Starting your workflow with more insights
ZEISS IOLMaster 700 with Central Topography
Agenda

1. Introduction
2. Corneal Topography
3. ZEISS IOLMaster 700 with Central Topography
4. EQ Mobile Connectivity
5. Key Messages
Starting your workflow with more insights
ZEISS IOLMaster 700 with Central Topography

With no changes in workflow, the ZEISS IOLMaster 700 now measures
Central Topography
Starting your workflow with more insights
ZEISS IOLMaster 700 with Central Topography

- Central Topography provides information on central corneal shape - right from the start!
- It gives central corneal shape information **before** deciding on the IOL and consulting the patient
- Surgeons have a more comprehensive data at hand right away …
  - … without extra hardware
  - … with no change in workflow
  - … without additional measurement
  - … easy and intuitively
Starting your workflow with more insights
ZEISS IOLMaster 700 with Central Topography

• An important part of the preoperative evaluation of the cataract patient is evaluation of corneal topography
• Regardless of IOL type but especially for toric & multifocal IOLs
• Corneal irregularities in the central optical zone are regarded as visually relevant
• With no changes in workflow, the ZEISS IOLMaster 700 now measures central corneal topography.
• It provides anterior and total axial power maps, designed to detect visually relevant corneal irregularities.

<table>
<thead>
<tr>
<th>Total Power Map</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pupil Diameter</td>
</tr>
<tr>
<td>Topography Diameter</td>
</tr>
<tr>
<td>Step</td>
</tr>
</tbody>
</table>

49.5 44.0 38.5
Getting Central Topography without additional measurements
No change to existing workflow

- Central Topography is integrated in the ZEISS IOLMaster 700 standard measurement.
- < 45 sec for both eyes
- Including Biometry, Total Keratometry, and Central Topography
Starting your workflow with more insights
ZEISS IOLMaster 700 with Central Topography

Your benefits at a glance

- Integrating topography in your daily biometry routine without changing your workflow or hardware
- Detecting visually relevant corneal asymmetries
- Reading central cornea shape information easily and intuitively
What do surgeons say?

“Scaling and hues of the ZEISS IOLMaster 700 with Central Topography are optimized for easy and intuitive cornea checks.”

“I am amazed at how much information we get from Central Topography.”

Douglas D. Koch, Houston, TX, USA
In this presentation, several leading ophthalmic surgeons provide insight on how to nail refractive outcomes in cataract surgery. They detail new surgical technologies and techniques (including Central Topography), and offer guidance on making treatment decisions.


• Presenting Faculty

Eric Donnenfeld, MD  
OCLI Vision  
Garden City, NY  
Moderator

Cynthia Matossian, MD  
Matossian Eye Associates  
Pennington, NJ  
Moderator

Ike Ahmed, MD  
Omega Ophthalmics  
Toronto, Canada

Ed Hu, MD  
Illinois Eye Center  
Peoria, IL

Douglas Koch, MD  
Baylor College of Medicine  
Houston, TX

Yuri McKee, MD  
East Valley Ophthalmology  
Mesa, AZ

Rolando Toyos, MD  
Toyo’s Clinic  
Germantown, TX
Global Premium Cataract Webinar
ZEISS Ophthalmic Surgery Webinar

ADDITIONAL PRELIMINARY TEST FOR CATARACT REFRACTIVE SURGERY: INCREMENTAL ACCURACY IN PATIENT OUTCOME

To view all webinars: https://www.gotostage.com/channel/ophthalmic-surgery-webinar-recordings

23 JUNE 2020 | 12:00 PM (GMT+2)

- DRY EYE MANAGEMENT AND ITS IMPACT ON BIOMETRIC MEASUREMENT
- INFLUENCE OF TOPOGRAPHY ON YOUR OUTCOMES
- CASE PRESENTATIONS
- Q&A

PROF. DR. MICHAEL LAWLESS
Consultant Ophthalmic Surgeon, Vision Eye Institute, Australia

DR. HAN BOR FAM
Senior Consultant, Tan Tock Seng Hospital, Singapore
• ULIB will no longer be maintained.
• ULIB constants have been moved to the IOLCon. ([www.IOLCon.org](http://www.IOLCon.org))
• IOLCon is a database independent of ZEISS.
• IOLCon allows:
  • manufacturers to provide their IOL constants and specifications,
  • hosts the ULIB constants, and
  • offers constant optimization.

