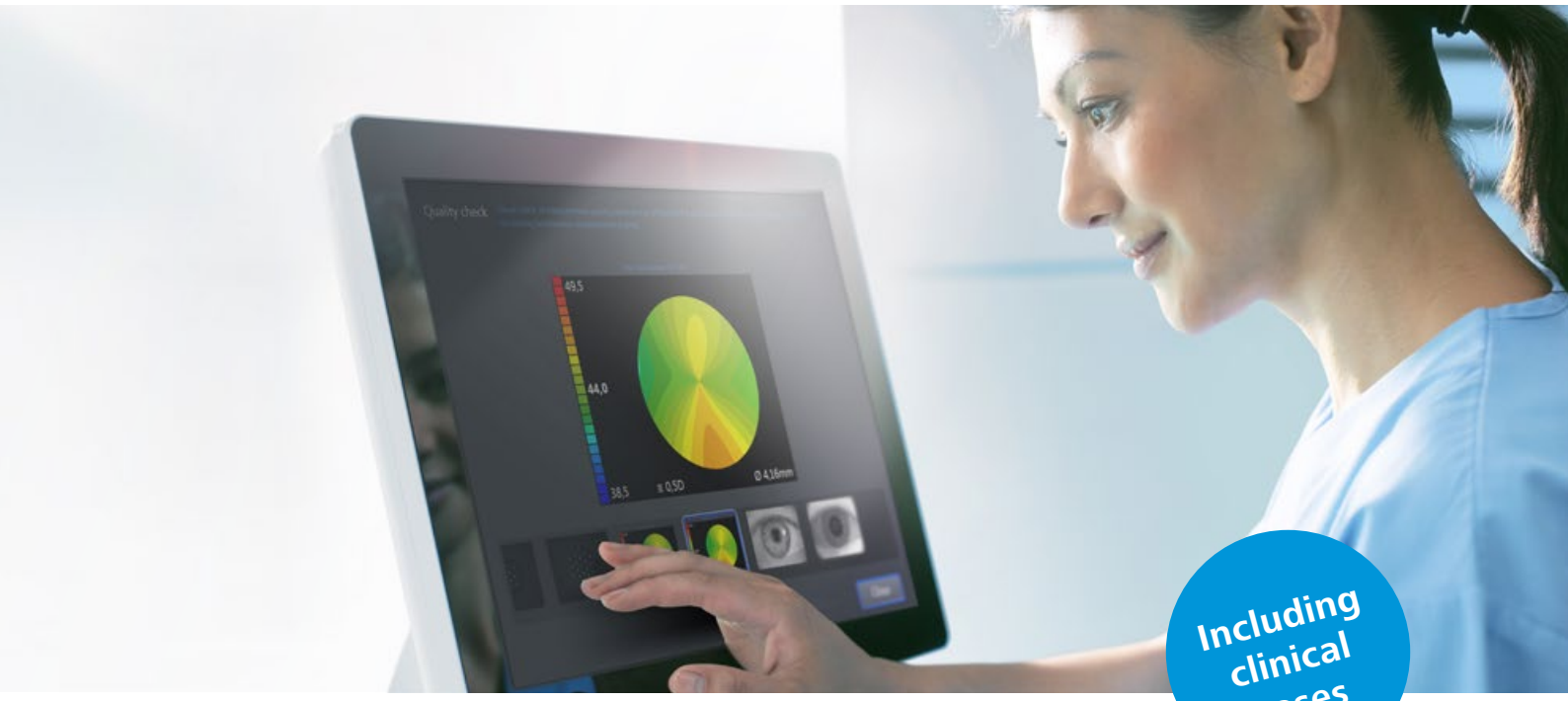
Compendium

ZEISS IOLMaster 700

with Central Topography



ZEISS

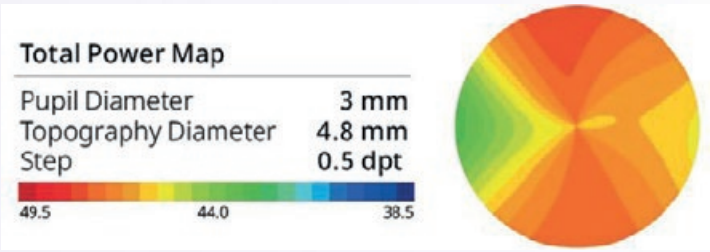
Seeing beyond

Introducing the ZEISS IOLMaster 700

with Central Topography

The IOLMaster® 700 from ZEISS with Central Topography provides important insights on the central corneal shape to detect visual relevant irregularities, which cannot be accomplished by keratometry alone.

Central Topography is integrated into the standard biometry measurement of the ZEISS IOLMaster 700, with the advantage that surgeons do not need an additional hardware to their current ZEISS IOLMaster 700.



The total power map (from anterior AND posterior surface of the cornea) supplements the known biometric analysis of ZEISS IOLMaster 700.

"It is remarkable how much clinically relevant corneal information we can get from the Central Topography on the IOLMaster 700."

Michael Lawless, MD, Australia

At a glance

Central Topography of the ZEISS IOLMaster 700 provides anterior and total axial power maps based on its telecentric measurement principle and SWEPT Source OCT. This existing feature enables repeatable and reliable keratometry as well as anterior and total central topography values.

Content

What is Central Topography?

Generally a corneal topography feature is an important non-invasive tool to visualize corneal shape characteristics as a decisive advantage to aid in IOL selection as it allows a clinician to preliminarily visualize corneal asymmetries.*

Central Topography of the ZEISS IOLMaster 700 provides anterior and total axial power maps based on its telecentric measurement principle and SWEPT Source OCT.

