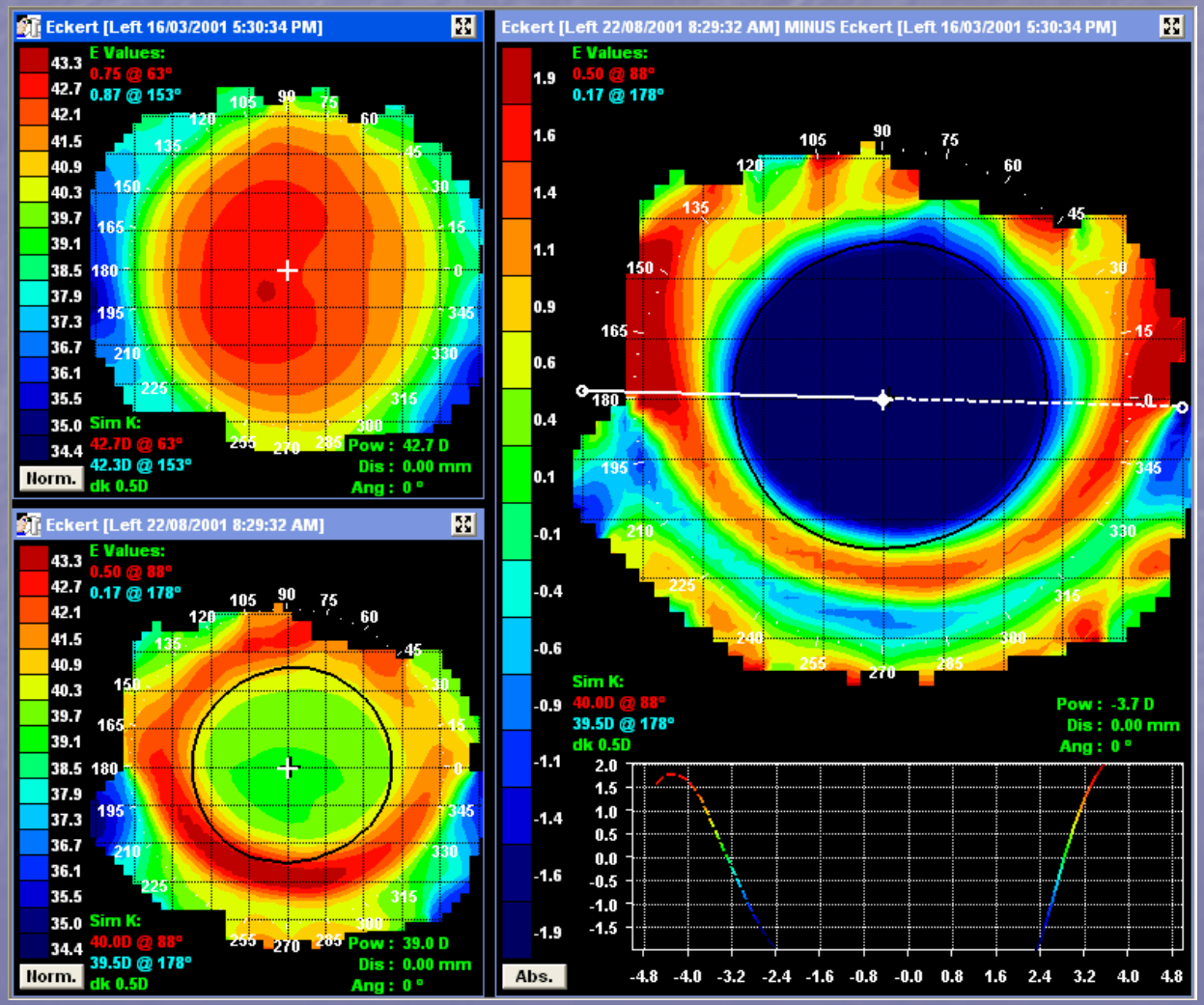
# The BE System for Orthokeratology




## Comprehensive Training Course

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04.11.10.be.c.cert.us

# About this Course:

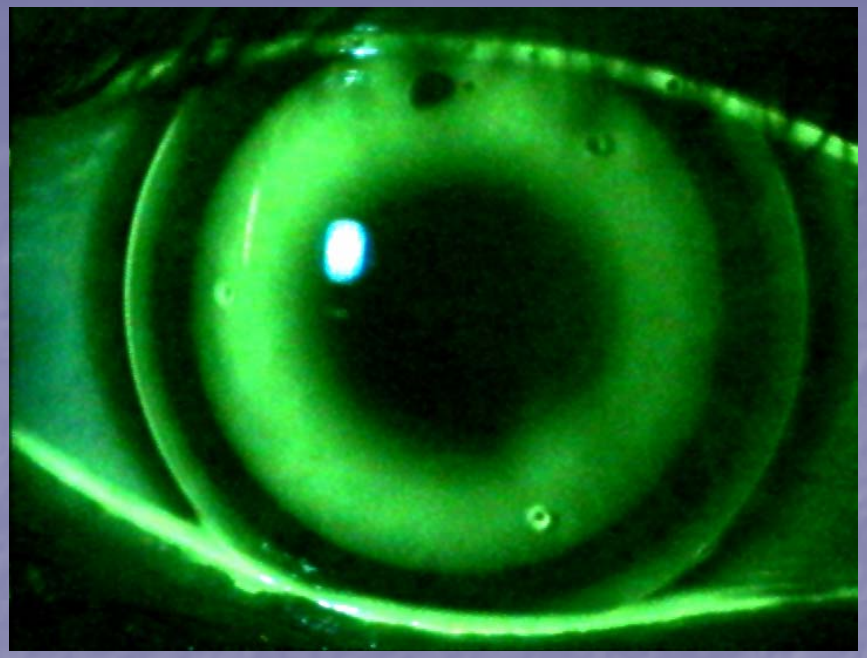
- The following certification course has been designed to provide you with the necessary information to fit both the:
  - BE Retainer®
  - BE-4
- This course presents the concepts and process to follow if fitting the BE Retainer design. Practitioners can apply this more comprehensive BE Retainer education to fitting the more simplified BE-4 design.

