm																								
P	5.2 mm																								
Px	+0.1 mm																								
Py	-0.1 mm																								
																									
<ul style="list-style-type: none">Angle alpha is the difference between the center of the limbus and the visual axis.	<ul style="list-style-type: none">Angle kappa is the difference between the center of the pupil and the visual axis.																								

Chang-Waring Chord (Angle Kappa)

Evaluate pre-op for MIOL implantation – Optimize IOL centration



WTW	11.2 mm
Ix	-0.2 mm
Iy	+0.7 mm
P	3.8 mm
Px	-0.1 mm
Py	+0.5 mm



Chang-Waring Chord (Angle Kappa)

Evaluate pre-op for MIOL implantation – Screen patients suitability



- **Jack Holladay – „Pay attention to the Angla Kappa!“**
 - The dimension between the visual axis and the pupil is called the angla kappa (or chord mu / CWC).
 - The proper place to center a diffractive, premium aspheric, or toric IOL is halfway between the visual axis and the center of the pupil.
 - If that **value is greater than 0.6mm**, patients with diffractive lenses will have halos and glare.

Jack T. Holladay, MD, Hidden Figures, Cataract & Refractive Surgery Today Europe, April 2018, pg 78-80

- 1 Introduction: SW 1.80 & Total Keratometry (TK)
- 2 Total Keratometry (TK)
- 3 GUI - Measurement, Analyze
- 4 GUI - IOL Calculation
- 5 Print & Export Options
- 6 Websites

ZEISS IOLMaster 700 - IOL Calculation screen

New features to improve workflow efficiency



The screenshot shows the IOL calculation interface for patient 001, 60 years old. The screen is divided into several sections:

- OD (Right Eye):** AL 24.00, K1 44.55 (169°), K2 46.90 (79°), ΔK 2.35 dpt (79°). TK values are listed as TK1 44.85 D (169°), TK2 47.25 D (79°), and ΔTK +2.40 dpt (79°).
- OS (Left Eye):** No measurement.
- Formulas:** Barrett Suite is selected. Options include New formula and Delete formula.
- Physician:** Doctor.
- Target ref. [D]:** +0.00.
- LVC mode:** None.
- SIA [D/°]:** +0.00 (0°).
- Calculation Mode:** Torical is selected. K and TK options are available.
- Manufacturer:** ZEISS.
- Model:** TORBI 709 MP/M.
- Lens:** Phakic.
- LVC Status:** Untreated.
- Pre-surg refraction:** Sph and Cyl fields.

Annotations with yellow arrows point to specific features:

- TK values:** Points to the TK1, TK2, and ΔTK values.
- Target refraction:** Points to the Target ref. [D] field.
- Keratometry & Total Keratometry:** Points to the K and TK calculation mode buttons.
- LVC Status:** Points to the LVC dropdown menu.

Target refraction

Setting target refraction individually for OD & OS to improve workflow



Patient > Measurement > Analyze > IOL calculation

001 60 years **OD** OS

OD

AL 18.33
K1 44.55 169
K2 46.90 79°
ΔK 2.35 dpt 79°
TK1 44.85 D 169°
TK2 47.25 D 79°
ΔTK +2.40 dpt 79°
ACD 2.64
LT 2.85
WTW 11.1

Lens Phakic
LVC Untreated
Pre-surg refraction
Sph D
Cyl D °

Barrett Suite

+ New formula Delete formula

Physician Doctor

LVC mode None

SIA [D/°] +0.00 0

Spherical Torical K TK 1

ZEISS

TORBI 709 MP/M

Spherical Torical K TK 2

ZEISS

TORBI 709 MP/M

+ Add lens

OS

AL 18.33 mm
K1 44.55 D @ 169°
K2 46.90 D @ 79°
ΔK +2.35 dpt @ 79°
TK1 44.85 D @
TK2 47.25 D
ΔTK +2.40 dp
ACD 2.64 mm
LT 2.85 mm
WTW 11.1 mm

Lens Phakic
LVC Untreated
Pre-surg refraction
Sph ---
Cyl ---

Analyze Calculate Finish

Target ref. [D] -1.00 +

Workflow improvement

Target refraction

Identify changes in target refraction with appropriate warning messages



The screenshot displays the IOLMaster 700 SW 1.80 & Total Keratometry (TK) software interface. A prominent orange warning dialog box is overlaid on the top half of the screen. The dialog box contains the following text:

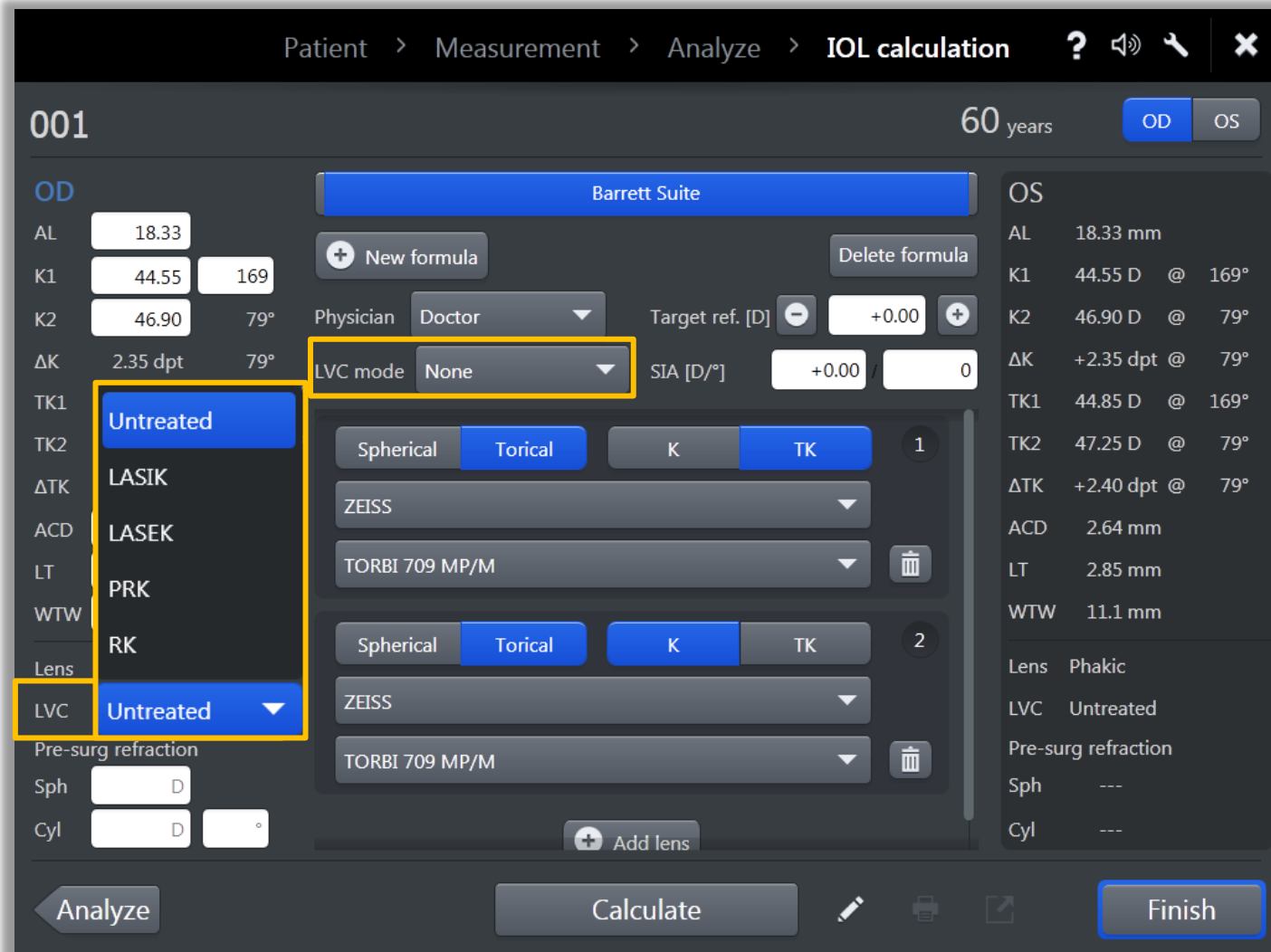
Warning
The selected target refraction for both eyes is outside the usual range between -0.5 and 0 D.
The selected target refractions for the right and left eye are not consistent.

Buttons for "Cancel" and "OK" are visible in the bottom right corner of the dialog box. The background software interface shows various parameters for two eyes (1 and 2), including AL, K1, K2, ΔK, TK1, TK2, ΔTK, ACD, LT, and WTW. It also features dropdown menus for "Physician" (set to Doctor), "LVC mode" (set to None), and "SIA [D/°]" (set to D). The "Target ref. [D]" field is set to +0.50. The interface includes buttons for "New formula", "Delete formula", "Spherical", "Toric", "K", "TK", "ZEISS", "TORBI 709 MP/M", "Add lens", "Calculate", "Analyze", and "Finish".

Appropriate warning messages

Change of LVC status

No need to re-measure the patient!



- Ability to change LVC status **post-acquisition**.
 - Only Barrett Suite (ie. Barrett True-K) will calculate for post-RK patients (with standard Ks).