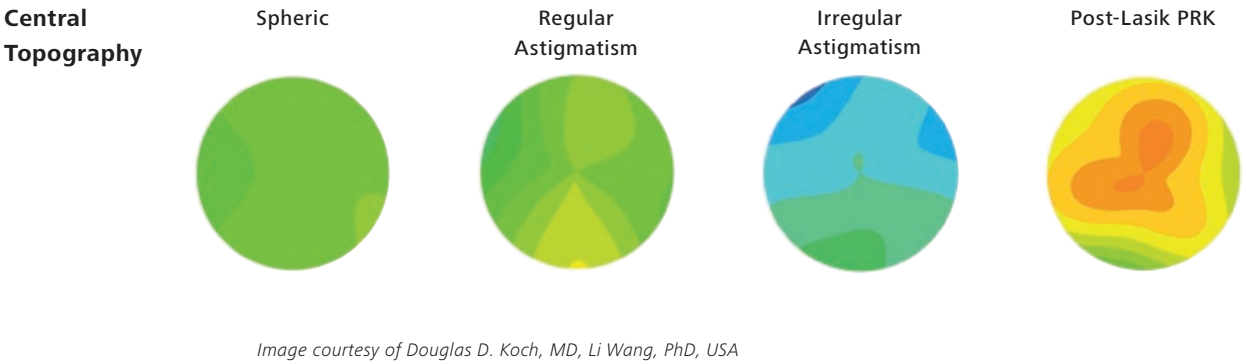
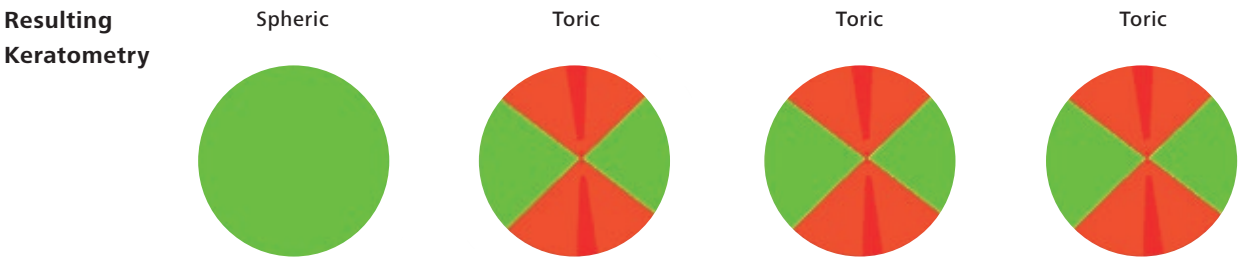


Image courtesy of Douglas D. Koch, MD, Li Wang, PhD, USA



> Central Topography provides visually relevant information on central corneal shape that cannot be detected with keratometry alone, e.g. information on corneal irregularities and overall shape

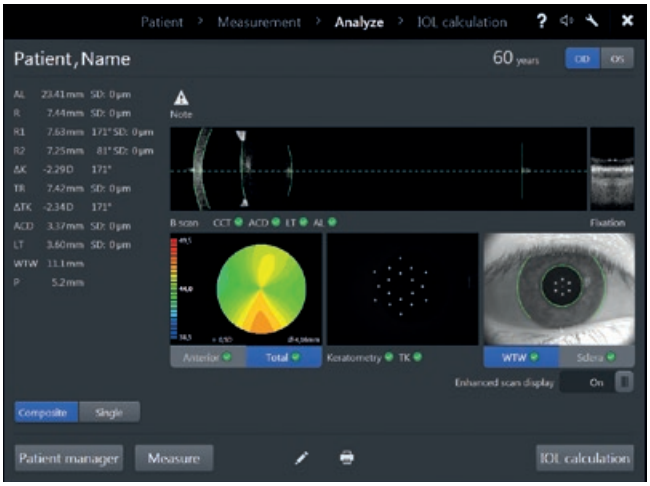
**Please note that Central Topography is not intended to replace a topographer*

At a glance
ZEISS IOLMaster with Central Topography provides important insights on the central corneal shape, which cannot be accomplished by keratometry alone.

Start your workflow
with more insights

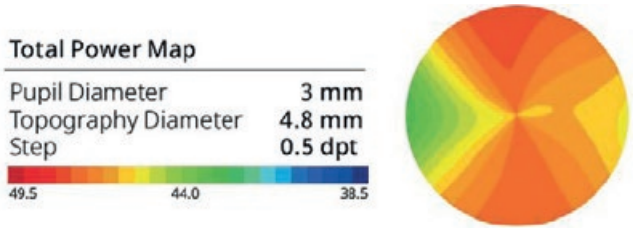
Central Topography is designed to provide you with more insights when you start your workflow and before you decide on the IOL and consult with your patient.
It is integrated into the standard biometry measurement of the ZEISS IOLMaster 700, with the advantage that surgeons do not need any additional hardware to their current ZEISS IOLMaster 700. The full biometry measurements including Central Topography can be obtained in less than 44 seconds for both eyes.

Central Topography allows easy reading of central corneal shape information. The scaling and hues have been developed in cooperation with Douglas D. Koch, MD, and Li Wang, PhD, USA.



Screenshot of the ZEISS IOLMaster 700 showing Central Topography as part of the biometry measurement

Successful implementation of toric and multifocal IOLs requires regular corneal curvature within the central zone. Central Topography provides central corneal shape information and detects visually relevant corneal asymmetries before deciding on the IOL and consulting the patient.