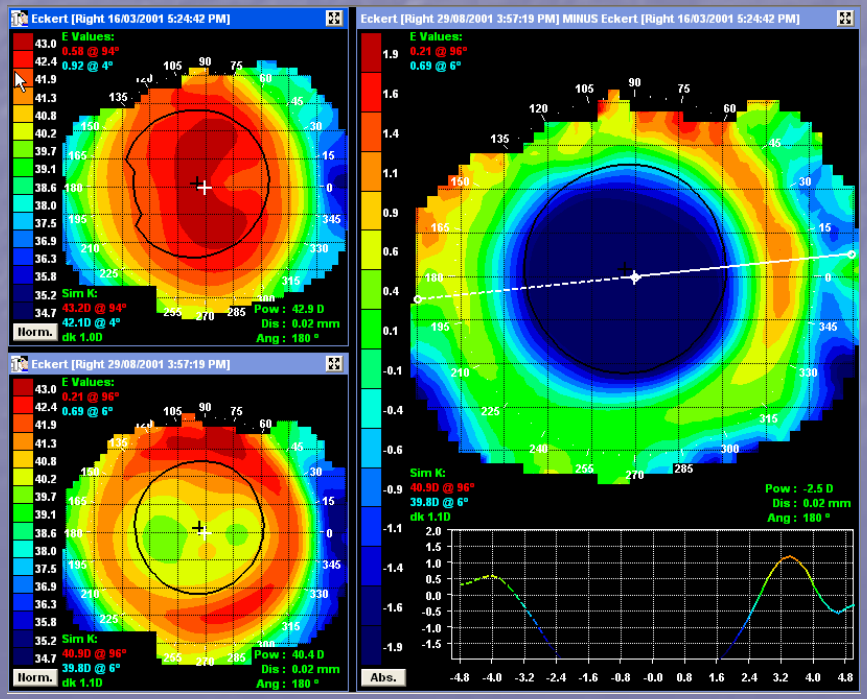
# BE Retainer
# Optimal Orthokeratology practice involves 3 components:

- Topography
- BE Retainer Diagnostic Trials
- BE Retainer Software

# Course Outline

- Optimal Orthokeratology Science
- Patient Selection
- Patient Work-up
- Topography Review
- BE Retainer Software
- Case Studies
- Follow-up
- Marketing
- Advanced Concepts





# The Goal of Optimal Orthokeratology Therapy

- Freedom from glasses and contact lenses
- 20/20 – 20/15 Visual Acuity
- Crisp Clear Vision all Day Long
- Reduced Wear Schedule?
  Not every day…every 2nd,3rd,4th or 5th

# Example of BE Retainer Optimal Orthokeratology:

# Sample Patient: Montana

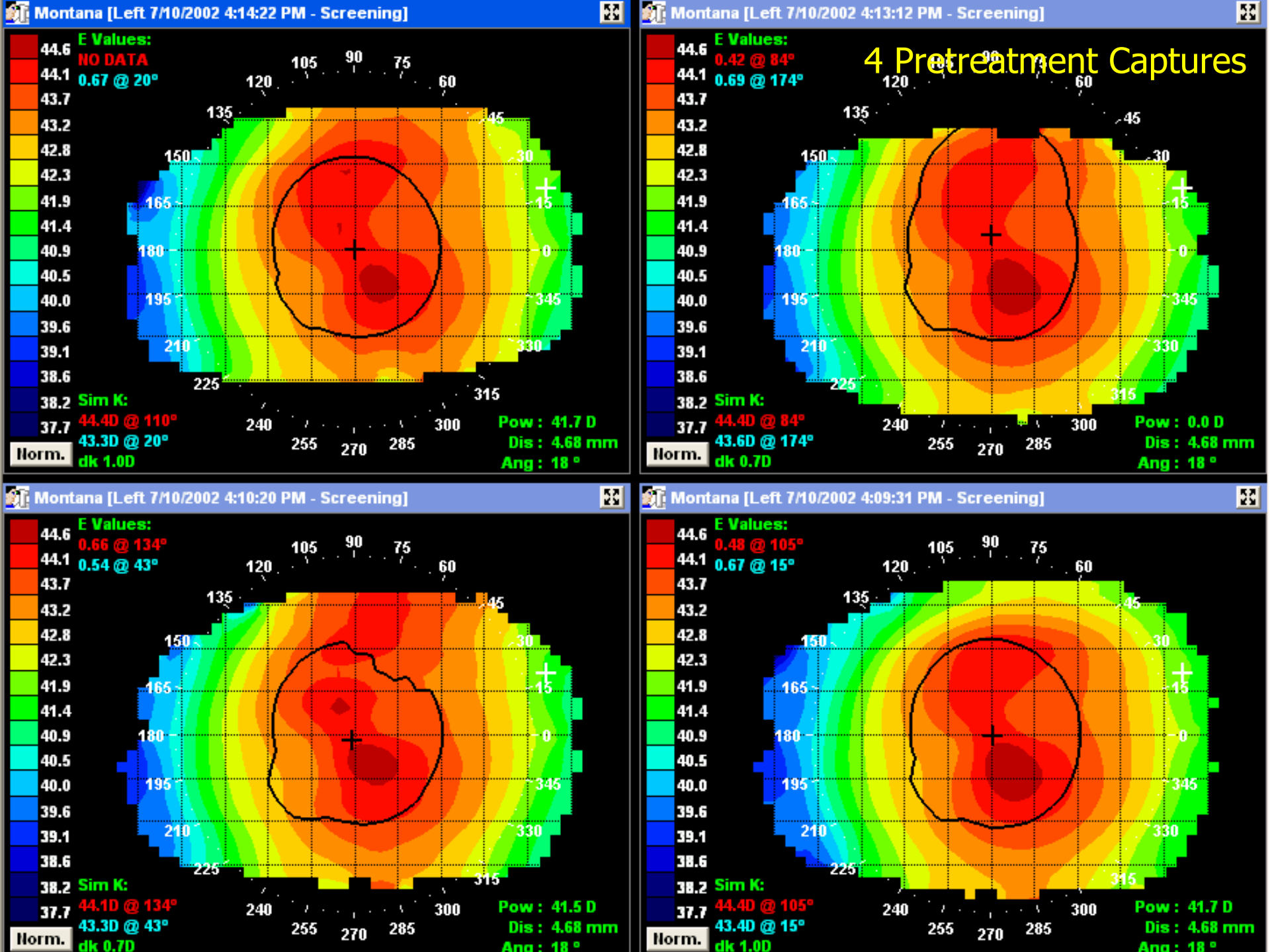
# Step 1:

# Record Spectacle Rx:

(Do not compensate for spherical equivalent. Vertex if necessary)

# Step 2:

Capture 4 topographies on each eye

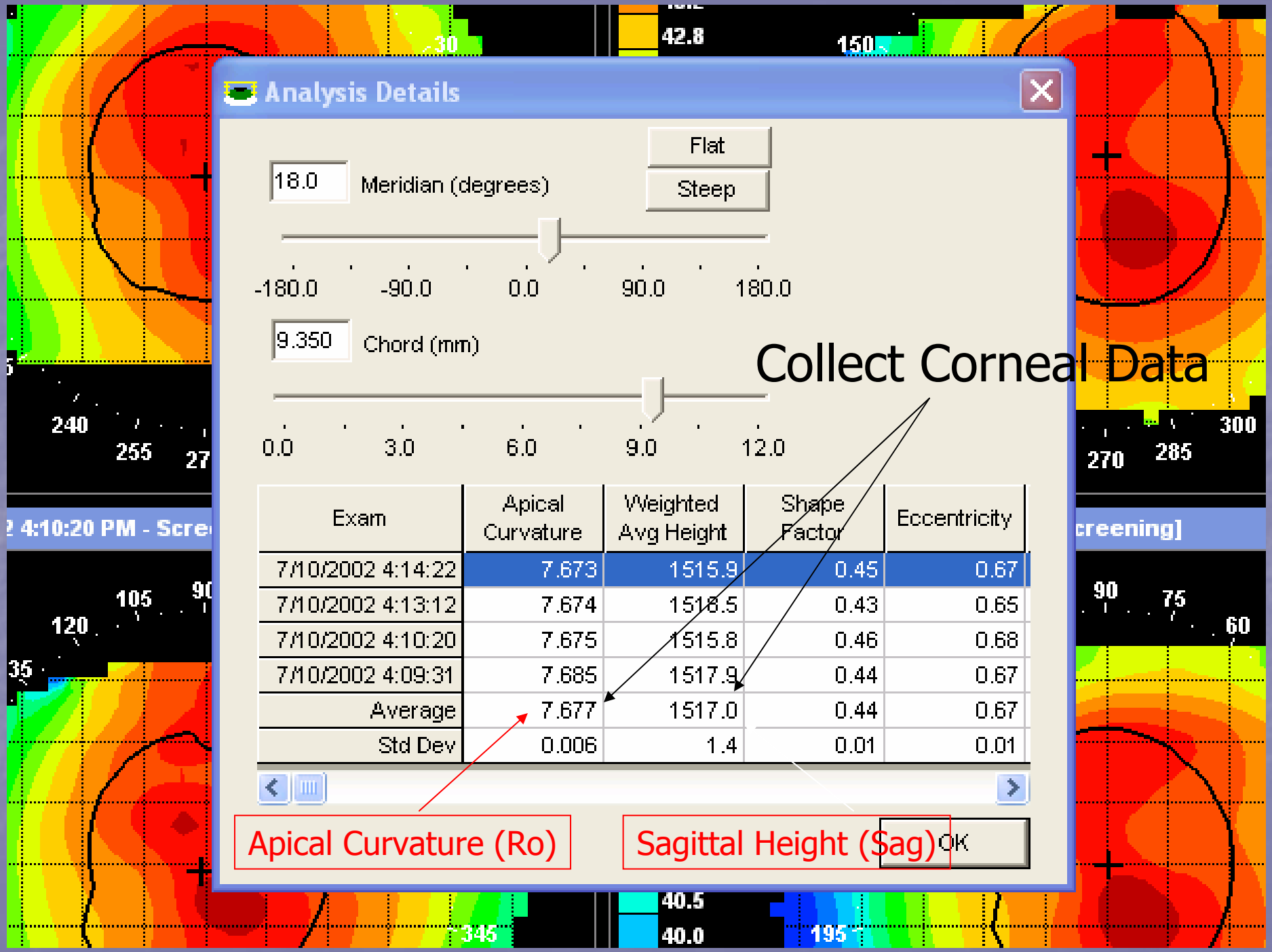

Montana [Left 7/10/2002 4:14:22 PM - Screening]
E Values:
NO DATA
0.67 @ 20°
Sim K:
44.4D @ 110°
43.3D @ 20°
dk 1.0D
Pow : 41.7 D
Dis : 4.68 mm
Ang : 18 °
Norm.
Montana [Left 7/10/2002 4:13:12 PM - Screening]
4 Pretreatment Captures
E Values:
0.42 @ 84°
0.69 @ 174°
Sim K:
44.4D @ 84°
43.6D @ 174°
dk 0.7D
Pow : 0.0 D
Dis : 4.68 mm
Ang : 18 °
Norm.
Montana [Left 7/10/2002 4:10:20 PM - Screening]
E Values:
0.66 @ 134°
0.54 @ 43°
Sim K:
44.1D @ 134°
43.3D @ 43°
dk 0.7D
Pow : 41.5 D
Dis : 4.68 mm
Ang : 18 °
Norm.
Montana [Left 7/10/2002 4:09:31 PM - Screening]
E Values:
0.48 @ 105°
0.67 @ 15°
Sim K:
44.4D @ 105°
43.4D @ 15°
dk 1.0D
Pow : 41.7 D
Dis : 4.68 mm
Ang : 18 °
Norm.

# Step 3:

# Calculate and Record:

-Average Apical Curvature (Ro)
-Average Sagittal Height (Weighted Avg Height) OR Eccentricity *

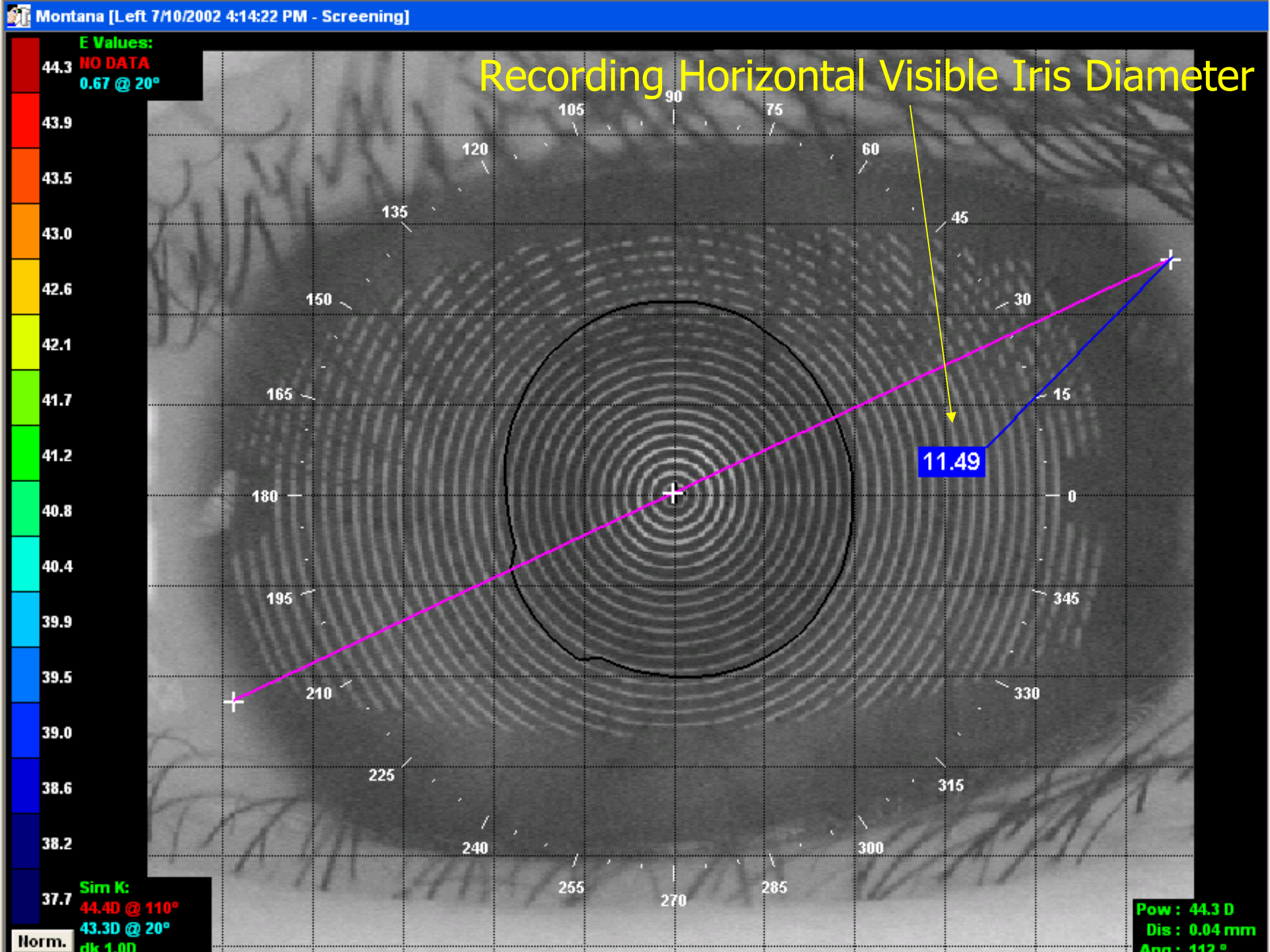
* if your topographer calculates Shape Factor or Asphericity (rather than Sag or E-value), then convert this value to Eccentricity (E-Value)