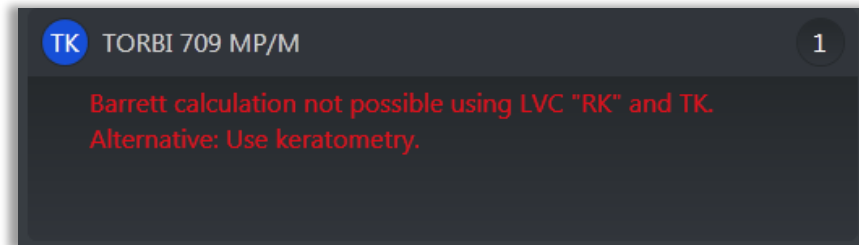
Total Keratometry & Post-LVC Formulas

Expand IOL calculation for your post-LVC patients

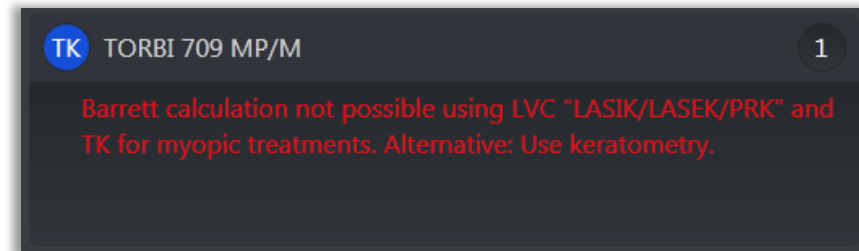


- TK measurement values can be used to calculate **post myopic LASIK and PRK with Haigis and Holladay II formulas** (ie. formulas that do not consider Ks for the ELP prediction).
- TK measurement values cannot be used with LVC formulas such as Haigis-L and Barrett True-K.
- ZEISS IOLMaster 700 will block any calculations that are not yet available.

- EG. Barrett TK calculation is not possible using LVC 'RK'.



- EG. Barrett TK Toric calculation is not possible using LVC 'LASIK/LASEK/PRK'.



ZEISS IOLMaster 700 - IOL Calculation screen

View and compare TK & K measurement values on one screen



Patient > Measurement > Analyze > IOL calculation

001 60 years OD OS

OD

AL 24.00 (*)
K1 44.55 169
K2 46.90 79°
AK 2.35 dpt 79°
TK1 44.85 D 169°
TK2 47.25 D 79°
ΔTK +2.40 dpt 79°
ACD 2.64
LT 2.85
WTW 11.1
Lens Phakic
LVC Untreated (*)
Pre-surg refraction
Sph D
Cyl D °

Barrett Suite

+ New formula Delete formula

Physician Doctor Target ref. [D] - +0.00 +
LVC mode None SIA [D/°] +0.00 0

Spherical Torical **K TK** 1
ZEISS
TORBI 709 MP/M

Spherical Torical **K TK** 2
ZEISS
TORBI 709 MP/M

+ Add lens

OS

AL 22.00 mm (*)
K1 44.55 D @ 169°
K2 46.90 D @ 79°
ΔK +2.35 dpt @ 79°
TK1 44.85 D @ 169°
TK2 47.25 D @ 79°
ΔTK +2.40 dpt @ 79°
ACD 2.64 mm
LT 2.85 mm
WTW 11.1 mm
Lens Phakic
LVC Untreated
Pre-surg refraction
Sph ---
Cyl ---

Analyze Calculate Finish

ZEISS IOLMaster 700 - IOL Calculation screen

View and compare TK & K measurement values on one screen



Patient > Measurement > Analyze > IOL calculation

001 60 years OD OS

Barrett Suite

Physician Doctor Target ref. [D] +0.00
LVC mode None SIA +0.00 @ 0°

Keratometry (K)

K	TORBI 709 MP/M	1
IOL SE	Cyl [D]	A [°]
+16.50	+2.00	76
+16.00	+2.00	76
+15.50	+2.00	76
Ref SE	Sph [D]	Cyl [D]
-0.53	-0.66	+0.26
-0.17	-0.30	+0.26
+0.18	+0.05	+0.27

Total Keratometry (TK)

TK	TORBI 709 MP/M	2
IOL SE	Cyl [D]	A [°]
+16.00	+2.00	79
+15.50	+2.00	79
+15.00	+2.00	79
Ref SE	Sph [D]	Cyl [D]
-0.49	-0.68	+0.38
-0.13	-0.32	+0.38
+0.22	+0.03	+0.38

OD: AL 24.00 mm (*), K1 44.55 D @ 169°, K2 46.90 D @ 79°, TK1 44.85 D @ 169°, TK2 47.25 D @ 79°, ΔTK +2.40 dpt @ 79°, ACD 2.64 mm, WTW 11.1 mm, Lens Phakic, LVC Untreated (*), Pre-surg refraction Sph ---, Cyl ---

OS: AL 22.00 mm (*), K1 44.55 D @ 169°, K2 46.90 D @ 79°, ΔK +2.35 dpt @ 79°, TK1 44.85 D @ 169°, TK2 47.25 D @ 79°, ΔTK +2.40 dpt @ 79°, ACD 2.64 mm, LT 2.85 mm, WTW 11.1 mm, Lens Phakic, LVC Untreated, Pre-surg refraction Sph ---, Cyl ---

Analyze Edit Finish

Detailed IOL information screen

Quickly view and change IOL selection



Formula used for IOL calculation → Barrett Suite - Barrett TK Toric

Change IOL → ZEISS

View formula constants → Constants: LensFactor=+1.62 DesignFactor=+0.00

Easily toggle between standard K & TK for IOL calculation → K TK

Select IOL → Select IOL

Spherical selection

IOL SE	Cyl [D]	A [°]	Ref SE	Sph [D]	Cyl [D]	A [°]
+17.00	+2.00	79	-1.22	-1.41	+0.38	79
+16.50	+2.00	79	-0.85	-1.04	+0.38	79
+16.00	+2.00	79	-0.49	-0.68	+0.38	79
+15.50	+2.00	79	-0.13	-0.32	+0.38	79
+15.00	+2.00	79	+0.22	+0.03	+0.38	79
+14.50	+2.00	79	+0.57	+0.38	+0.38	79
+14.00	+2.00	79	+0.91	+0.72	+0.38	79

Toric selection

+15.75	+2.50	79	-0.31	-0.33	+0.03	79
+15.50	+2.00	79	-0.13	-0.32	+0.38	79
+15.75	+1.50	79	-0.31	-0.67	+0.73	79

+15.50 +2.48 79 Emmetropia

Cancel Save

Detailed IOL information screen

Identify selected IOL and formula



Barrett Suite - Barrett TK Toric

Spheric **Toric** K **TK**

ZEISS

TORBI 709 MP/M

Constants: LensFactor=+1.62 DesignFactor=+0.00

Spherical selection

IOL SE	Cyl [D]	A [°]	Ref SE	Sph [D]	Cyl [D]	A [°]
+17.00	+2.00	79	-1.22	-1.41	+0.38	79
+16.50	+2.00	79	-0.85	-1.04	+0.38	79
+16.00	+2.00	79	-0.49	-0.68	+0.38	79
+15.50	+2.00	79	-0.13	-0.32	+0.38	79
+15.00	+2.00	79	+0.22	+0.03	+0.38	79
+14.50	+2.00	79	+0.57	+0.38	+0.38	79
+14.00	+2.00	79	+0.91	+0.72	+0.38	79

Toric selection

+15.75	+2.50	79	-0.31	-0.33	+0.03	79
+15.50	+2.00	79	-0.13	-0.32	+0.38	79
+15.75	+1.50	79	-0.31	-0.67	+0.73	79

+15.50 +2.48 79 Emmetropia

Cancel **Save**

Select IOL

Patient > Measurement > Analyze > IOL calculation ?