• With ZEISS IOLMaster 700 SW1.90, IOLCon can now be transferred to the IOLMaster via an automated export/import function (USB).
**Clinical results**

**New:**

**Total Keratometry in Intraocular Lens Power Calculations in Eyes With Previous Laser Refractive Surgery**

Michael Lawless¹ ², James Y Jiang³, Chris Hodge¹ ² ⁴, Gerard Sutton¹ ², Timothy V Roberts¹ ², Graham Barrett⁵ ⁶ ⁷

- “The Barrett True K (TK) provided the lowest mean refractive prediction error and variance for both prior myopes and hyperopes undergoing cataract surgery.”

- “The Barrett True K (TK) exhibited the highest percentages of eyes within ±0.50D, ±0.75D and ±1.00D of the refractive prediction error compared to other formulae for prior myopic patients.”

- “Accuracy of IOL power calculations in post-laser eyes can be improved by the addition of posterior corneal values as measured by the IOLMaster 700.”


*In post-myopic LASIK eyes, Barrett True K with TK improved the outcome prediction compared to Barrett True K with classic K’s within ±0.5 D by >12% (p = 0.04)*

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Carl Zeiss Meditec AG, ZEISS IOLMaster 700 with Central Topography
ZEISS IOLMaster 700 with Central Topography
Feature Overview

1. Starting your workflow with more insights.
ZEISS IOLMaster 700 with Central Topography.

2. Data access anywhere
ZEISS IOLMaster 700 with ZEISS EQ Mobile.

3. Getting 12% more post myopic LASIK patients within 0.5D.
ZEISS IOLMaster 700 with Barrett True K with TK Formula.

4. Accessing the latest up to date IOL constants
ZEISS IOLMaster 700 with IOLCon import.

Plus upgrade to WIN 10
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5. Key Messages
A non-invasive medical imaging technique for mapping the surface curvature of the cornea, providing a detailed description of various curvature and shape characteristics of the cornea.

- Prior to this technology, the standard of care for measuring corneal curvature was the manual keratometer, which measures approximately 3mm of the cornea.

- The advantage of corneal topography is the ability to measure a wider area of the cornea and is able to quantify irregular astigmatism, which cannot be done with a manual keratometer.
Corneal Topography

Regular cases

80% of all corneas: Standard cases – Keratometry works

Topography

Keratometry

Round

Regular Astigmatism

Spheric

Toric
Corneal Topography
Irregular cases

20% of all corneas: Special cases – additional topography

Topography

Keratoconus

Irregular Astigmatism

Keratoplastic

Multifocal IOL? Toric IOL?

Keratometry

Toric

Toric

Toric
Corneal Topography
Detecting irregularities

Corneal topography is most commonly used for the following purposes:

- Detect irregularities of the cornea (i.e. irregular astigmatism or pathologies).
- Important for premium IOLs (i.e. toric and multifocal IOLs) → Determine if the astigmatism is ‘regular’ or ‘irregular’ to know if patient is a good candidate (standard keratometers cannot make this determination).

- **Regular astigmatism**: principle meridians are 90 degrees away from each other (eg. WTW, ATR)
- **Irregular astigmatism**: axes not 90 degrees from each other
Corneal Topography
Corneal patterns – what do they mean?

Symmetric patterns
Asymmetric patterns
Skewed patterns
Special patterns

Abbreviations:
SB = symmetric bowtie; SS = superior steep;
AB/SS = asymmetric bowtie superior steep; IS = inferior steep; AB/IS = asymmetric bowtie inferior steep;
SB/SRAX = symmetric bowtie with skewed radial axis index; AB/SRAX = asymmetric bowtie with skewed radial axis index

Source: Dr. Han Bor Fam
Corneal Topography
Colored maps – what do they mean?

Corneal topographers measure surface curvatures then present the information in the form of a colored map.

- **BLUE** - Cool colors = FLATTER curvature or BELOW average height.
- **GREEN** - Medium colors = NORMAL curvature or AVERAGE height.
- **RED/ORANGE** - Hot colors = Steeper curvature or above average height.
- **BLACK** - NO information = Lid, lash, lack of tear film or severe pathology.

Intermediate colors - white, aqua, yellow and orange are transition areas on the cornea
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1. The **anterior axial power map** represents total corneal power, assuming a fixed ratio of anterior to posterior curvature and normal corneal thickness.

2. The **total axial power map** represents total corneal power, replacing assumptions about the posterior corneal surface and pachymetry with measurements.

