

Refractive Lens Exchange Preoperative Evaluation Pearls



BUSINESS *of* REFRACTIVE
CATARACT SURGERY
— SUMMIT —

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Financial Disclosure

- I have the following financial interests or relationships to disclose:

- Alcon: Consultant/Advisor, Lecture Fees/Speakers Bureau
- Allergan: Consultant/Advisor, Lecture Fees/Speakers Bureau
- Bausch and Lomb: Consultant/Advisor
- Beaver Visitec International : Consultant/Advisor
- Centricity Vision: Consultant/Advisor
- Dompe: Consultant/Advisor
- Horizon Therapeutics: Consultant/ Advisor
- Johnson & Johnson Vision: Consultant/Advisor
- LensAr: Consultant/Advisor
- Novartis, Alcon Pharmaceuticals: Consultant/Advisor
- Novabay, Advisor
- Ocular Science: Consultant/Advisor
- Orasis Pharmaceuticals: Consultant/Advisor
- Oyster Point: Consultant/Advisor
- Sight Sciences: Consultant/Advisor, Lecture Fees/Speakers Bureau, Grant Support
- Sun Ophthalmics: Consultant/Advisor, Lecture Fees/Speakers Bureau
- Tarsus: Consultant/Advisor
- Visus: Consultant/Advisor
- Zeiss: Consultant/Advisor

Surgical Goals: RLE

Consistently:

- Excellent UCVA for Distance & Near
- High Patient Satisfaction
- Reduction or elimination of astigmatic error



Residual error
impacts all of
these, severely

Important to be on target
with both sphere and cylinder

Goal: 0.5D or less of astigmatism

Bifocal, Trifocal & EDOF Toric IOLs

Lowest power torics:
Correct 1D of astigmatism at Corneal Plane

Monofocal Torics

Alcon & JNJ: Correct 1D of astig at Corneal Plane
B&L: Corrects 0.85D of astig at Corneal Plane

Light adjustable lens

Corrects 0 to 3D of astigmatism - but is not part of this talk

Challenging Case: Presbyopic IOL candidate

68 year old female with 2+NS & low astigmatism

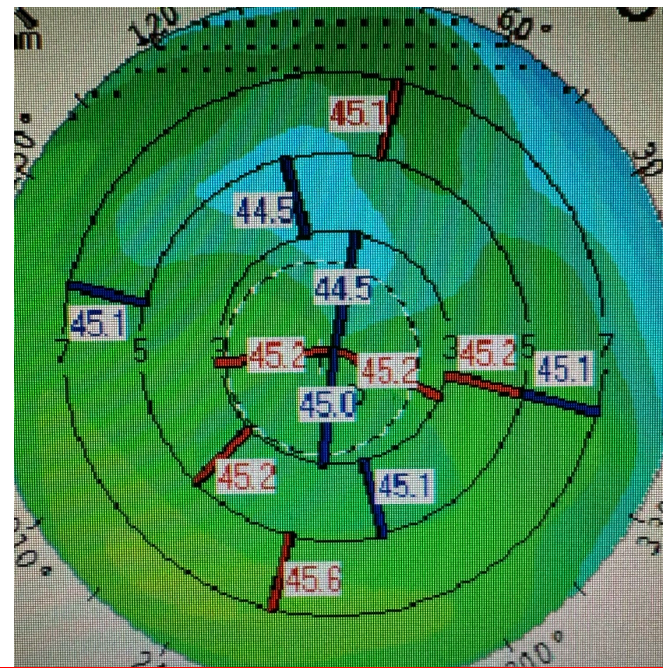
Do we need the Standard or Toric version?

Biometry Ks

AsL K +0.43 D @ 5°

Do we need to worry that there is
A 19 degree difference in the axis?