001 60 years **OD** OS

OD

AL 24.00 mm (*) Physician **Doctor** Target ref. [D] +0.00
 K1 44.55 D @ 169° LVC mode **None** SIA +0.00 @ 0°
 K2 46.90 D @ 79°
 ΔK +2.35 dpt @ 79°
 TK1 44.85 D @ 169°
 TK2 47.25 D @ 79°
 ΔTK +2.40 dpt @ 79°
 ACD 2.64 mm
 LT 2.85 mm
 WTW 11.1 mm
 Lens Phakic
 LVC Untreated (*)
 Pre-surg refraction
 Sph ---
 Cyl ---

OS

AL 22.00 mm (*)
 K1 44.55 D @ 169°
 K2 46.90 D @ 79°
 ΔK +2.35 dpt @ 79°
 TK1 44.85 D @ 169°
 TK2 47.25 D @ 79°
 ΔTK +2.40 dpt @ 79°
 ACD 2.64 mm
 LT 2.85 mm
 WTW 11.1 mm
 Lens Phakic
 LVC Untreated
 Pre-surg refraction
 Sph ---
 Cyl ---

K TORBI 709 MP/M 1

IOL SE	Cyl [D]	A [°]	Ref SE	Sph [D]	Cyl [D]	A [°]
+16.50	+2.00	76	-0.53	-0.66	+0.26	76
+16.00	+2.00	76	-0.17	-0.30	+0.26	76
+15.50	+2.00	76	+0.18	+0.05	+0.27	76

TK TORBI 709 MP/M 2

IOL SE	Cyl [D]	A [°]	Ref SE	Sph [D]	Cyl [D]	A [°]
+16.00	+2.00	79	-0.49	-0.68	+0.38	79
+15.50	+2.00	79	-0.13	-0.32	+0.38	79
+15.00	+2.00	79	+0.22	+0.03	+0.38	79
	+15.50	+2.00	-0.13	-0.32	+0.38	79

Analyze Edit **Finish**

Preselection of an IOL and export to ZEISS CALLISTO eye

Automatic transfer target axis and detailed printout



Patient > Measurement > Analyze > IOL calculation

001 60 years OD OS

Barrett Suite

Physician Doctor Target ref. [D] +0.00
LVC mode None SIA +0.00 @ 0°

TK Toric SN6AT (2-9) 1

IOL SE	Cyl [D]	A [°]	Ref SE	Sph [D]	Cyl [D]	A [°]
T4 +42.50	+2.25	79	-0.24	-0.33	+0.19	79
T4 +42.00	+2.25	79	+0.15	+0.05	+0.19	79
T4 +41.50	+2.25	79	+0.52	+0.42	+0.19	79

TK T5 +42.00 +3.00 79 +0.15 -0.02 +0.33 169

TK Tecnis 1 ZCB00 2

IOL SE	Cyl [D]	A [°]	Ref SE	Sph [D]	Cyl [D]	A [°]
ZCT +43.00	+2.25	79	-0.38	-0.47	+0.20	79
ZCT +42.50	+2.25	79	+0.01	-0.09	+0.20	79
ZCT +42.00	+2.25	79	+0.38	+0.28	+0.20	79

AL 18.33 mm K1 44.55 D @ 169° K2 46.90 D @ 79° ΔK +2.35 dpt @ 79° TK1 44.85 D @ 169° TK2 47.25 D @ 79° ΔTK +2.40 dpt @ 79° ACD 2.64 mm LT 2.85 mm WTW 11.1 mm

Lens Phakic LVC Untreated Pre-surg refraction Sph --- Cyl ---

Analyze Edit Finish

OD right Reference image

Eye status

LS: Phakic VS: Vitreous body LVC: Untreated (*)
Ref: --- VA: ---

Biometric values

AL: 18.33 mm	SE: 45.69 D	TSE: 46.02 D
ACD: 2.64 mm	K1: 44.55 D @ 169°	TK1: 44.85 D @ 169°
LT: 2.85 mm	K2: 46.90 D @ 79°	TK2: 47.25 D @ 79°
WTW: 11.1 mm	ΔK: +2.35 D @ 79°	ΔTK: +2.40 D @ 79°
P: 5.2 mm	bc: +0.2 mm ly: +0.0 mm	
	CW-Chord: 0.2 mm @ 121°	

TK Toric SN6AT (2-9) IOL SE IOL Cyl IOL axis Ref SE Ref Sph Ref Cyl Ref Axis
- Barrett TK Toric - T5 +42.00 +3.00 79 +0.15 -0.02 +0.33 169

(!) Borderline value (*) Value was edited manually --- No value measured

ZEISS IOLMaster 700 - IOL Calculation screen

No need to manually enter data to online calculators



- Support of non-constant toric IOL ranges
- EG. Alcon toric IOLs
 - Cylinder step sizes
 - Naming convention (eg. T2, T3, T4, etc)

Patient > Measurement > Analyze > IOL calculation

001 60 years OD OS

Barrett Suite

Physician Doctor Target ref. [D] +0.00
LVC mode None SIA +0.00 @ 0°

TK	IOL	SE	Cyl [D]	A [°]	Ref SE	Sph [D]	Cyl [D]	A [°]
TK	T4	+42.50	+2.25	79	-0.24	-0.33	+0.19	79
	T4	+42.00	+2.25	79	+0.15	+0.05	+0.19	79
	T4	+41.50	+2.25	79	+0.52	+0.42	+0.19	79
TK	225	+43.00	+2.25	79	-0.38	-0.47	+0.20	79
	225	+42.50	+2.25	79	+0.01	-0.09	+0.20	79
	225	+42.00	+2.25	79	+0.38	+0.28	+0.20	79

Buttons: Analyze, Edit, Finish

ZEISS IOLMaster 700 - IOL Calculation screen

No need to manually enter data to online calculators



Barrett Suite - Barrett TK Toric

Spheric Toric

Alcon

Toric SN6AT (2-9)

Constants: LensFactor=+2.02 DesignFactor=+5.00

Spherical selection

	IOL SE	Cyl [D]	A [°]	Ref SE
T4	+43.50	+2.25	79	-1.01
T4	+43.00	+2.25	79	-0.62
T4	+42.50	+2.25	79	-0.24
T4	+42.00	+2.25	79	+0.15
T4	+41.50	+2.25	79	+0.52
T4	+41.00	+2.25	79	+0.89
T4	+40.50	+2.25	79	+1.26

Toric selection

	IOL SE	Cyl [D]	A [°]	Ref SE
T5	+42.00	+3.00	79	+0.15
T4	+42.00	+2.25	79	+0.15
T3	+42.00	+1.50	79	+0.15

+42.00 +2.32 79 Emmetropia

Cancel

Barrett Suite - Barrett TK Toric

Spheric Toric

K TK

Alcon

Toric SN6AT (2-9)

Constants: LensFactor=+2.02 DesignFactor=+5.00

Spherical selection

	IOL SE	Cyl [D]	A [°]	Ref SE	Sph [D]	Cyl [D]	A [°]
T4	+43.50	+2.25	79	-1.01	-1.10	+0.18	79
T4	+43.00	+2.25	79	-0.62	-0.71	+0.18	79
T4	+42.50	+2.25	79	-0.24	-0.33	+0.19	79
T4	+42.00	+2.25	79	+0.15	+0.05	+0.19	79
T4	+41.50	+2.25	79	+0.52	+0.42	+0.19	79
T4	+41.00	+2.25	79	+0.89	+0.80	+0.20	79
T4	+40.50	+2.25	79	+1.26	+1.16	+0.20	79

Toric selection

	IOL SE	Cyl [D]	A [°]	Ref SE
T5	+42.00	+3.00	79	+0.15
T4	+42.00	+2.25	79	+0.15
T3	+42.00	+1.50	79	+0.15

+42.00 +2.32 79 Emmetropia

Cancel Save

Select IOL

- Spherical selection (IOL SE)

ZEISS IOLMaster 700 - IOL Calculation screen

No need to manually enter data to online calculators



Barrett Suite - Barrett TK Toric

Spheric Toric K TK

Alcon

Toric SN6AT (2-9)

Constants: LensFactor=+2.02 DesignFactor=+5.00

Spherical selection Select IOL

	IOL SE	Cyl [D]	A [°]	Ref SE	Sph [D]	Cyl [D]	A [°]
T4	+43.50	+2.25	79	-1.01	-1.10	+0.18	79
T4	+43.00	+2.25	79	-0.62	-0.71	+0.18	79
T4	+42.50	+2.25	79	-0.24	-0.33	+0.19	79
T4	+42.00	+2.25	79	+0.15	+0.05	+0.19	79
T4	+41.50	+2.25	79	+0.52	+0.42	+0.19	79
T4	+41.00	+2.25	79	+0.89	+0.80	+0.20	79
T4	+40.50	+2.25	79	+1.26	+1.16	+0.20	79

Toric selection

T5	+42.00	+3.00	79	+0.15	-0.02	+0.33	169
T4	+42.00	+2.25	79	+0.15	+0.05	+0.19	79
T3	+42.00	+1.50	79	+0.15	-0.21	+0.71	79

+42.00 +2.32 79 Emmetropia

Cancel Save

Select IOL

- Toric selection (Cyl & Axis)
 - 1 overcorrection (axis flip)
 - 2 undercorrection (no axis flip)

- 1 Introduction: SW 1.80 & Total Keratometry (TK)
- 2 Total Keratometry (TK)
- 3 GUI - Measurement, Analyze
- 4 GUI - IOL Calculation
- 5 Print & Export Options
- 6 Websites

Print and Export Options

Customizable and flexible options to improve workflow efficiency



Patient > Measurement > Analyze > IOL calculation

001 60 years OD OS

Barrett Suite

Physician Doctor Target ref. [D] +0.00
LVC mode None SIA +0.00 @ 0°

K Toric SN6AT (2-9) 1

	IOL SE	Cyl [D]	A [°]	Ref SE	Sph [D]	Cyl [D]	A [°]
T3	+43.00	+1.50	75	-0.30	-0.55	+0.50	75
T3	+42.50	+1.50	75	+0.08	-0.17	+0.50	75
T3	+42.00	+1.50	75	+0.46	+0.21	+0.50	75

TK Tecnis 1 ZCB00 2

	IOL SE	Cyl [D]	A [°]	Ref SE	Sph [D]	Cyl [D]	A [°]
ZCT	+43.00	+2.25	79	-0.38	-0.47	+0.20	79
ZCT	+42.50	+2.25	79	+0.01	-0.09	+0.20	79
ZCT	+42.00	+2.25	79	+0.38	+0.28	+0.20	79

Finish
Print
Export
Print & export
Finish

Analyze Edit

Set printer & export settings in menu will be applied

Print and Export Options

Customizable and flexible options to improve workflow efficiency



Print & Export icons

The screenshot shows the 'IOL calculation' window for a 60-year-old patient. The interface is split into OD (right eye) and OS (left eye) sections. The OD section shows measurements like AL (18.33 mm), K1 (44.55 D @ 169°), K2 (46.90 D @ 79°), ΔK (+2.35 dpt @ 79°), TK1 (44.85 D @ 169°), TK2 (47.25 D @ 79°), ΔTK (+2.40 dpt @ 79°), ACD (2.64 mm), LT (2.85 mm), WTW (11.1 mm), Lens (Phakic), and LVC (Untreated). The OS section shows similar measurements. A central table displays lens options for Toric SN6AT (2-9) and Tecnis 1 ZCB00. The bottom toolbar contains buttons for 'Analyze', 'Edit', a pencil icon, a printer icon, an export icon, and a 'Finish' button with a dropdown arrow. Two yellow callouts point to the printer and export icons, stating 'Print options will appear' and 'Export options will appear' respectively.