**Generally, axial maps:**
- Simple way of describing the overall shape of the cornea
- Displays astigmatism (regular or irregular)
- Most common, intuitive map to understand
Providing central anterior axial power maps
Using 18 telecentric spot locations

Measurement of the *anterior corneal curvature or power*

- The IOLMaster 700 Telecentric Keratometry directly measures surface slopes on 18 spot locations.
- This results in high independence from system misalignment.
- Every spot is a fully individual and independent measurement (no skew error as Placido!)
- The measured curvatures (r) are converted to powers (D) via the chosen keratometric index.
- Thus, the anterior axial power map represents total corneal power, assuming a fixed ratio of anterior to posterior curvature and normal corneal thickness.
Providing central total axial power maps
Using 18 telecentric spot locations and SWEPT-Source OCT

Measurement of the total corneal curvature or power

- Additionally to the anterior surface model, pachymetry and posterior surface curvatures are measured by SWEPT-Source OCT in 6 meridians.
- The measured curvatures (r) are converted to powers (D) via the refractive indices of the cornea and the aqueous, including corneal thickness.
- Thus, the total axial power map represents total corneal power, replacing assumptions about the posterior corneal surface and pachymetry with measurements.
Scaling and hues of the ZEISS IOLMaster 700 with Central Topography are optimized for easy and intuitive cornea checks
Co-Developed with Douglas D. Koch and Li Wang, Houston

- **Extended Color Scale (based on ISO 19880)**
  - 34 D to 54 D range; 0.5 D steps; 41 colors
    - Default color scale window: 39..49 D (10 D range, 21 colors)
    - Extreme cases color scale window moved up/down on very steep/flat corneas (>49 D / <39 D)
    - Color scale window extended on highly aberrated corneas (>10 D range → >21 colors)
  - **Green always 44 D and always displayed**
  - Diameter of analysis is displayed

*According to ISO 19980 standard, the hue changes monotonically from green to red and shall change monotonically from green to blue.
In extreme cases color scale window automatically adjusted
For corneas >49 D / <39 D
ZEISS IOLMaster 700 with Central Topography
Anterior and Total axial power maps

User can set Preferred Central Topography map

Settings menu > Advanced settings > Parameters, units

Extended Color Scale
Step size (D)
Topography diameter (mm)
Toggle between anterior and total axial power maps
## ZEISS IOLMaster 700 with Central Topography

### Keratometry & Central Topography Overview

<table>
<thead>
<tr>
<th>Device</th>
<th>ZEISS IOLMaster 700</th>
</tr>
</thead>
<tbody>
<tr>
<td>Keratometry</td>
<td>Anterior, posterior and Total Keratometry (TK)</td>
</tr>
<tr>
<td>Telecentric Keratometry</td>
<td>•</td>
</tr>
<tr>
<td>Topography</td>
<td>Anterior and total</td>
</tr>
<tr>
<td><strong>Method of topography</strong></td>
<td><strong>3-zone Keratometry (18 LED) and SS-OCT</strong></td>
</tr>
<tr>
<td>Diameter of Topography</td>
<td>3.4 – 5.4mm for corneal radii of 6 – 11mm</td>
</tr>
<tr>
<td>Pupil diameter</td>
<td>•</td>
</tr>
<tr>
<td><strong>Topography maps</strong></td>
<td><strong>Anterior and total axial power map</strong></td>
</tr>
<tr>
<td>Color scale</td>
<td>34D to 54D range; 0.5D steps; 41 colors; Green always 44D and always displayed; steps and colors can’t be changed</td>
</tr>
</tbody>
</table>

**Telecentric Keratometry + SS-OCT based topography → Reals Ks, not Sim Ks**
Starting your cataract workflow with more information
ZEISS IOLMaster 700 with Central Topography

Cases of
Regular Astigmatism

Cases of
Irregular Pathological Astigmatism

Cases of
Irregular post LVC Astigmatism
Comparing Central Topography to a dual-Scheimpflug / Placido device
ZEISS IOLMaster 700 vs. Ziemer Galilei G4

Approx. 4 mm diameter
ZEISS IOLMaster 700

Approx. 4 mm diameter
Galilei G4

9 mm diameter
Galilei G4

DOCTOR’S CONCLUSION: Excellent Comparability

• With-the-rule astigmatism: normal range of power, meridians straight
• Minimal color differences, low amount of astigmatism
• Same decision for toric or multifocal IOL

Data Source and interpretation: Li Wang & Douglas D. Koch, USA
Comparing Central Topography to a dual-Scheimpflug / Placido device
ZEISS IOLMaster 700 vs. Ziemer Galilei G4