Next step: Typically treat dry eye/MGD &
repeat measurements



166.0 *

Astig 0.4 D

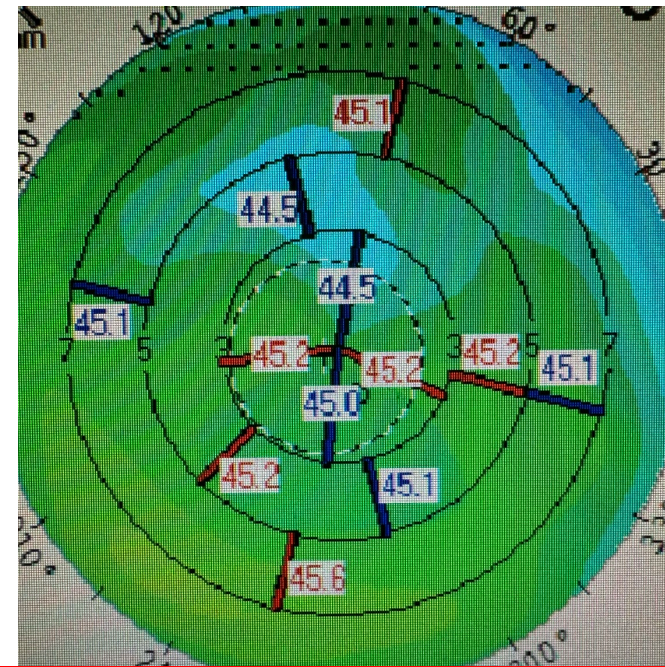
Challenging Case: Presbyopic IOL candidate

68 year old female with 2+NS & low astigmatism

How does the posterior cornea
Impact total corneal astigmatism?

Based on work by Doug Koch, MD, Liz Yeu, MD
and Mitch Weikert, MD at Baylor

The posterior cornea adds 0.4D to 0.6D of horizontal astigmatism



166.0 *

Astig

0.4 D

Challenging Case: Presbyopic IOL candidate

68 year old female with 2+NS & low astigmatism

3 Devices to measure
Corneal power

Biometry Ks

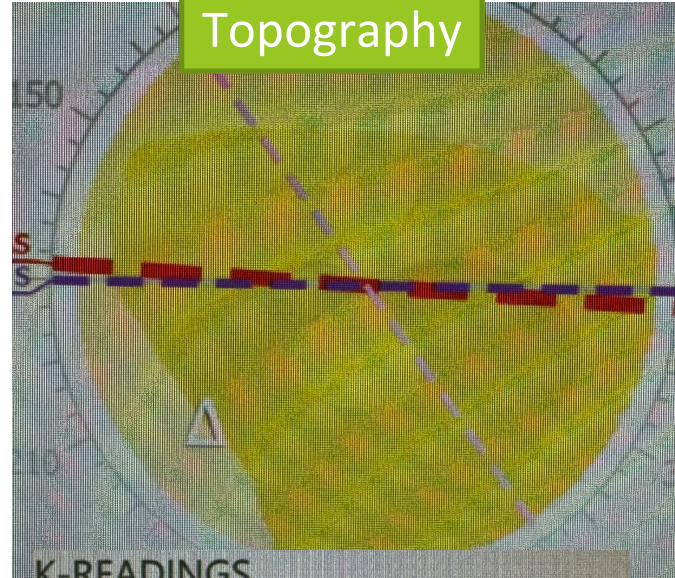
Ast K +0.43 D @ 5°

Some devices also measure
TOTAL Cornea Power

Biometry Total Ks

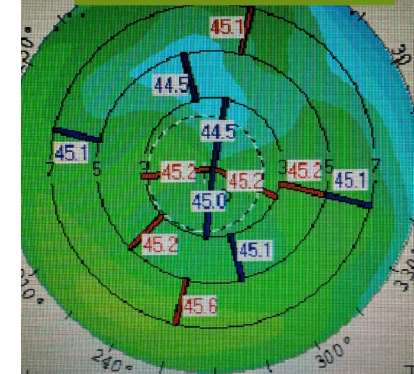
Ast TK +0.61 D @ 8°

Topography



K-READINGS	
Keratometric SimK (n=1.3375)	
Average Kavg	45.10 D (7.48 mm)
Steepest K2	45.48 D (7.42 mm) @ 177°
Flat K1	44.72 D (7.55 mm) @ 87°
Astigmatism	+0.76 D

Tomography



166.0 * Astig 0.4 D

Challenging Case: Presbyopic IOL candidate

68 year old female with 2+NS & low astigmatism

Front (anterior) Ks

AsL K +0.43 D @ 5°

166.0 * Astig: 0.4 D

Steep K2 45.48 D (7.42 mm) @ 177°
Flat K1 44.72 D (7.55 mm) @ 87°
Astigmatism +0.76 D

Total Ks

AsT TK +0.61 D @ 8°

Total Cornea
Astigmatism +0.88 D @ 0° (Steep K2)

Barrett Calculator (Biometry)
Toric IOL: Residual astigmatism is 0.1D

Toric Power		Res. Ast.	K
150	1.50	+0.10 @ 92° ()	
	n/a		
	n/a		
N	T		
2°		1.30	0.00