IOL	SE	Cyl [D]	A [°]	Ref SE	Sph [D]	Cyl [D]	A [°]
T3	+43.00	+1.50	75	-0.30	-0.55	+0.50	75
T3	+42.50	+1.50	75	+0.08	-0.17	+0.50	75
T3	+42.00	+1.50	75	+0.15	-0.21	+0.50	75

IOL	SE	Cyl [D]	A [°]
ZCT	+43.00	+2.25	79
ZCT	+42.50	+2.25	79
ZCT	+42.00	+2.25	79

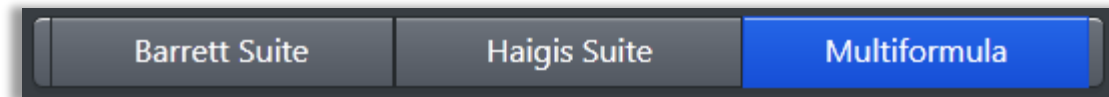
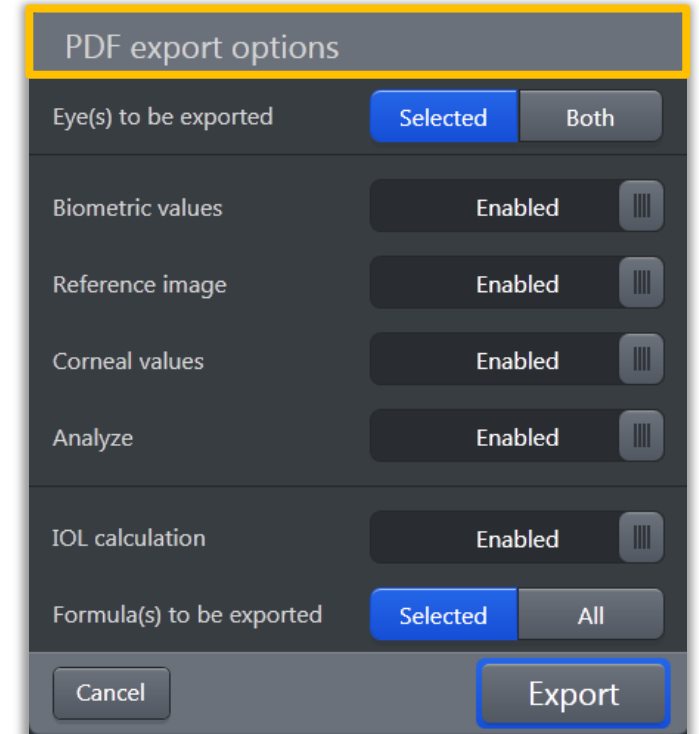
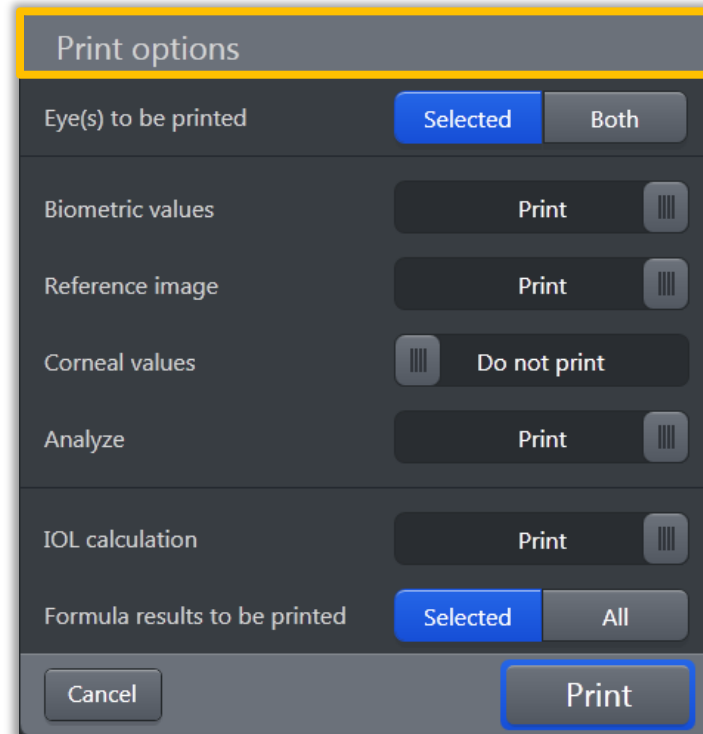
Print and Export Options

Customizable and flexible options to improve workflow efficiency



Optional pop-up menu

- Pop-up print/export menu will appear when clicking on icon (default settings)
- User can easily change as required
- Eyes to be printed (Selected/Both)
- Formula results to be printed (same as IOLM500)



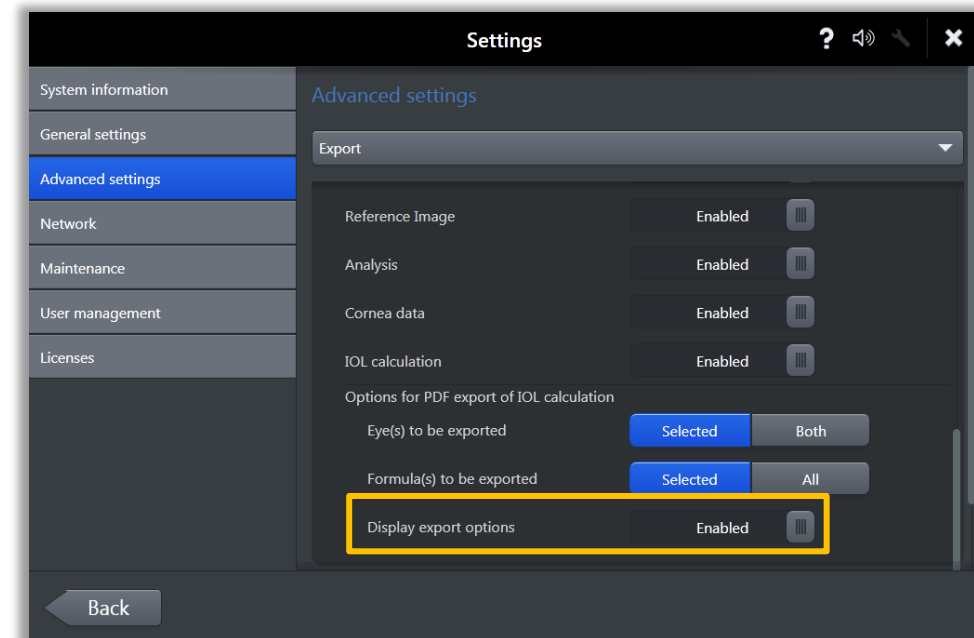
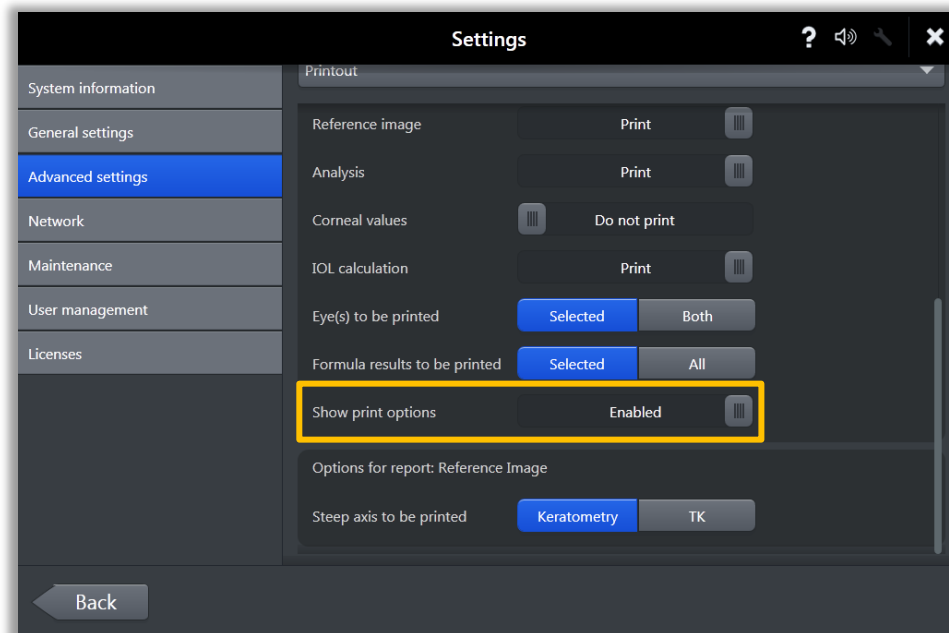
Print and Export Options