Analysis Details
Flat
Steep
18.0
Meridian (degrees)
-180.0
-90.0
0.0
90.0
180.0
9.350
Chord (mm)
0.0
3.0
6.0
9.0
12.0
Collect Corneal Data
Exam
Apical Curvature
Weighted Avg Height
Shape Factor
Eccentricity
7/10/2002 4:14:22 7.673 1515.9 0.45 0.67
7/10/2002 4:13:12 7.674 1516.5 0.43 0.65
7/10/2002 4:10:20 7.675 1515.8 0.46 0.68
7/10/2002 4:09:31 7.685 1517.9 0.44 0.67
Average 7.677 1517.0 0.44 0.67
Std Dev 0.006 1.4 0.01 0.01
Apical Curvature (Ro)
Sagittal Height (Sag)
OK

# Step 4:

# Measure Horizontal Visible Iris Diameter (HVID) *

Limbus to Limbus /White to White


Montana [Left 7/10/2002 4:14:22 PM - Screening]
E Values:
NO DATA
0.67 @ 20°
44.3
43.9
43.5
43.0
42.6
42.1
41.7
41.2
40.8
40.4
39.9
39.5
39.0
38.6
38.2
37.7
Sim K:
44.4D @ 110°
43.3D @ 20°
dk 1.0D
Norm.
Recording Horizontal Visible Iris Diameter
90
105
75
120
60
135
45
150
30
165
15
180
0
195
345
210
330
225
315
240
300
255
285
270
11.49
Pow : 44.3 D
Dis : 0.04 mm