LF +2.04 DF +5.0

Challenging Case: Presbyopic IOL candidate

68 year old female with 2+NS & low astigmatism

Front (anterior) Ks

Ast K +0.43 D @ 5°

166.0° Astig 0.4 D

Steep K2 45.48 D (7.42 mm) @ 177°
Flat K1 44.72 D (7.55 mm) @ 87°
Astigmatism +0.76 D

Total Ks

Ast TK +0.61 D @ 8°

Total Cornea
Astigmatism +0.88 D @ 0° (Steep K2)

Final Outcome with Toric IOL:

UCVA = 20/20⁻²

MR = -0.25 +0.25 x 090

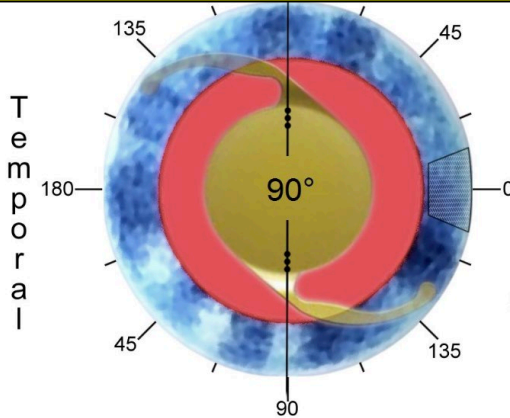
Panel Question: was it OK to flip the axis by 0.25 degrees?

Impact of Axis on IOL Calculation

using low power toric (1.50D)

Flat K: 42@ 180 Steep K: 43.25@ 90

Vertical Astigmatism of 1.25D
Subtract 0.55D of astigmatism

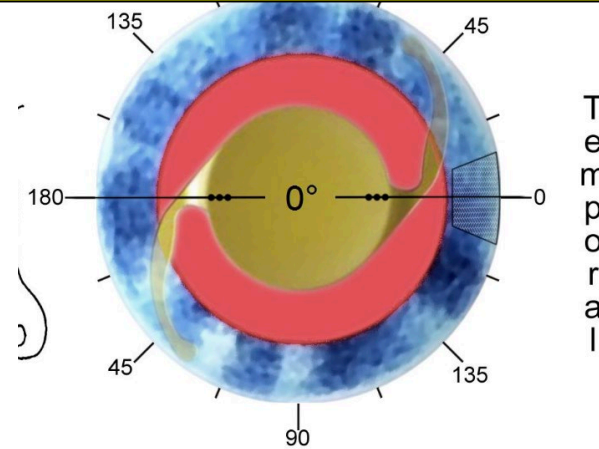


Non Toric 1.5
0.66 Cyl Axis 90
0.36 Cyl Axis 180

Axis flipped by .36D

Flat K: 42@ 90 Steep K: 42.5@ 180

Horizontal Astigmatism of 0.5D
Add 0.4D of astigmatism



1.5 0.10 Cyl Axis 90

Axis flipped by 0.1D

Barrett TORIC IOL Formula

A Constant/LF: 119.3 / 2.04 AL: 24 ACD: 3.5

Potential Causes of Residual Astigmatism

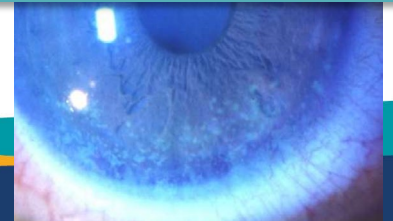
1. Axis off-target

- Preop measurements inaccurate
- Errors with identifying proper axis during surgery
- Rotation of IOL postoperative

2. Wrong astigmatism power

- Preop measurements/calculations errors
 - Topo Ks, IOL Ks not in agreement
- Surprising Surgically Induced Astigmatism (SIA)
- Surprising Posterior Cylinder
 - Too high or lower than expected