Customizable and flexible options to improve workflow efficiency



- **Optional pop-up menu**

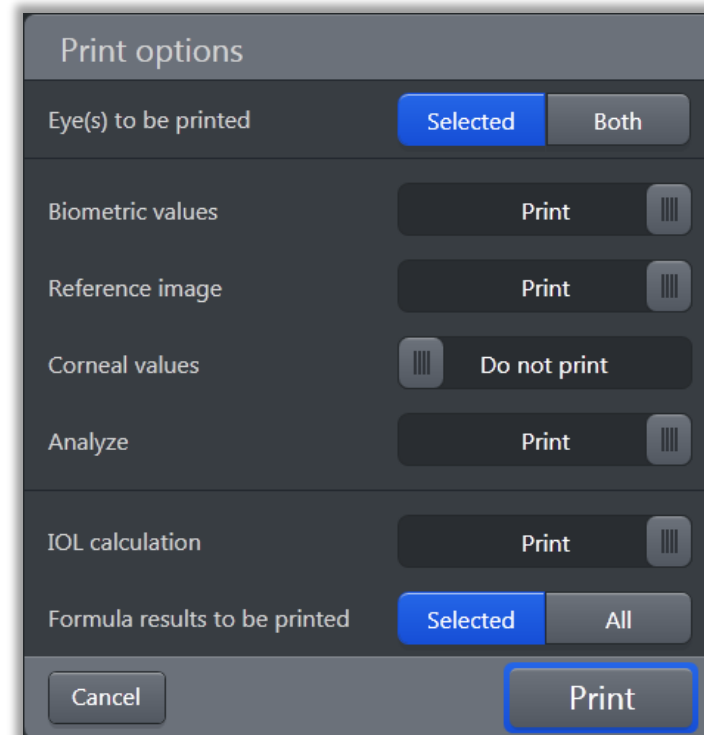
- Enable in *Advanced settings > Printout > Show print options*
- Enable in *Advanced settings > Export > Enable PDF export > Display export options*



- **Printouts available:**

- IOL Calculation (OD/OS)
- Analyze (OD)
- Analyze (OS)
- Biometric values (OD/OS)
- **Corneal values (OD/OS)**
- Reference image (OD)
- Reference image (OS)

NEW!



Picture source: Carl Zeiss Meditec Media Database

IOL Calculation (OU)

Patient: TEST TEST
 Date of birth: 3/9/1968 Gender: Female
 Patient ID: 001
 Physician: Doctor Operator: Doctor
 Carl Zeiss Meditec AG
 Goeschwißer Strasse 51-52
 www.meditec.zeiss.de
 Date of calibration test: 3/16/2018 by: Doctor Result: Failed
 Date of measurement: 4/24/2018 rc: 1.3375 CVD: 12.00 mm

This IOL calculation contains values that were edited manually.
 Please note the information on the following page.

OD right				IOL calculation				OS left			
(E) Toric SN6AT (2-9) - Barrett TK Toric - T5											
Eye status											
L8: Phakic		VS: Vitreous body		L8: Phakic		VS: Vitreous body					
Ref: ---		VA: ---		Ref: ---		VA: ---					
LVC: Untreated		LVC mode: -		LVC: Untreated		LVC mode: -					
Target ref.: plano		SIA: +0.00 D @ 0°		Target ref.: plano		SIA: +0.00 D @ 0°					
Biometric values											
AL: 22.00 mm (*)				AL: 22.10 mm (*)							
ACD: 2.64 mm		SD: 0 µm		ACD: 2.64 mm		SD: 0 µm					
LT: 2.86 mm		SD: 0 µm		LT: 2.86 mm		SD: 0 µm					
WTW: 11.1 mm				WTW: 11.1 mm							
SE: 45.69 D		SD: 0.00 D		K1: 44.55 D @ 169°		SE: 45.69 D					
ΔK: +2.36 D @ 79°		K2: 46.90 D @ 79°		SE: 45.69 D		SD: 0.00 D					
TSE: 46.02 D		SD: 0.00 D		TK1: 44.85 D @ 169°		SE: 45.69 D					
ΔTK: +2.40 D @ 79°		TK2: 47.25 D @ 79°		TK2: 47.25 D @ 79°		SE: 45.69 D					
ZEISS TORBI 700 MPM				ZEISS TORBI 700 MPM							
- Barrett TK Toric - LF: +1.52 DF: +0.0											
IOL SE		IOL Cyl		IOL axis		Ref SE					
+23.00		+2.00		79°		-0.80					
+22.60		+2.00		79°		-0.41					
+22.00		+2.00		79°		-0.04					
+21.60		+2.00		79°		+0.34					
+21.00		+2.00		79°		+0.71					
+22.00		+2.34		79°		Emmetropia					
Alcon Toric SN6AT (2-8)				Alcon Toric SN6AT (2-8)							
- Barrett TK Toric - LF: +2.02 DF: +5.0											
IOL SE		IOL Cyl		IOL axis		Ref SE					
T4 +24.00		+2.25		79°		-0.89					
T4 +23.60		+2.25		79°		-0.51					
T4 +23.00		+2.25		79°		-0.16					
T4 +22.60		+2.25		79°		+0.22					
T4 +22.00		+2.25		79°		+0.58					
+23.00		+2.41		79°		Emmetropia					
ZEISS TORBI 700 MPM				ZEISS TORBI 700 MPM							
- Barrett TK Toric - LF: +1.52 DF: +0.0											
IOL SE		IOL Cyl		IOL axis		Ref SE					
+22.60		+2.00		79°		-0.70					
+22.00		+2.00		79°		-0.32					
+21.60		+2.00		79°		+0.06					
+21.00		+2.00		79°		+0.43					
+20.60		+2.00		79°		+0.79					
+21.60		+2.36		79°		Emmetropia					
Alcon Toric SN6AT (2-8)				Alcon Toric SN6AT (2-8)							
- Barrett TK Toric - LF: +2.02 DF: +5.0											
IOL SE		IOL Cyl		IOL axis		Ref SE					
T4 +23.60		+2.25		79°		-0.81					
T4 +23.00		+2.25		79°		-0.44					
T4 +22.60		+2.25		79°		-0.07					
T4 +22.00		+2.25		79°		+0.29					
T4 +21.60		+2.25		79°		+0.66					
+22.60		+2.42		79°		Emmetropia					
T5 +22.60		+3.00		79°		-0.07					

() Borderline value (*) Value was edited manually -- No value measured
 Comment:



Picture source: Carl Zeiss Meditec Media Database

Analyze (OD/OS)

Patent	TEST TEST		
Date of birth	3/9/1968	Gender	Female
Patent ID	001	Carl Zeiss Meditec AG	
Physician	Doctor	Operator	Doctor
		Goeschwtzler Strasse 51-52	
		www.meditec.zeiss.de	
Date of calibration	Date of calibration test: 3/16/2018	by: Doctor	Result: Failed
Date of measurement	Date of measurement: 4/24/2018	rt: 1.3375	CVD: 12.00 mm
OD: Fixation OK	OB: Fixation Check! Axial length values slightly inconsistent. Unstable fixation? OS: Axis length of left eye: 18.33 mm. - Note: short eye.		

OD right	Analyze		OS left
LS: Phakic Ref: ---	Eye status		
	LS: Phakic Ref: ---	VS: Vitreous body VA: ---	LVC: Untreated
	Biometric values		
AL: 18.33 mm CCT: 476 µm ACD: 2.64 mm LT: 2.86 mm	AL: 18.33 mm CCT: 476 µm ACD: 2.64 mm LT: 2.86 mm	SD: 0 µm SD: 0 µm SD: 0 µm SD: 0 µm	WTW: 11.1 mm P: 5.2 mm ix: +0.2 mm iy: +0.0 mm CW-Chord 0.2 mm @ 121°
SE: 45.69 D K1: 44.66 D K2: 46.90 D ΔK: +2.36 D	SE: 45.69 D K1: 44.66 D @ 169° K2: 46.90 D @ 79° ΔK: +2.36 D @ 79°	SD: 0.00 D SD: 0.00 D SD: 0.00 D	TSE: 46.02 D TK1: 44.86 D @ 169° TK2: 47.26 D @ 79° ΔTK: +2.40 D @ 79°
	B scan		
	Keratometry	White-to-white	Fixation
(!) Borderline value	(!) Borderline value	(*) Value was edited manually	--- No value measured
Comment	Comment		



Picture source: Carl Zeiss Meditec Media Database

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ZEISS | Template - Version 01 02018 | - Copyright 2012 All rights reserved

Biometric Values (OD/OS)

Patient: TEST TEST
 Date of birth: 3/9/1968 Gender: Female
 Patient ID: 001
 Physician: Doctor Operator: Doctor
 Carl Zeiss Meditec AG
 Goeckelwitzer Strasse 51-52
 www.meditec.zeiss.de
 Date of calibration test: 3/16/2018 by: Doctor Result: Failed
 Date of measurement: 4/24/2018 rc: 1.3375 CVD: 12.00 mm
 OD: Fixation Check! Axial length values slightly inconsistent. Unstable fixation? OD: Axial length of right eye: 18.33 mm. - Note: short eye.
 OS: Fixation Check! Axial length values slightly inconsistent. Unstable fixation? OS: Axial length of left eye: 18.33 mm. - Note: short eye.