DOCTOR’S CONCLUSION: Great comparability
• Irregular astigmatism, inferior steepening (“lazy-eight”) visible on both devices
• Same decision for toric or multifocal IOL

Approx. 4 mm Diameter
ZEISS IOLMaster 700

Approx. 4 mm Diameter
Galilei G4

9mm Diameter
Galilei G4

Data Source and interpretation: Li Wang & Douglas D. Koch, USA
Comparing Central Topography to a dual-Scheimpflug / Placido device
ZEISS IOLMaster 700 vs. Ziemer Galilei G4

DOCTOR’S CONCLUSION: Good comparability

- Irregular astigmatism on central topography, shape of Central Topography from ZEISS IOLMaster 700 is similar to the Galilei map
- No straight meridians: irregular
- Steep and irregular: Be careful!
- Same decision for toric or multifocal IOL
Comparing Central Topography to a dual-Scheimpflug / Placido device
ZEISS IOLMaster 700 vs. Ziemer Galilei G4 – Case report: previous myopic LASIK/PRK

DOCTOR’S CONCLUSION: Good comparability

- Flat cornea, irregular and against-the-rule astigmatism (Blue color, meridians not straight, “lying eight“)
- Flat, ATR and meridians not straight both are a warning in itself to check further
- Same decision for toric or multifocal IOL

Data Source and interpretation: Li Wang & Douglas D. Koch, USA
Comparing Central Topography to a dual-Scheimpflug / Placido device
ZEISS IOLMaster 700 vs. Ziemer Galilei G4 – Case report: previous hyperopic LASIK/PRK

DOCTOR’S CONCLUSION: Good comparability

- Central steep cornea on central topography
- Overall shape similar to the Galilei map
- Galilei shows peripheral flattening
- IOLM K astigmatism: 0.38 D @ 15° | Galilei SimK astigmatism: 0.29 D @ 28°

Data Source and interpretation: Li Wang & Douglas D. Koch, USA
Corneal information you can trust
ZEISS IOLMaster 700 with Central Topography

Measurement 1
Subject 1
IOLMaster 700

Measurement 2
Subject 1
IOLMaster 700

Measurement 3
Subject 1
IOLMaster 700

Measurement 1
Subject 2
IOLMaster 700

Measurement 2
Subject 2
IOLMaster 700

Measurement 3
Subject 2
IOLMaster 700

Data Source: ZEISS
Corneal information you can trust
ZEISS IOLMaster 700 with Central Topography vs. Pentacam AXL

Measurement 1

Measurement 2

Measurement 3

IOLMaster 700
4.2 mm

Pentacam AXL
9 mm
(approx. 4 mm black circle)

Data Source: ZEISS
The ZEISS IOLMaster 700 is indicated to aid clinicians with IOL selection. While clinicians may find Central Topography feature to be helpful in their decision-making process, topographers should be used as primary devices for topographical decisions. The information presented in this presentation was an opinion of Dr. Douglas D. Koch (clinician). Douglas D. Koch has a contractual or other financial relationship with Carl Zeiss Meditec AG and its affiliates and has received financial support for consulting activities.
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**ZEISS EQ Mobile**
A FORUM and cloud based software solution including a mobile app for iPhone and iPad

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**What is ZEISS EQ Mobile:**
ZEISS EQ Mobile provides a flexible and secure data transfer to ZEISS CALLISTO eye via the cloud-based ZEISS EQ Mobile app
→ Replace paper and USB sticks
→ Streamline your cataract refractive workflow

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**Benefits**
1. **Secure astigmatism management workflow** via cloud connectivity
2. **Peace of mind and increased safety**. Surgical data becomes automatically available where and when needed
3. **Avoid critical workflow events during the surgery** by automatic inclusion of comprehensive surgical planning via the cloud and allowing digital IOL confirmation in the OR
4. **Facilitated surgical documentation** by automated surgery reports

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**Features**
1. **Flexible and secure data access** on iPad and iPhone – anywhere, anytime, independent of the location of surgery
2. **Easy wireless data transfer** to/from ZEISS CALLISTO eye in the OR via ZEISS EQ Mobile cloud
3. **Digital IOL confirmation** via QR/barcode scan for ZEISS IOLS or photo documentation for non-ZEISS IOLs
4. **Surgery report** from ZEISS CALLISTO eye, transferred back to ZEISS FORUM
ZEISS EQ Mobile Connectivity
Supporting different use cases within the ZEISS Cataract Suite with/without ZEISS FORUM

*EQ Mobile 1.7 is still in development and not yet released.*
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Seeing beyond