Note: Ocular surface disease
can impact the preop
measurements

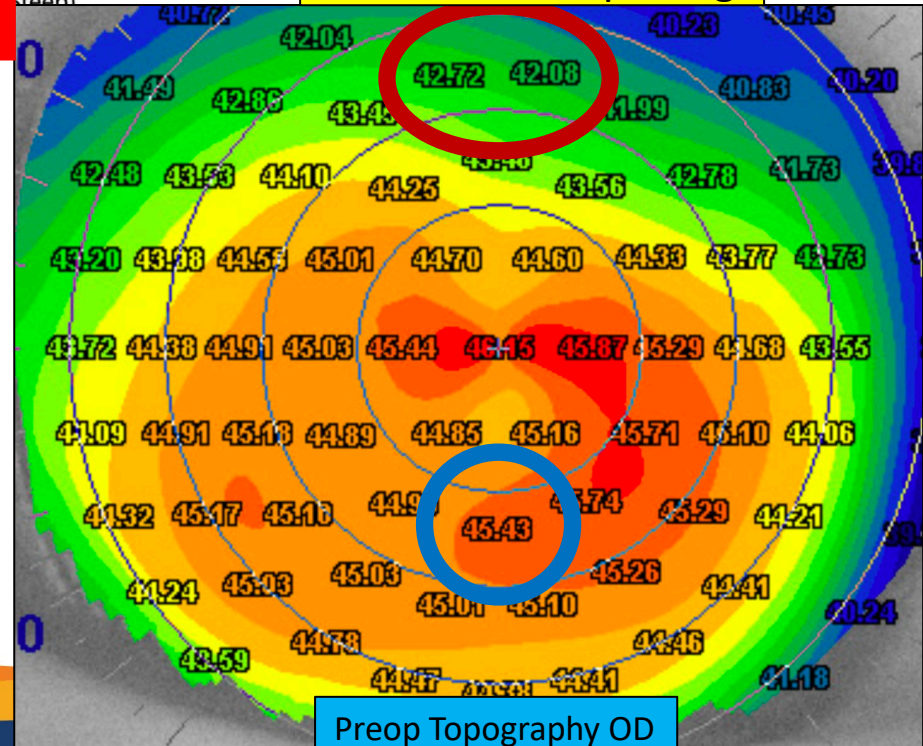


Case #2: 65 year old with 2+ NS cataract OD Horizontal Astigmatism (1.46 D)

K-READINGS

Keratometric SimK (n=1.3375)		Total Cornea	
Average K	45.20 D (7.47 mm)	Astigmatism	1.46 D @ 180°
Steep K	45.86 D (7.36 mm) @ 173°		
Flat K	44.55 D (7.58 mm) @ 83°		
Astigm.	1.32 D		

Pellucid Pattern
+ Inferior Steepening



To reduce astigmatism postop:

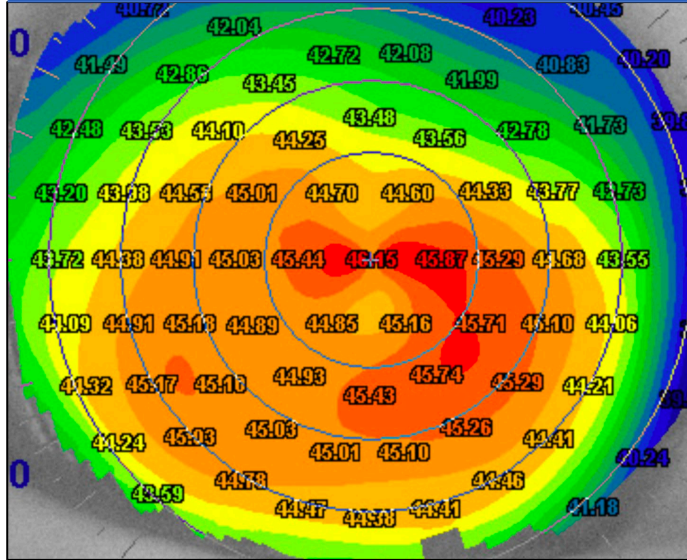
1. TORIC IOL
2. Manual AKs/LRI
3. Femto AKs