OD right				Biometric values				OS left			
Eye status											
LS: Phakic Ref: --- LVC: Untreated VS: Vitreous body VA: ---				LS: Phakic Ref: --- LVC: Untreated VS: Vitreous body VA: ---							
Biometric values											
AL: 18.33 mm		SD: 0 µm		AL: 18.33 mm		SD: 0 µm					
CCT: 475 µm		SD: 0 µm		CCT: 475 µm		SD: 0 µm					
ACD: 2.64 mm		SD: 0 µm		ACD: 2.64 mm		SD: 0 µm					
LT: 2.85 mm		SD: 0 µm		LT: 2.85 mm		SD: 0 µm					
AL	CCT	ACD	LT	AL	CCT	ACD	LT				
18.33 mm	475 µm	2.64 mm	2.85 mm	18.33 mm	475 µm	2.64 mm	2.85 mm				
18.33 mm	475 µm	2.64 mm	2.85 mm	18.33 mm	475 µm	2.64 mm	2.85 mm				
18.33 mm	475 µm	2.64 mm	2.85 mm	18.33 mm	475 µm	2.64 mm	2.85 mm				
18.33 mm	475 µm	2.64 mm	2.85 mm	18.33 mm	475 µm	2.64 mm	2.85 mm				
18.33 mm	475 µm	2.64 mm	2.85 mm	18.33 mm	475 µm	2.64 mm	2.85 mm				
18.33 mm	475 µm	2.64 mm	2.85 mm	18.33 mm	475 µm	2.64 mm	2.85 mm				
Central corneal thickness											
SE: 45.69 D SD: 0.00 D				SE: 45.69 D SD: 0.00 D							
K1: 44.66 D @ 169° SD: 0.00 D				K1: 44.66 D @ 169° SD: 0.00 D							
K2: 46.90 D @ 79° SD: 0.00 D				K2: 46.90 D @ 79° SD: 0.00 D							
ΔK: +2.36 D @ 79°				ΔK: +2.36 D @ 79°							
SE: 45.69 D ΔK: +2.36 D @ 79°				SE: 45.69 D ΔK: +2.36 D @ 79°							
SE: 45.69 D ΔK: +2.36 D @ 79°				SE: 45.69 D ΔK: +2.36 D @ 79°							
SE: 45.69 D ΔK: +2.36 D @ 79°				SE: 45.69 D ΔK: +2.36 D @ 79°							
TSE: 46.02 D SD: 0.00 D				TSE: 46.02 D SD: 0.00 D							
TK1: 44.66 D @ 169° SD: 0.00 D				TK1: 44.66 D @ 169° SD: 0.00 D							
TK2: 47.26 D @ 79° SD: 0.00 D				TK2: 47.26 D @ 79° SD: 0.00 D							
ΔTK: +2.40 D @ 79°				ΔTK: +2.40 D @ 79°							
TSE: 46.02 D ΔTK: +2.40 D @ 79°				TSE: 46.02 D ΔTK: +2.40 D @ 79°							
TSE: 46.02 D ΔTK: +2.40 D @ 79°				TSE: 46.02 D ΔTK: +2.40 D @ 79°							
TSE: 46.02 D ΔTK: +2.40 D @ 79°				TSE: 46.02 D ΔTK: +2.40 D @ 79°							
White-to-white and pupil values (Chang-Waring Chord)											
WTW: 11.1 mm		lc: +0.2 mm		WTW: 11.1 mm		lc: +0.2 mm					
P: 6.2 mm		ly: +0.0 mm		P: 6.2 mm		ly: +0.0 mm					
CW-Chord: 0.2 mm @ 121°				CW-Chord: 0.2 mm @ 121°							
Image stored				Image stored							
Reference image											
(†) Borderline value (*) Value was edited manually --- No value measured											
Comment											



Picture source: Carl Zeiss Meditec Media Database

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NEW!
Corneal
Values
(OU)

Patient: TEST TEST

Date of birth: 3/9/1968 Gender: Female Carl Zeiss Meditec AG
 Patient ID: 001 Goeschwiizer Strasse 51-52

Physician: Doctor Operator: Doctor www.meditec.zeiss.de

Date of calibration last: 3/16/2018 by: Doctor Result: Failed
 Date of measurement: 4/24/2018 nr: 1.3375 CVD: 12.00 mm

OD: Fixation Check! Axial length values slightly inconsistent. Unstable fixation? OD: Axial length of right eye: 18.33 mm. - Note: short eye.
 OS: Fixation Check! Axial length values slightly inconsistent. Unstable fixation? OS: Axial length of left eye: 18.33 mm. - Note: short eye.

OD right				Corneal values				OS left			
Eye status											
LS: Phakic		VS: Vitreous body		LS: Phakic		VS: Vitreous body					
Ref: ---		VA: ---		Ref: ---		VA: ---					
LVC: Untreated				LVC: Untreated							
Corneal values											
SE: 45.69 D		SD: 0.00 D		SE: 45.69 D		SD: 0.00 D					
K1: 44.66 D @ 169°		SD: 0.00 D		K1: 44.66 D @ 169°		SD: 0.00 D					
K2: 46.90 D @ 79°		SD: 0.00 D		K2: 46.90 D @ 79°		SD: 0.00 D					
ΔK: +2.36 D @ 79°				ΔK: +2.36 D @ 79°							
SE: 45.69 D		ΔK: +2.36 D @ 79°		SE: 45.69 D		ΔK: +2.36 D @ 79°					
SE: 45.69 D		ΔK: +2.36 D @ 79°		SE: 45.69 D		ΔK: +2.36 D @ 79°					
SE: 45.69 D		ΔK: +2.36 D @ 79°		SE: 45.69 D		ΔK: +2.36 D @ 79°					
True keratonic power											
TSE: 46.02 D		SD: 0.00 D		TSE: 46.02 D		SD: 0.00 D					
TK1: 44.86 D @ 169°		SD: 0.00 D		TK1: 44.86 D @ 169°		SD: 0.00 D					
TK2: 47.26 D @ 79°		SD: 0.00 D		TK2: 47.26 D @ 79°		SD: 0.00 D					
ΔTK: +2.40 D @ 79°				ΔTK: +2.40 D @ 79°							
TSE: 46.02 D		ΔTK: +2.40 D @ 79°		TSE: 46.02 D		ΔTK: +2.40 D @ 79°					
TSE: 46.02 D		ΔTK: +2.40 D @ 79°		TSE: 46.02 D		ΔTK: +2.40 D @ 79°					
TSE: 46.02 D		ΔTK: +2.40 D @ 79°		TSE: 46.02 D		ΔTK: +2.40 D @ 79°					
Corneal back surface values											
PSE: -5.81 D		SD: 0.00 D		PSE: -5.81 D		SD: 0.00 D					
PK1: -5.68 D @ 169°		SD: 0.00 D		PK1: -5.68 D @ 169°		SD: 0.00 D					
PK2: -5.96 D @ 79°		SD: 0.00 D		PK2: -5.96 D @ 79°		SD: 0.00 D					
ΔPK: +0.28 D @ 169°				ΔPK: +0.28 D @ 169°							
PSE: -5.81 D		ΔPK: +0.28 D @ 169°		PSE: -5.81 D		ΔPK: +0.28 D @ 169°					
PSE: -5.81 D		ΔPK: +0.28 D @ 169°		PSE: -5.81 D		ΔPK: +0.28 D @ 169°					
PSE: -5.81 D		ΔPK: +0.28 D @ 169°		PSE: -5.81 D		ΔPK: +0.28 D @ 169°					
Other values											
CCT: 476 μm		SD: 0 μm		CCT: 476 μm		SD: 0 μm					
WTW: 11.1 mm		bc: +0.2 mm ly: +0.0 mm		WTW: 11.1 mm		bc: +0.2 mm ly: +0.0 mm					
P: 5.2 mm		CW-Chord: 0.2 mm @ 121°		P: 5.2 mm		CW-Chord: 0.2 mm @ 121°					

(!) Borderline value (*) Value was edited manually --- No value measured

Comment



Picture source: Carl Zeiss Meditec Media Database

Reference
Image
(OD/OS)

Patient: TEST TEST
 Date of birth: 3/9/1968
 Patient ID: 001
 Physician: Doctor

Patient: TEST TEST
 Date of birth: 3/9/1968 Gender: Female
 Patient ID: 001
 Physician: Doctor Operator: Doctor
 Carl Zeiss Meditec AG
 Goeschwiizer Strasse 51-52
 www.meditec.zeiss.de
 Date of calibration test: 3/16/2018 by: Doctor Result: Failed
 Date of measurement: 4/24/2018 n: 1.3375 CVD: 12.00 mm
 This IOL calculation contains values that were edited manually.
 OS: Fixation Check! Axial length values slightly inconsistent. Unstable fixation? OS: Axial length of left eye: 18.33 mm. - Note: short eye.