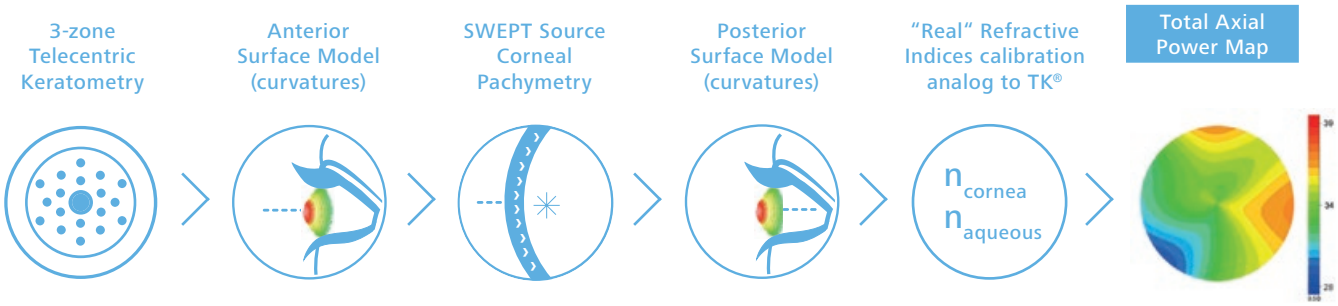
The total power map (from anterior AND posterior surface of the cornea) supplements the known biometric analysis of ZEISS IOLMaster 700.

At a glance
Central Topography is easy to use without interrupting the cataract workflow.

What is the technology
behind Central Topography?

The ZEISS IOLMaster is the only biometer using a unique distance-independent telecentric measurement principle with SWEPT Source OCT. It provides robust and precise corneal curvature measurement at each of the 18 measured spots. This existing feature enables repeatable and reliable keratometry as well as anterior and total central topography values.

- Anterior curvature is directly converted into local refractive power using the corneal keratometric index as chosen by the user
- The anterior surface model is combined with corneal thickness measurements from SWEPT Source OCT technology to create a posterior surface model
- Anterior and posterior surface model are used to create a total axial power map



Using its 18 measurement points ZEISS IOLMaster 700 combines a unique telecentric measurement principle with SS-OCT to create a total axial power map.

Keratometry measures corneal curvature and builds a surface model from the available measuring points.
ZEISS IOLMaster 700 is the only biometer creating a Central Topography using 3-zone Telecentric Keratometry data.

At a glance
ZEISS IOLMaster 700 with Central Topography combines keratometry data from the 3-zone Telecentric Keratometry with data of the corneal thickness measurement of the SWEPT Source OCT to create a total power map from the anterior and posterior corneal surface.

What is the benefit
of Central Topography?

Central Topography provides details on the central corneal shape, right at the beginning of your workflow which allows you to optimize your clinical decision-making for IOL selection.

The main benefits:

- Add Central Topography to biometry and keratometry
- Gain additional valuable insights on central corneal shape, taking anterior and posterior power into account
- Detect visually relevant corneal irregularities
  - No extra measurement
  - No extra time: complete biometry measurement including Central Topography for both eyes in < 44 sec*
  - No extra hardware
  - Easy interpretation

**depending on experience of operator and eye conditions*

Wang et al. (inculding D. Koch) (Wang et al.) compared Central Topography maps to topographic maps from a Placido-dual-Scheimpflug Topographer. This study included 105 eyes with various corneal conditions such as regular/irregular corneas, previous corneal refractive surgery and keratoconus or pellucid marginal degeneration. In 68.6 – 89.5 % similar overall shape was observed which leads to the same decision for premium IOL selection in 75.2 – 97.1 % of cases..

At a glance
ZEISS IOLMaster 700 with Central Topography provides you with more information on the central corneal shape right from the start without changing your workflow or taking more of your valuable time.

"Scaling and hues of the ZEISS IOLMaster 700 with Central Topography are optimized for easy and intuitive corneal evaluation."

Douglas D. Koch, MD, USA

Clinical cases

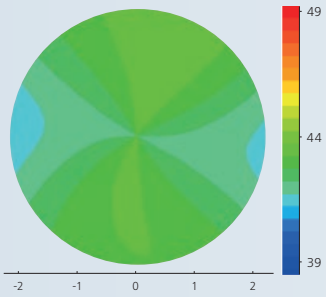
The following overview of clinical cases includes a 9 mm topography map (Dual-Scheimpflug / Placido device and Scheimpflug device) and a 4 mm extract of this map to evaluate the comparability of the ZEISS IOLMaster 700 Central Topography.
The interpretation was performed by Douglas D. Koch, MD, USA, Li Wang, MD, PhD, USA, Giacomo Savini, MD, Italy and Michael Lawless, MD, Australia.

Case 01

Regular Astigmatism – With-the-rule Astigmatism

ZEISS IOLMaster 700 anterior axial power map

Step: 0.5 D



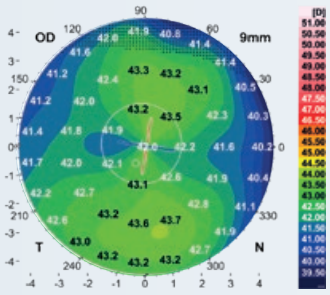
ø approx. 4 mm

Dual-Scheimpflug / Placido device anterior axial power map

ø approx. 4 mm

Dual-Scheimpflug / Placido device anterior axial power map

Step: 0.5 D



ø approx. 9 mm

Dr. Koch's & Dr. Wang's interpretation:

- Normal range of power, meridians straight
- Minimal color differences, low amount of astigmatism
- Same decision for toric or multifocal IOL

Dr. Koch's & Dr. Wang's conclusion:

Excellent comparability

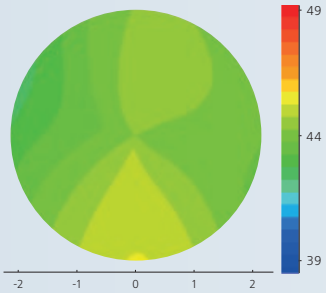
Clinical cases

Case 02

Regular Astigmatism – With-the-rule Astigmatism

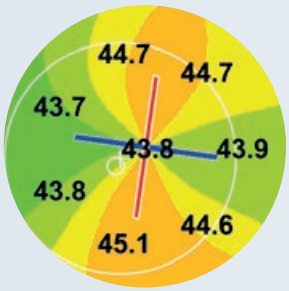
ZEISS IOLMaster 700 anterior axial power map

Step: 0.5 D



ø approx. 4 mm

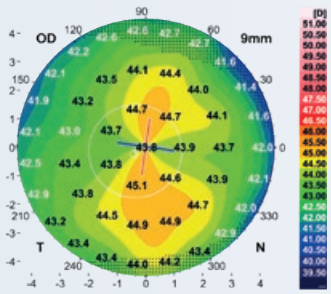
Dual-Scheimpflug / Placido device anterior axial power map



ø approx. 4 mm

Dual-Scheimpflug / Placido device anterior axial power map

Step: 0.5 D



ø approx. 9 mm

Dr. Koch's & Dr. Wang's interpretation:

- Central Topography, overall shape similar to the Dual-Scheimpflug / Placido device map
- Same decision for toric or multifocal IOL

Dr. Koch's & Dr. Wang's conclusion:

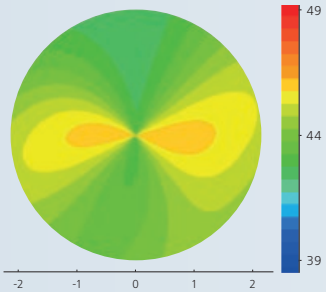
Excellent comparability, however this one has some differences between the two; note the inferior steepening on Central Topography

Case 03

Regular Astigmatism – Against-the-rule Astigmatism

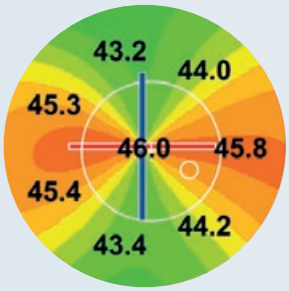
ZEISS IOLMaster 700 anterior axial power map

Step: 0.5 D



ø approx. 4 mm

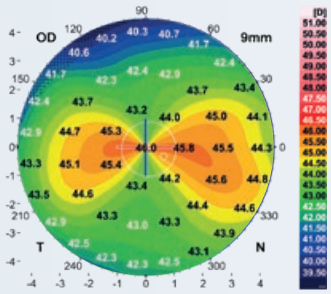
Dual-Scheimpflug / Placido device anterior axial power map



ø approx. 4 mm

Dual-Scheimpflug / Placido device anterior axial power map

Step: 0.5 D



ø approx. 9 mm

Dr. Koch's & Dr. Wang's interpretation:

- Against-the-rule astigmatism on Central Topography, overall shape similar to the Dual-Scheimpflug / Placido device map
- Same decision for toric or multifocal IOL

Dr. Koch's & Dr. Wang's conclusion:

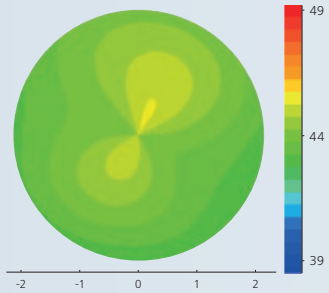
Excellent comparability

Case 04

Regular Astigmatism – Oblique Astigmatism

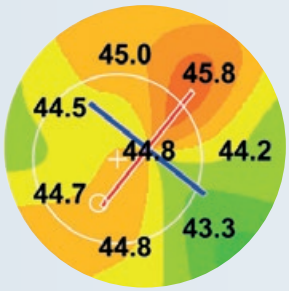
ZEISS IOLMaster 700 anterior axial power map

Step: 0.5 D



ø approx. 4 mm

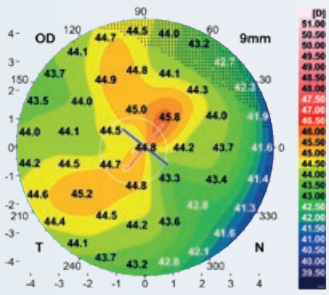
Dual-Scheimpflug / Placido device anterior axial power map



ø approx. 4 mm

Dual-Scheimpflug / Placido device anterior axial power map

Step: 0.5 D



ø approx. 9 mm

Dr. Koch's & Dr. Wang's interpretation:

- Regular oblique astigmatism on Central Topography, overall shape similar to the Dual-Scheimpflug / Placido device map, both images show mild superonasal steepening
- Same decision for toric or multifocal IOL

Dr. Koch's & Dr. Wang's conclusion:

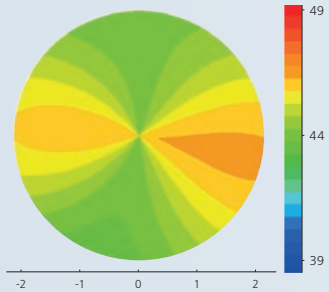
Good comparability

Case 05

Pellucid Marginal Degeneration

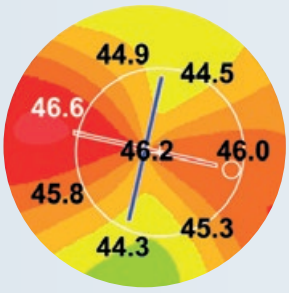
ZEISS IOLMaster 700 anterior axial power map