# Step 5:

# Enter the Patient & Corneal Data in the BE Retainer Software

# Start
# BE Retainer Software

BE™

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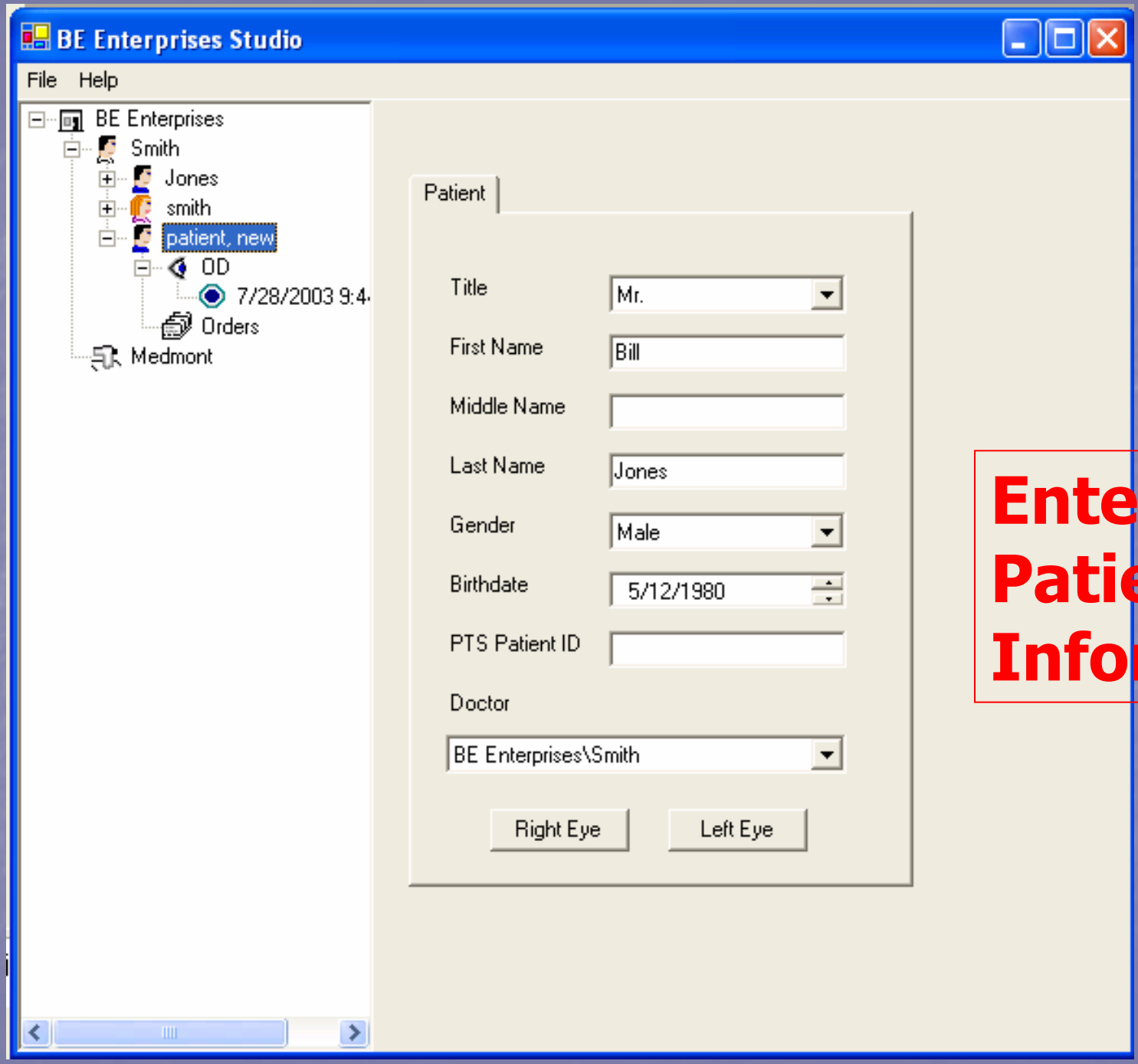
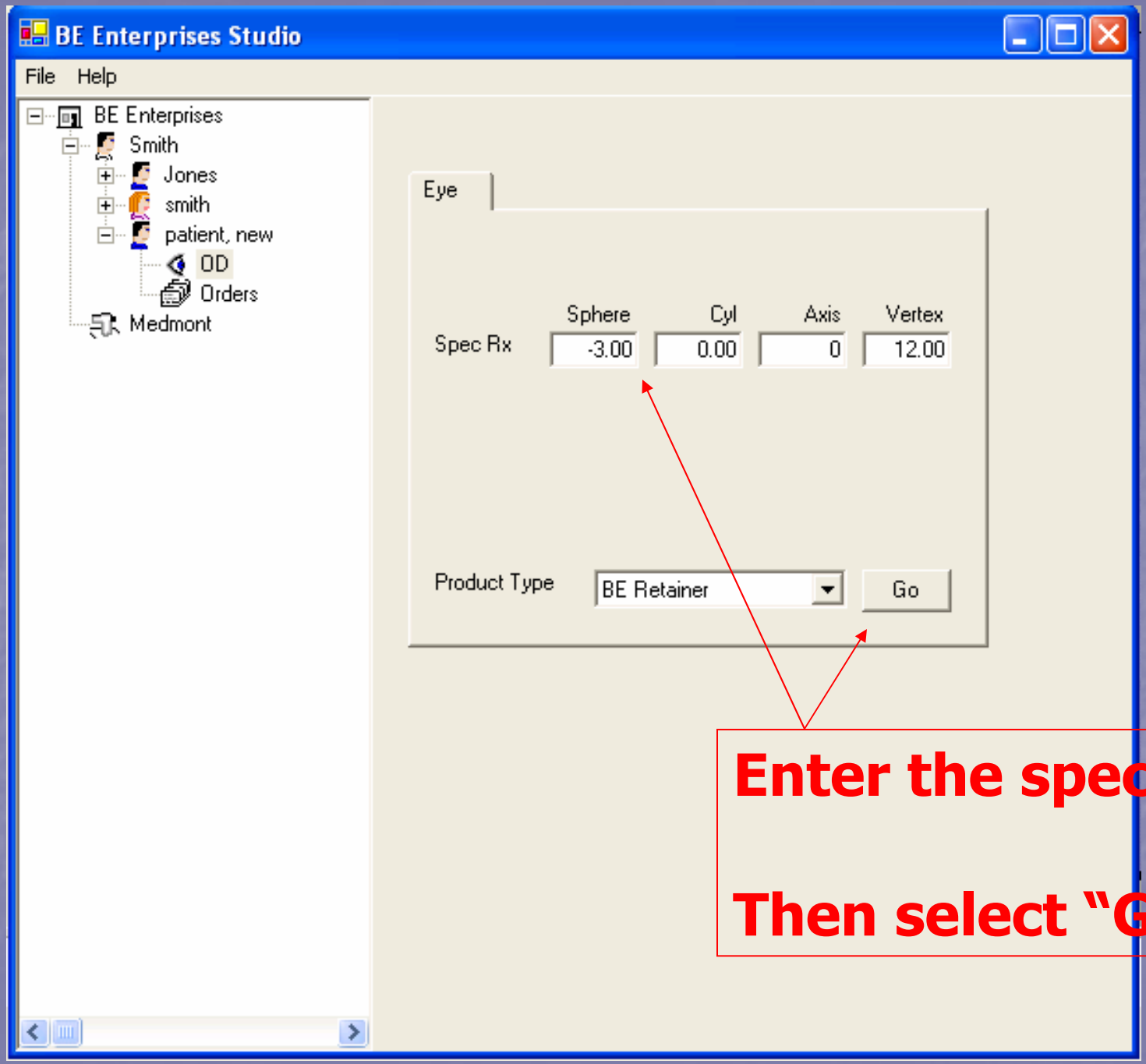
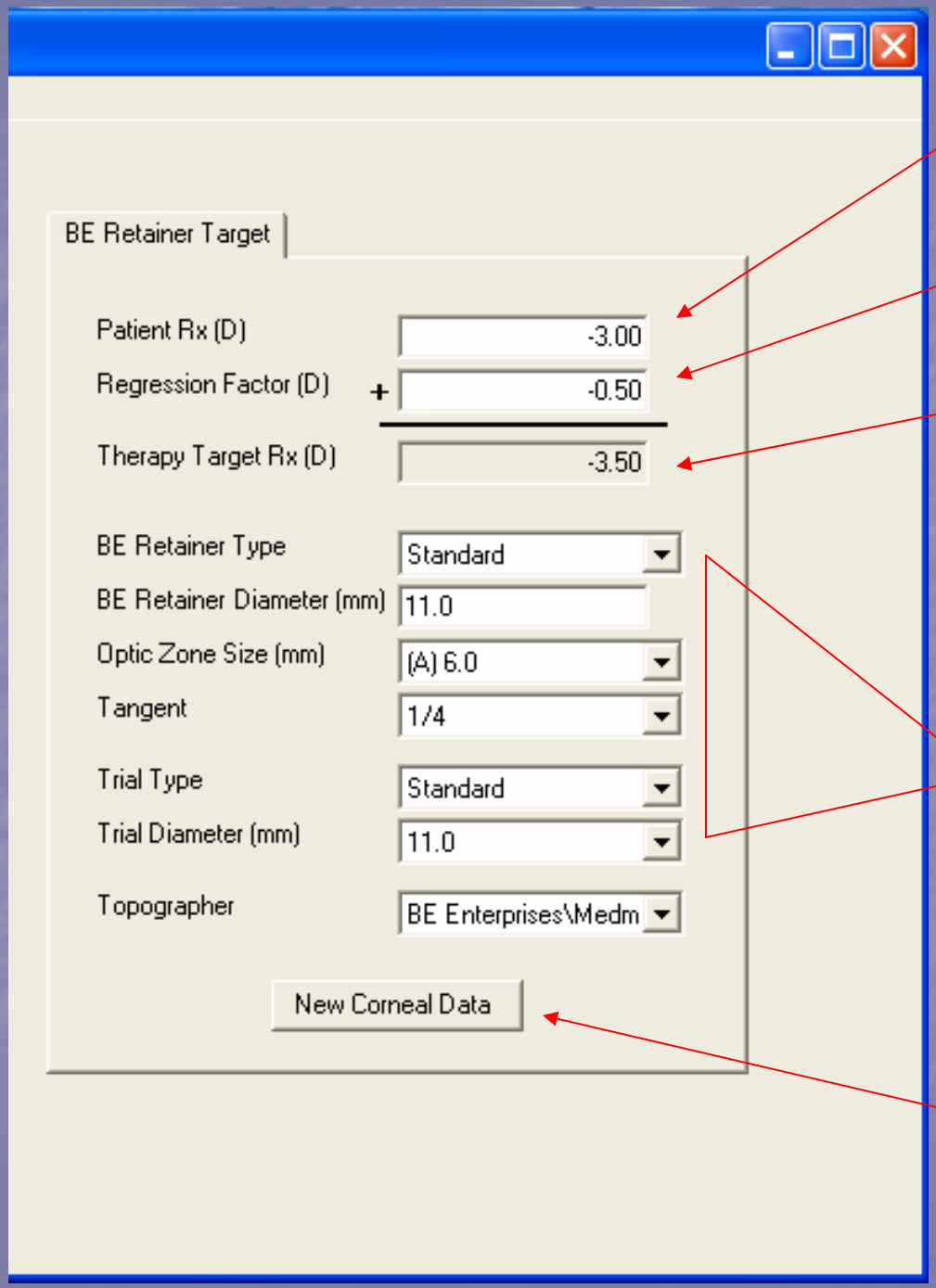