OD
right

LS: Phakic
Ref: ---

AL: 22.00 mm (*)
 ACD: 2.64 mm
 LT: 2.86 mm
 WTW: 11.1 mm
 P: 5.2 mm

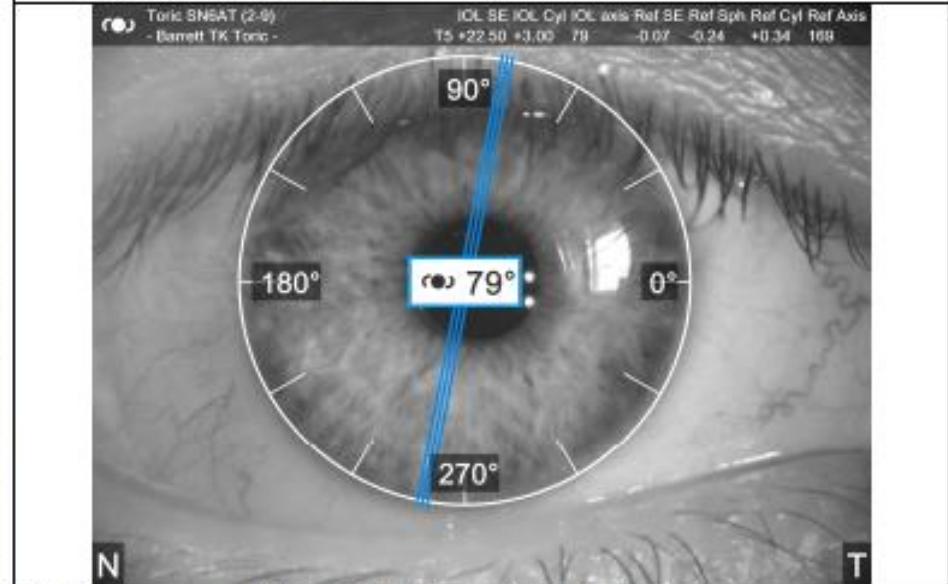
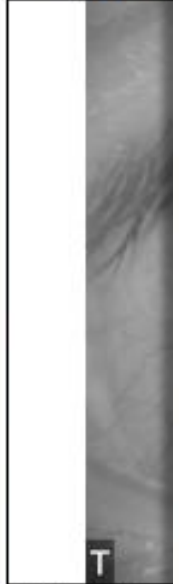
Reference image

OS
left

Eye status
 LS: Phakic VS: Vitreous body LVC: Untreated
 Ref: --- VA: ---

Biometric values

AL: 22.10 mm (*)	SE: 45.69 D	TSE: 45.02 D
ACD: 2.64 mm	K1: 44.66 D @ 169°	TK1: 44.85 D @ 169°
LT: 2.86 mm	K2: 46.90 D @ 79°	TK2: 47.26 D @ 79°
WTW: 11.1 mm	AK: +2.36 D @ 79°	ATK: +2.40 D @ 79°
P: 5.2 mm	IC: +0.2 mm	IC: +0.0 mm
	CW-Chord 0.2 mm @ 121°	