Step: 0.5 D



ø approx. 4 mm

Dual-Scheimpflug / Placido device anterior axial power map



ø approx. 4 mm

Dr. Koch's & Dr. Wang's interpretation:

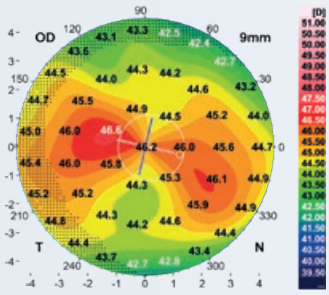
- Against-the-rule astigmatism on Central Topography, overall shape similar to the center of Dual-Scheimpflug / Placido device map
- Same decision for toric IOL, possible different decision on multifocal IOL

Dr. Koch's & Dr. Wang's conclusion:

Central Topography misses mild inferior steepening

Dual-Scheimpflug / Placido device anterior axial power map

Step: 0.5 D



ø approx. 9 mm

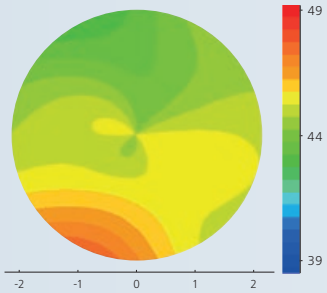
Clinical cases

Case 06

Irregular Pathological Astigmatism

ZEISS IOLMaster 700 anterior axial power map

Step: 0.5 D



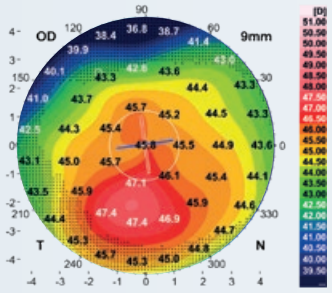
ø approx. 4 mm

Dual-Scheimpflug / Placido device anterior axial power map

ø approx. 4 mm

Dual-Scheimpflug / Placido device anterior axial power map

Step: 0.5 D



ø approx. 9 mm

Dr. Koch's & Dr. Wang's interpretation:

- Small central zone of against-the-rule astigmatism in the Central Topography, not seen with Placido, consistent with the irregular astigmatism
- Dominant feature is the inferior steepening on *both devices* → further investigation required
- Same decision for toric or multifocal IOL

Dr. Koch's & Dr. Wang's conclusion:

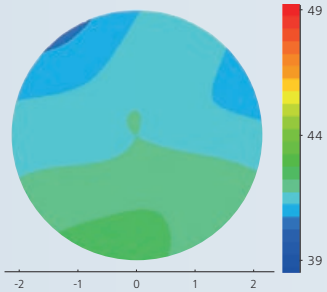
Great comparability

Case 07

Irregular Pathological Astigmatism

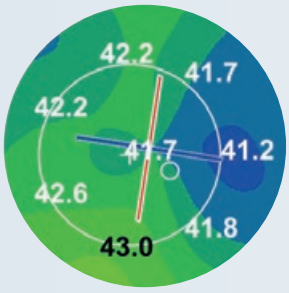
ZEISS IOLMaster 700 anterior axial power map

Step: 0.5 D



ø approx. 4 mm

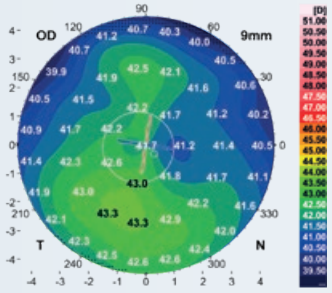
Dual-Scheimpflug / Placido device anterior axial power map



ø approx. 4 mm

Dual-Scheimpflug / Placido device anterior axial power map

Step: 0.5 D



ø approx. 9 mm

Dr. Koch's & Dr. Wang's interpretation:

- Irregular astigmatism on Central Topography, overall shape similar to the Dual-Scheimpflug / Placido device map
- Same decision for toric or multifocal IOL

Dr. Koch's & Dr. Wang's conclusion:

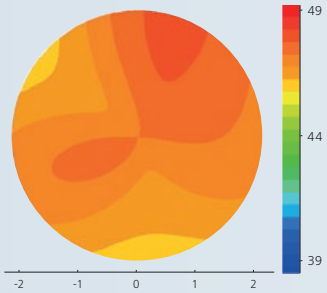
Good comparability

Case 08

Irregular Pathological Astigmatism

ZEISS IOLMaster 700
anterior axial power map

Step: 0.5 D



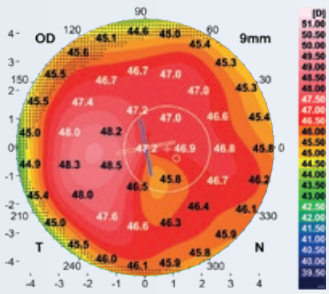
ø approx. 4 mm

Dual-Scheimpflug / Placido device
anterior axial power map

ø approx. 4 mm

Dual-Scheimpflug / Placido device
anterior axial power map

Step: 0.5 D



ø approx. 9 mm

Dr. Koch's & Dr. Wang's interpretation:

- Irregular astigmatism on Central Topography, shape of Central Topography is similar to the Dual-Scheimpflug / Placido device map
- No straight meridians: irregular
- Steep and irregular: Be careful!
- Same decision for toric or multifocal IOL

Dr. Koch's & Dr. Wang's conclusion:

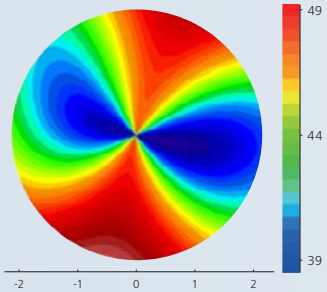
Good comparability

Case 09

Irregular Astigmatism – Post Penetrating Keratoplasty (PKP)