Preop Topography OD

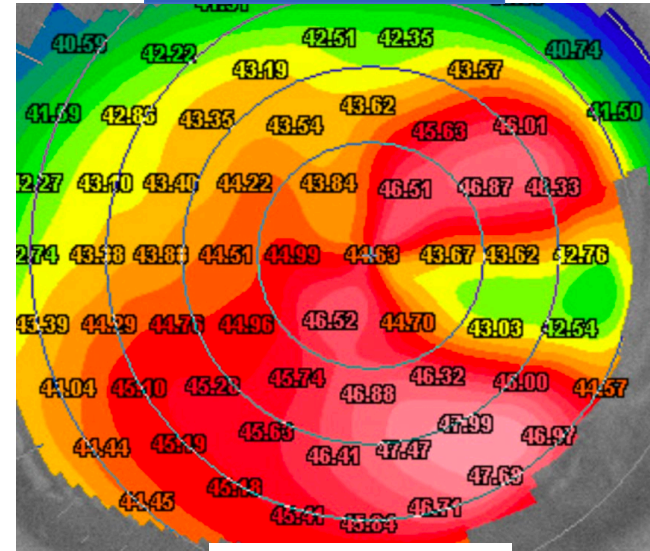
Following phaco/IOL with Femto AK OD

Preop Topography

Pellucid Pattern Keratoconus not recognized preop



One Month Postop
Topography



Total Cornea
Astigmatism 1.46 D @ 180°

CYL: 2.44

Increased Cylinder & flipped Axis

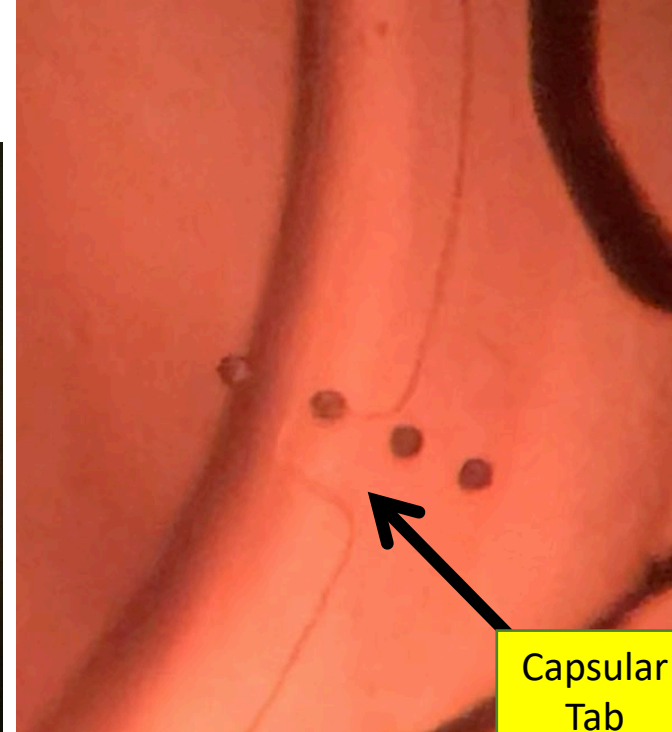
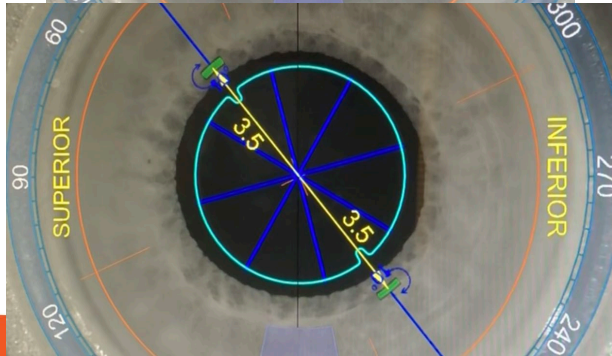
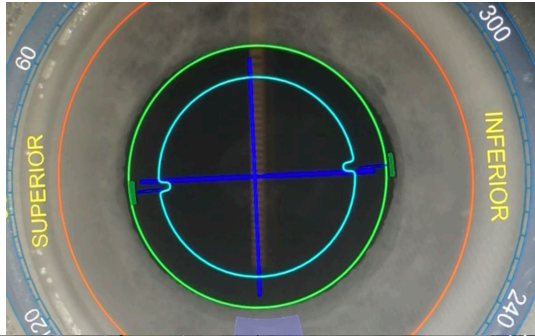
Key Step: Mark axis accurately

- Preoperative marking of axis
 - Slit lamp
 - Preop holding area with patient sitting up
- Intraoperative
 - Iris registration
 - Cassini/Lensar
 - Limbal vessels: multiple technologies
 - Wavefront
 - ORA

Postop: Check Axis

Is the IOL at the intended axis?

See patient 1-3 hours postop while pupil is still dilated



Intraop marking during femto
With iris registration (Lensar)

2-3 hours later at slit lamp
Cornea marks

Capsular tab and Toric Marks

Summary:

Preoperative evaluation prior to RLE ...

- Know your goals before you start the procedure
 - Understand the impact of residual error, and be sure you have strategies for refractive error
- Goal: End up with lowest amount of astigmatism
 - It is OK to flip the axis, especially for Presbyopic IOLs



Danny