(*) Borderline value
 Comment

(*) Borderline value (*) Value was edited manually -- No value measured
 Comment



Picture source: Carl Zeiss Meditec Media Database

Reference Image

Options for report – Implantation axis or steep axis to be printed

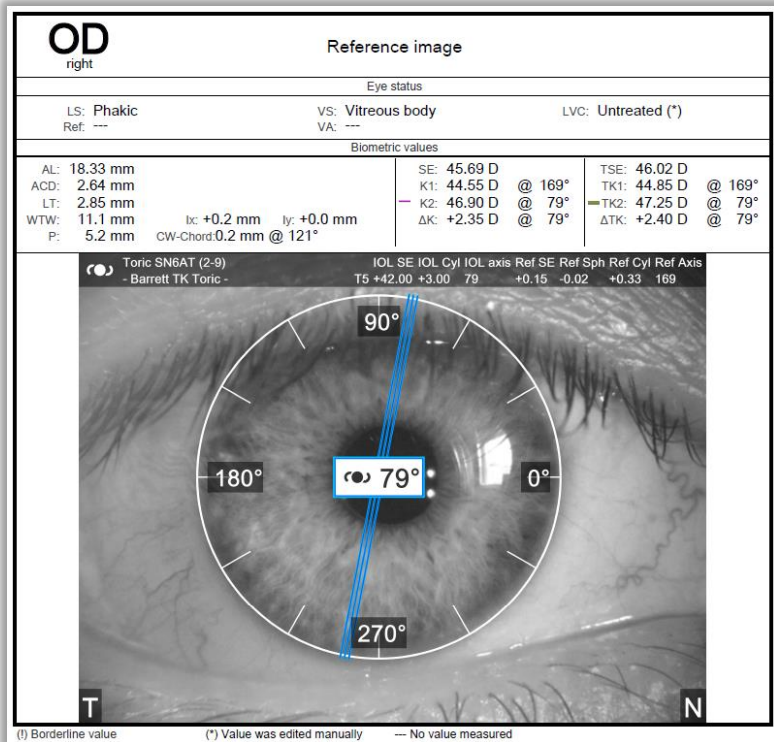


Chosen IOL

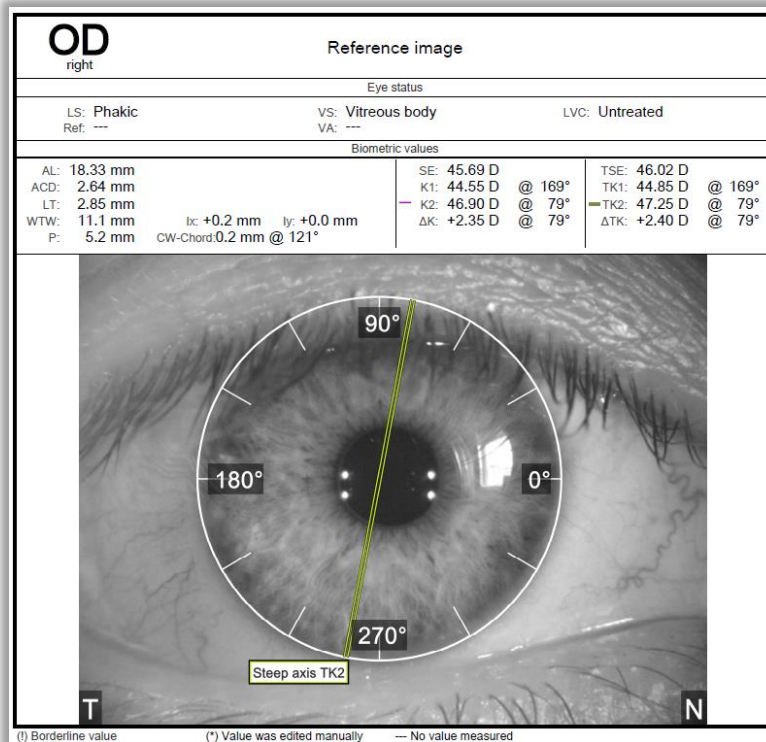


Total Keratometry

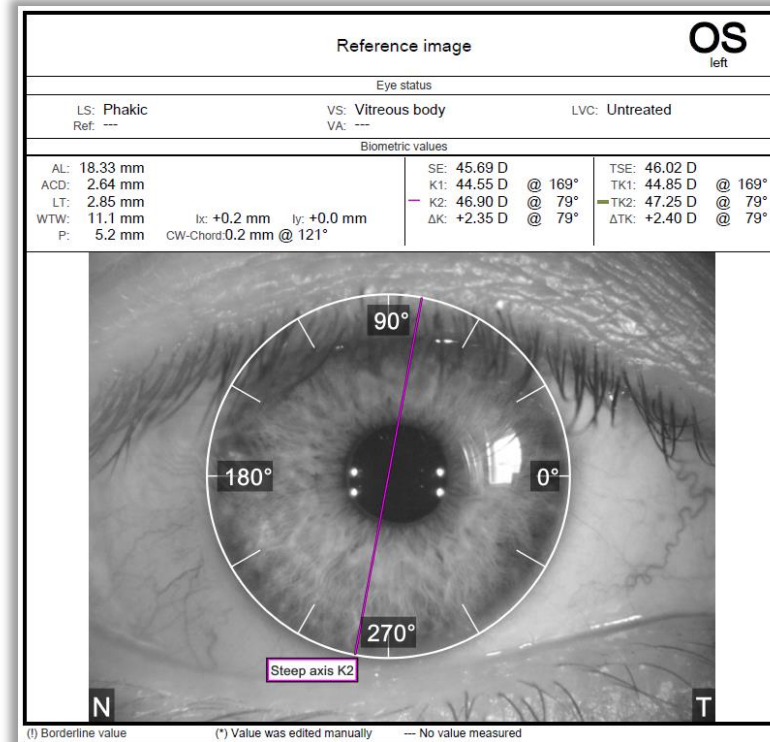
Keratometry



3 Blue Lines
CALLISTO implantation axis



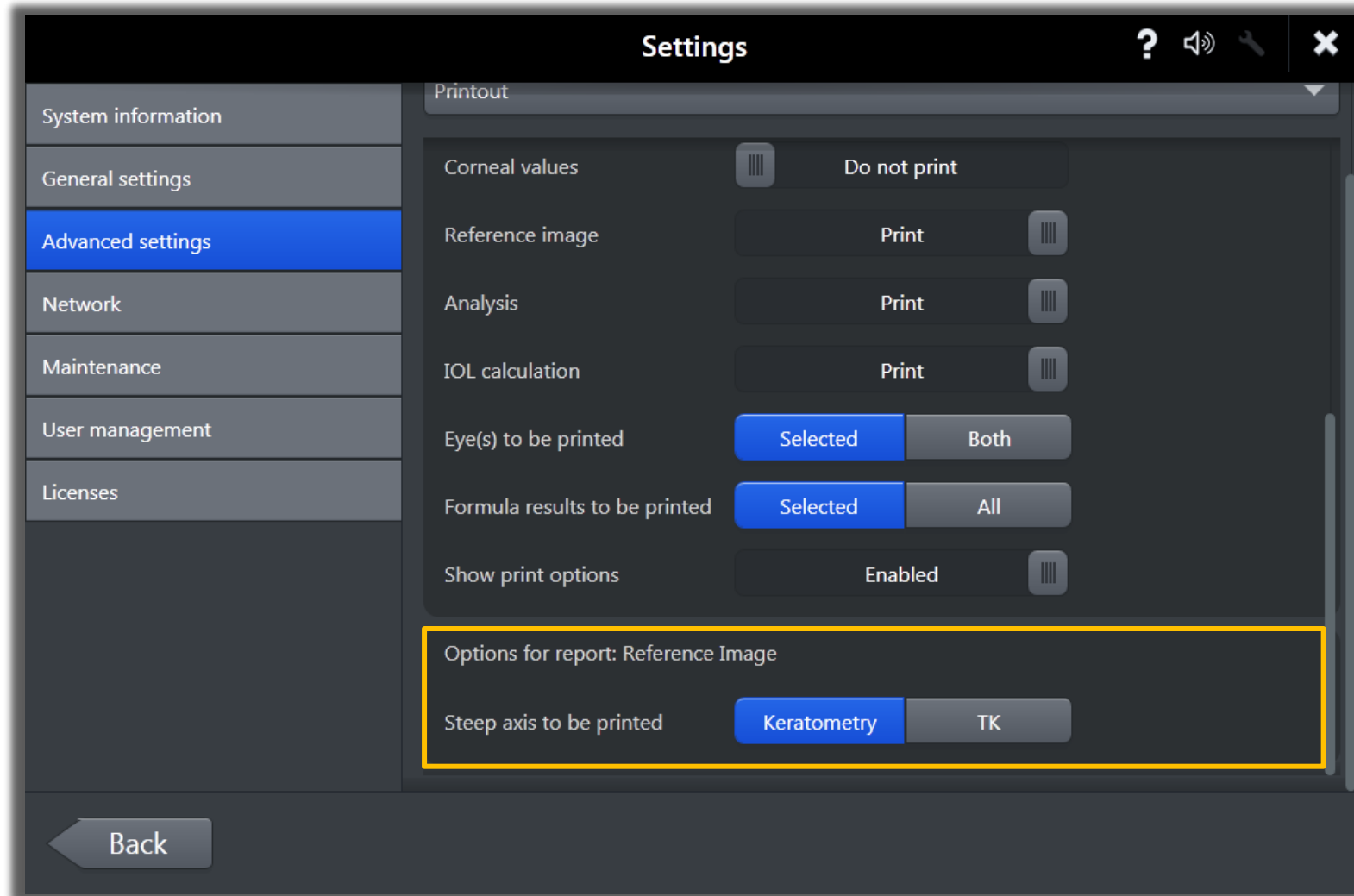
2 Green Lines
Total Keratometry steep axis
(2 surfaces - anterior & posterior)



1 Purple Line
Keratometry steep axis
(1 surface - anterior)

Reference Image

Options for report – Implantation axis or steep axis to be printed



Online User Help

Context Sensitive Help Menu



The screenshot displays the IOLMaster 700 software interface. At the top, the breadcrumb navigation shows 'Patient > Measurement > Analyze > IOL calculation'. A yellow circle highlights a question mark icon in the top right corner of the 'Analyze' window. The main display area shows a patient ID of '001', age '60 years', and eye selection buttons for 'OD' and 'OS'. On the left, a list of biometric parameters is shown, including AL (18.33 mm), SE (45.69 D), K1 (44.55 D), K2 (46.90 D), ΔK (+2.35 D), TSE (46.02 D), TK1 (44.85 D), TK2 (47.25 D), ΔTK (+2.40 D), PSE (-5.81 D), PK1 (-5.68 D), PK2 (-5.95 D), ΔPK (+0.28 D), ACD (2.64 mm), LT (2.85 mm), and CCT (475 μm). The central display shows a B-scan image with a note: 'OD: Fixation Check! Axial length values slightly inconsistent. Unstable fixation? OD: Axial length of right eye: 18.33 mm. - Note: short eye.' Below the B-scan are images for Keratometry, WTW, Sclera, and Fixation, each with a green checkmark indicating successful measurement. A 'Composite' button is visible at the bottom left. A context-sensitive help menu is overlaid on the right, showing a navigation tree with 'Analyze' selected. The help content for 'Analyze' includes instructions on how to open the dialog and a list of items displayed: captured images, measurement marks, signal quality indicators, warnings, measured values, and standard deviation values. A 'Close' button is at the bottom right of the help menu.

001 60 years OD OS

AL 18.33 mm SD: 0 μm
SE 45.69 D SD: 0.00 D
K1 44.55 D 169° SD: 0.00 D
K2 46.90 D 79° SD: 0.00 D
ΔK +2.35 D 79°
TSE 46.02 D SD: 0.00 D
TK1 44.85 D 169° SD: 0.00 D
TK2 47.25 D 79° SD: 0.00 D
ΔTK +2.40 D 79°
PSE -5.81 D SD: 0.00 D
PK1 -5.68 D 169° SD: 0.00 D
PK2 -5.95 D 79° SD: 0.00 D
ΔPK +0.28 D 169°
ACD 2.64 mm SD: 0 μm
LT 2.85 mm SD: 0 μm
CCT 475 μm SD: 0 μm
WTW 11.1 mm

Note
OD: Fixation Check! Axial length values slightly inconsistent. Unstable fixation?
OD: Axial length of right eye: 18.33 mm. - Note: short eye.

B scan CCT ✓ ACD ✓ LT ✓ AL ✓

Keratometry ✓ TK ✓ WTW ✓ Sclera ✓ Fixation

Composite Single Enhanced scan display

Patient manager Measure IOL c

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Analyze

In the "Analyze" dialog window, B-scans, more images and measured values are displayed to support the in evaluating the measurement. In this window, the user must check whether the measured values are plausible and consistent for both eyes (if both OD and OS were measured).

By tapping on the [Analyze] button in the "Measurement" dialog window, the "Analyze" dialog window will be opened after measurement and prior to IOL calculation. The "Analyze" dialog window can also be opened after IOL calculation.

The images of biometric scans, keratometry, WTW and sclera as well as the fixation check scans are displayed separately for the right and left eye. The following items are shown in the Analyze display:

- Captured images
- Measurement marks shown as an overlay on the images
- Signal quality indicators (green, yellow or red)
- Warnings
- measured values
- standard deviation (SD) values of several individual measurements

All elements are relevant to evaluate measurement quality. In addition to the general appearance of the images the user should check whether there are distorted or missing parts in the keratometry image, whether the eyelid was closed in one of the images, whether the foveal pit is missing, or whether unusual morphologies are present in the fixation check scan. Details for assessing the individual images are given below.

The correct positioning of the measurement marks in the images must be checked. Details for assessing the individual images are given below.

Close

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- 2 Total Keratometry (TK)
- 3 GUI - Measurement, Analyze
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Total Keratometry (TK) Websites



- **IOLMaster 700 website** www.zeiss.com/IOLMaster
- **Total Keratometry website** www.zeiss.com/tk
- **ZEISS Cataract Community** <https://cataract-community.zeiss.com/>
- **IOL Constants**
 - ULIB <http://ocusoft.de.ulib/c1.htm>
 - IOLCon <http://iolcon.org/>



Picture source: Carl Zeiss Meditec Media Database



Seeing beyond