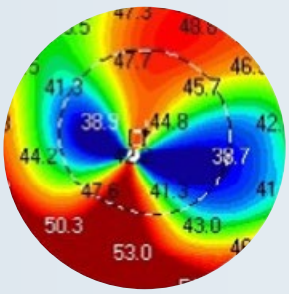
ZEISS IOLMaster 700
anterior axial power map

Step: 0.5 D



ø approx. 4 mm

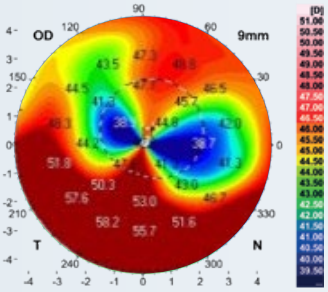
Scheimpflug device
anterior axial power map



ø approx. 4 mm

Scheimpflug device
anterior axial power map

Step: 0.5 D



ø approx. 9 mm

Dr. Lawless' interpretation:

- High amount of astigmatism
- Inferior steepening
- Scheimpflug device map looks similar

Dr. Lawless' conclusion:

Good comparability

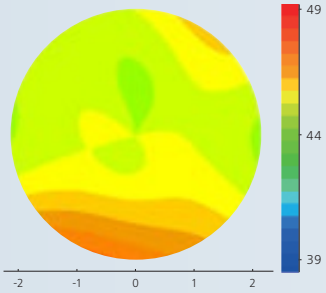
Clinical cases

Case 10

Irregular Astigmatism – Post Penetrating Keratoplasty (PKP)

ZEISS IOLMaster 700
anterior axial power map

Step: 0.5 D



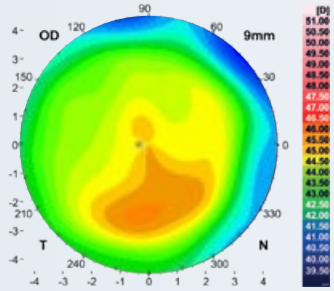
ø approx. 4 mm

Scheimpflug device
anterior axial power map

ø approx. 4 mm

Scheimpflug device
anterior axial power map

Step: 0.5 D



ø approx. 9 mm

Dr. Lawless' interpretation:

- Irregular Astigmatism on anterior axial power map with inferior steepening
- Suspected Keratoconus

Dr. Lawless' conclusion:

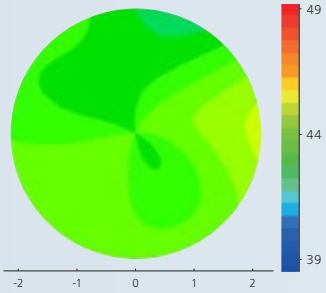
Full Topography contains further useful information about periphery

Case 11

Irregular Astigmatism – Mild Dry Eye Disease

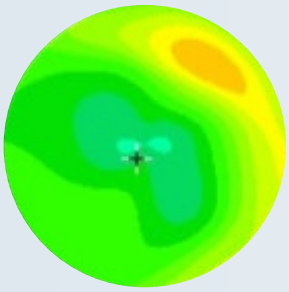
ZEISS IOLMaster 700
anterior axial power map

Step: 0.5 D



ø approx. 4 mm

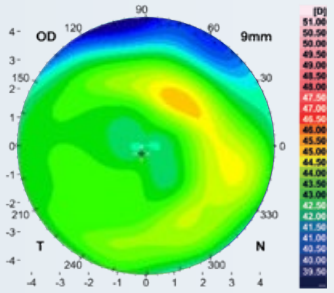
Scheimpflug device
anterior axial power map



ø approx. 4 mm

Scheimpflug device
anterior axial power map

Step: 0.5 D



ø approx. 9 mm

Dr. Lawless' interpretation:

- Small irregularity on anterior axial power map
- Superiorly steep
- Central and paracentral irregularity of Scheimpflug device map
- Scheimpflug device measurement not necessary for further decisions

Dr. Lawless' conclusion:

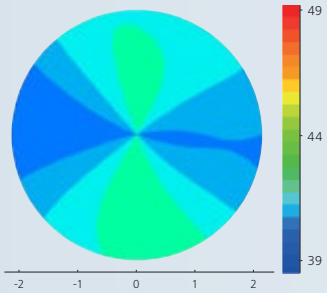
Good comparability

Case 12

Irregular Astigmatism

ZEISS IOLMaster 700
anterior axial power map

Step: 0.5 D



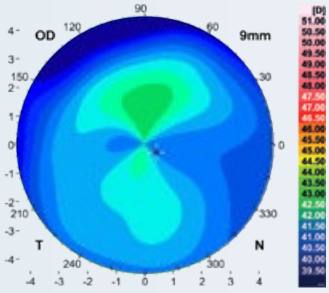
ø approx. 4 mm

Scheimpflug device
anterior axial power map

ø approx. 4 mm

Scheimpflug device
anterior axial power map

Step: 0.5 D



ø approx. 9 mm

Dr. Lawless' interpretation:

- Irregular Astigmatism with flat radii on Central Topography
- Scheimpflug device map shows more or less the same
- Additional Topography measurement isn't necessary

Dr. Lawless' conclusion:

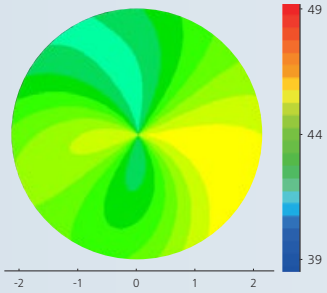
Good comparability

Case 13

Irregular Astigmatism – Pellucid Marginal Degeneration (PMD)

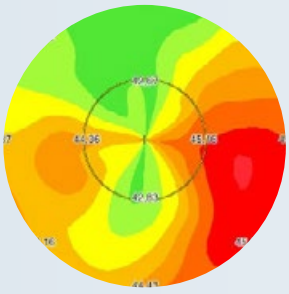
ZEISS IOLMaster 700
anterior axial power map

Step: 0.5 D



ø approx. 4 mm

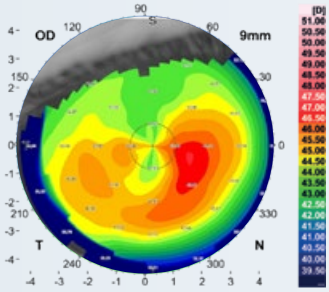
Dual-Scheimpflug / Placido device
anterior axial power map



ø approx. 4 mm

Dual-Scheimpflug / Placido device
anterior axial power map

Step: 0.5 D



ø approx. 9 mm

Dr. Savini's interpretation:

- Irregular astigmatism on anterior axial power map
- Flattening of the vertical meridian
- Placido device map looks similar

Dr. Savini's conclusion:

Good comparability

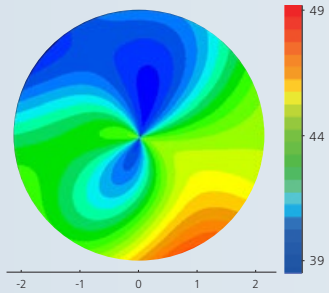
Clinical cases

Case 14

Irregular Astigmatism – Pellucid Marginal Degeneration (PMD)

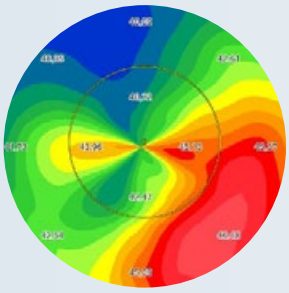
ZEISS IOLMaster 700
anterior axial power map

Step: 0.5 D



ø approx. 4 mm

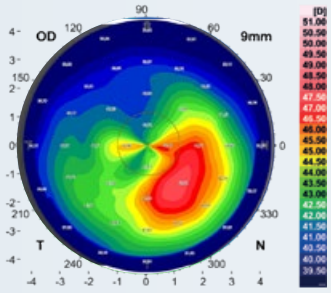
Dual-Scheimpflug / Placido device
anterior axial power map



ø approx. 4 mm

Dual-Scheimpflug / Placido device
anterior axial power map

Step: 0.5 D



ø approx. 9 mm

Dr. Savini's interpretation:

- Irregular Astigmatism on anterior axial power map with inferior steepening
- Flattening of the vertical meridian
- Placido device map looks similar

Dr. Savini's conclusion:

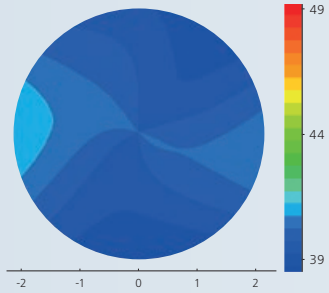
Good comparability

Case 15

Irregular Post LVC Astigmatism – Post Myopic LASIK/PRK

ZEISS IOLMaster 700
anterior axial power map

Step: 0.5 D



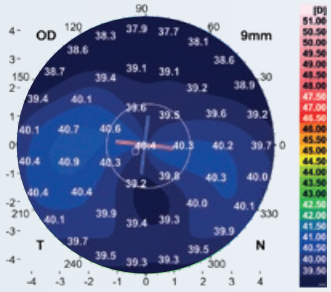
ø approx. 4 mm

Dual-Scheimpflug / Placido device
anterior axial power map

ø approx. 4 mm

Dual-Scheimpflug / Placido device
anterior axial power map

Step: 0.5 D



ø approx. 9 mm

Dr. Koch's & Dr. Wang's interpretation:

- 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

Dr. Koch's & Dr. Wang's conclusion:

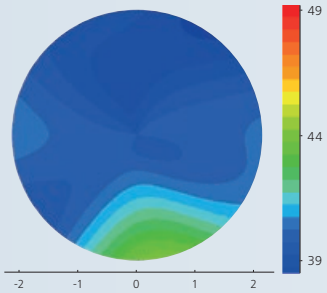
Good comparability

Case 16

Irregular Post LVC Astigmatism – Post Myopic LASIK

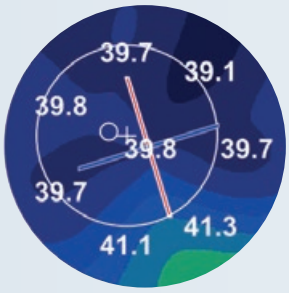
ZEISS IOLMaster 700 anterior axial power map

Step: 0.5 D



ø approx. 4 mm

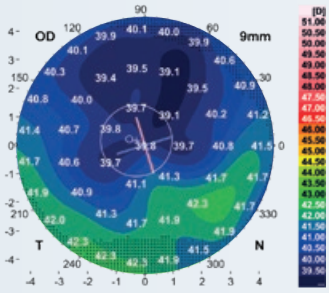
Dual-Scheimpflug / Placido device anterior axial power map



ø approx. 4 mm

Dual-Scheimpflug / Placido device anterior axial power map

Step: 0.5 D



ø approx. 9 mm

Dr. Koch's & Dr. Wang's interpretation:

- Central flat cornea on Central Topography
- Overall shape similar to the Dual-Scheimpflug / Placido device map; showing superior decentration

Dr. Koch's & Dr. Wang's conclusion:

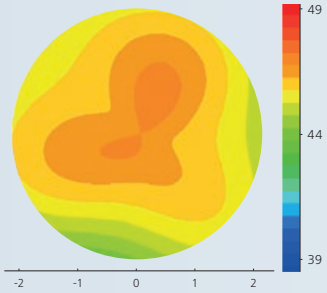
Good comparability

Case 17

Irregular Post LVC Astigmatism – Post Hyperopic LASIK/PRK

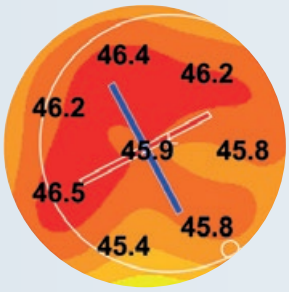
ZEISS IOLMaster 700 anterior axial power map

Step: 0.5 D



ø approx. 4 mm

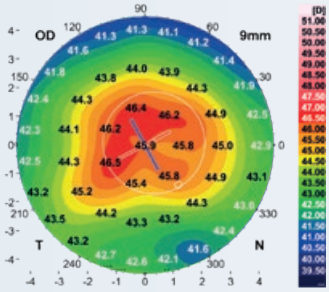
Dual-Scheimpflug / Placido device anterior axial power map



ø approx. 4 mm

Dual-Scheimpflug / Placido device anterior axial power map

Step: 0.5 D



ø approx. 9 mm

Dr. Koch's & Dr. Wang's interpretation:

- Central steep cornea on Central Topography
- Overall shape similar to the Dual-Scheimpflug / Placido device map
- Dual-Scheimpflug / Placido device map shows peripheral flattening

Dr. Koch's & Dr. Wang's conclusion:

Good comparability

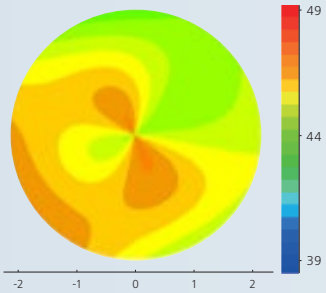
Clinical cases

Case 18

Irregular Post LVC Astigmatism – Post Hyperopic LASIK

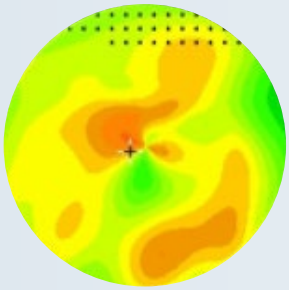
ZEISS IOLMaster 700
anterior axial power map

Step: 0.5 D



ø approx. 4 mm

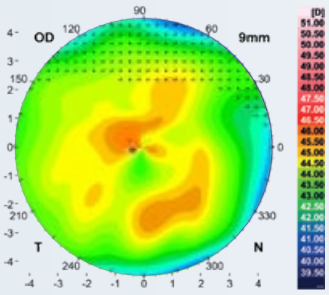
Scheimpflug device
anterior axial power map



ø approx. 4 mm

Scheimpflug device
anterior axial power map

Step: 0.5 D



ø approx. 9 mm

Dr. Lawless' interpretation:

- Steep cornea and a bit irregular Astigmatism
- Scheimpflug device map tells more or less the same
- Irregularity can be caused by tear film or LASIK

Dr. Lawless' conclusion:

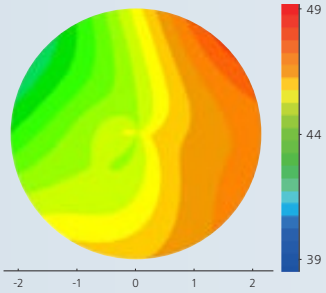
Good comparability

Case 19

Irregular Post LVC Astigmatism – Post Hyperopic LASIK

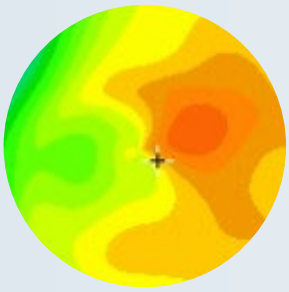
ZEISS IOLMaster 700
anterior axial power map

Step: 0.5 D



ø approx. 4 mm

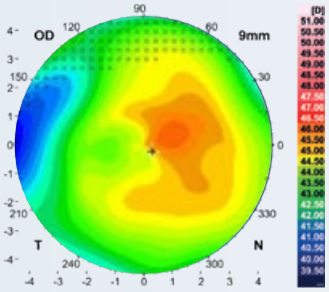
Scheimpflug device
anterior axial power map



ø approx. 4 mm

Scheimpflug device
anterior axial power map

Step: 0.5 D



ø approx. 9 mm

Dr. Lawless' interpretation:

- Irregular Astigmatism
- Decentered hyperopic ablation when just looking at anterior axial power map
- Scheimpflug device map gives roughly the same information

Dr. Lawless' conclusion:

Good comparability

Bibliography

Wang L, Canedo ALC, Wang Y, Xie KC, Koch DD. Comparison of central topographic maps from a swept-source OCT biometer and a Placido-dual-Scheimpflug tomographer – J Cataract Refract Surg. 2020;October PubMed.

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ZEISS Product Insights website

ZEISS IOLMaster 700 is intended to aid clinicians with IOL selection. While clinicians may find Central Topography helpful in their decision-making process, topographers should be used as primary devices for topographical decisions.
The information presented in this guide was an opinion of Dr. Douglas D. Koch (clinician), Dr. Giacomo Savini (clinican) and Dr. Michael Lawless (clinican). Douglas D. Koch and Dr. Michael Lawless have a contractual or other financial relationship with Carl Zeiss Meditec AG and its affiliates and have received financial support.

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IOLMaster 700

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