**Enter Patient Information**


BE Enterprises Studio
File
Help
BE Enterprises
Smith
Jones
smith
patient, new
OD
Orders
Medmont
Eye
Sphere
Cyl
Axis
Vertex
Spec Rx
-3.00
0.00
0
12.00
Product Type
BE Retainer
Go
Enter the spectacle Rx
Then select "Go"



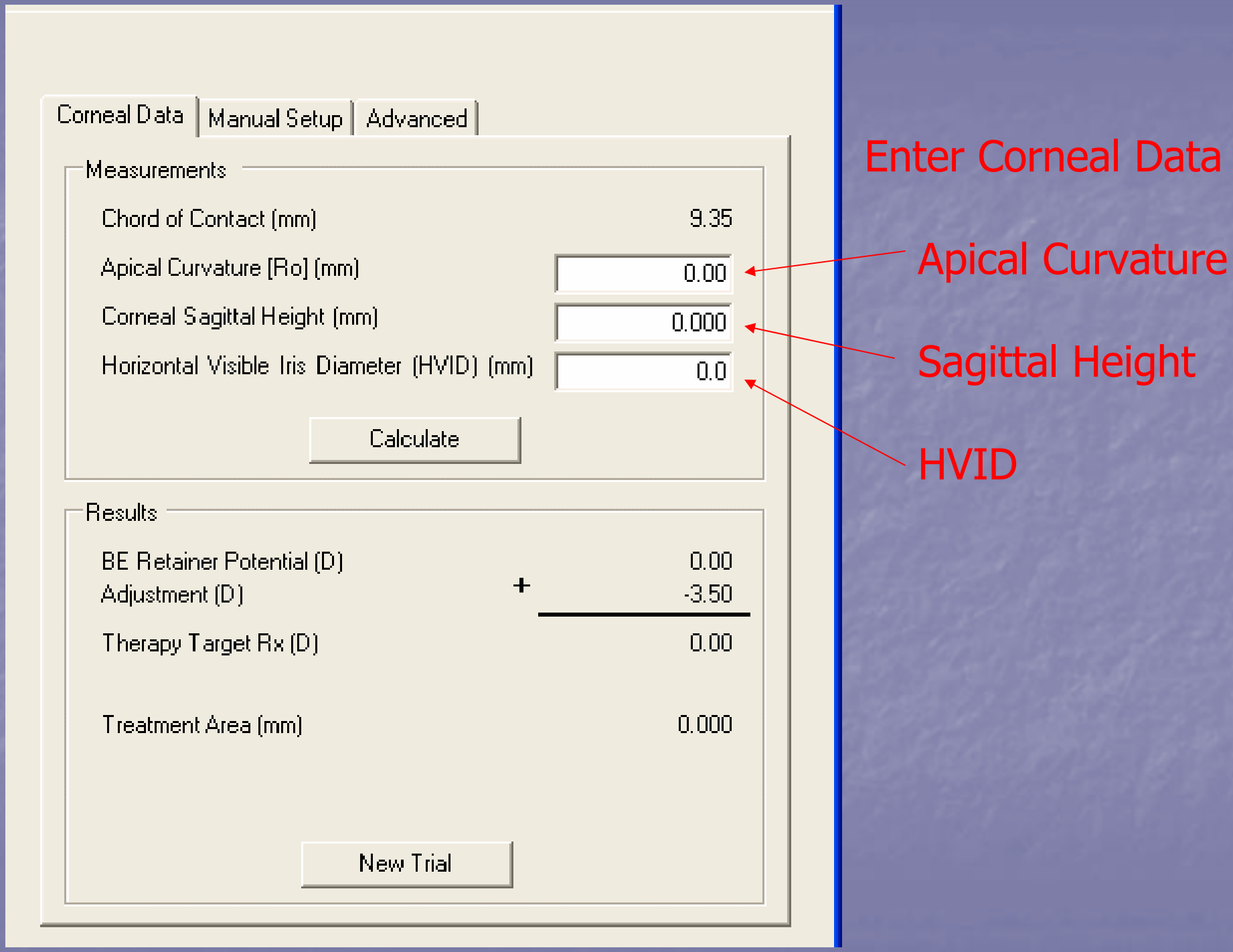

Entered Spectacle Rx

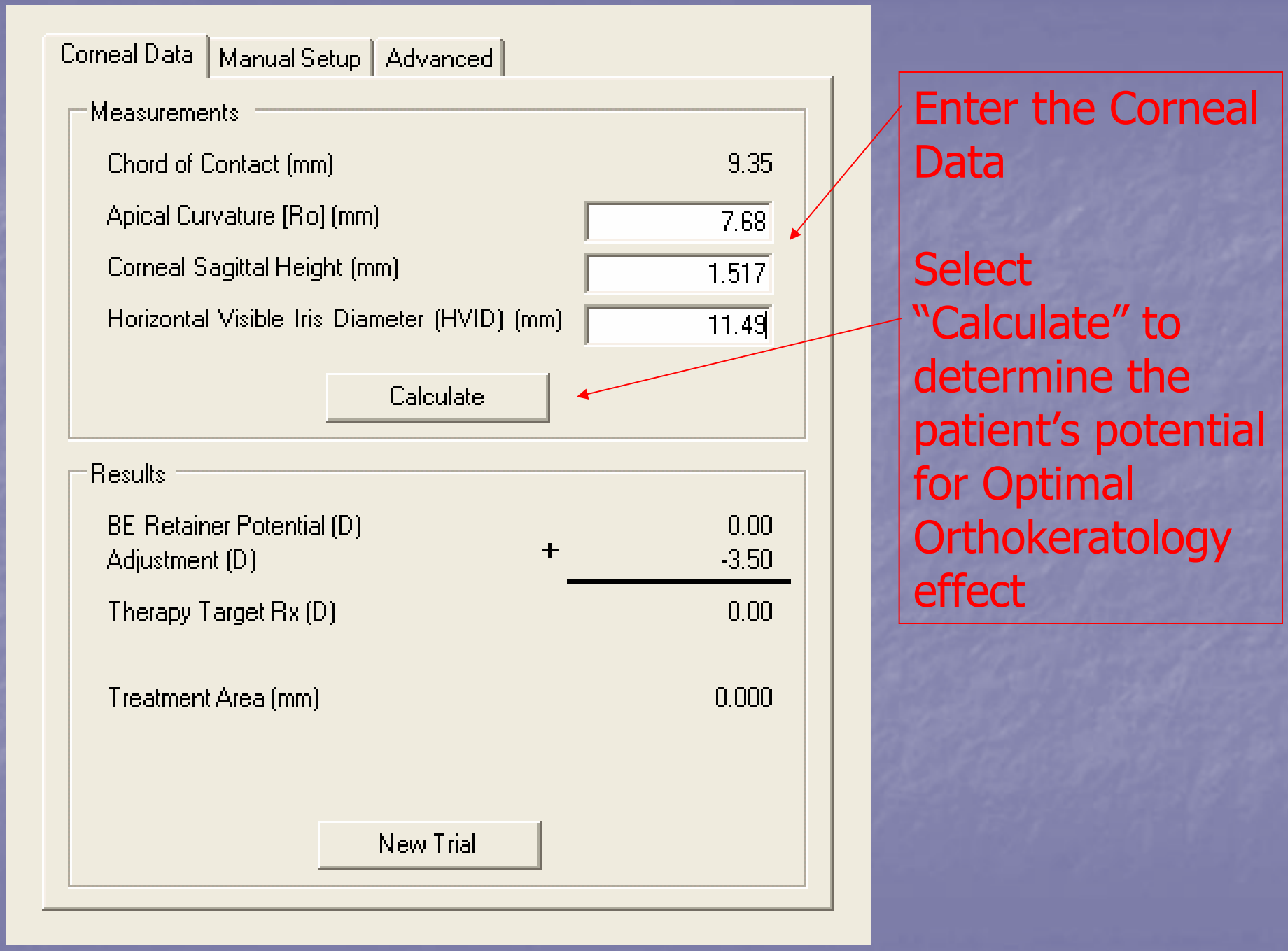
+ "Regression Factor"

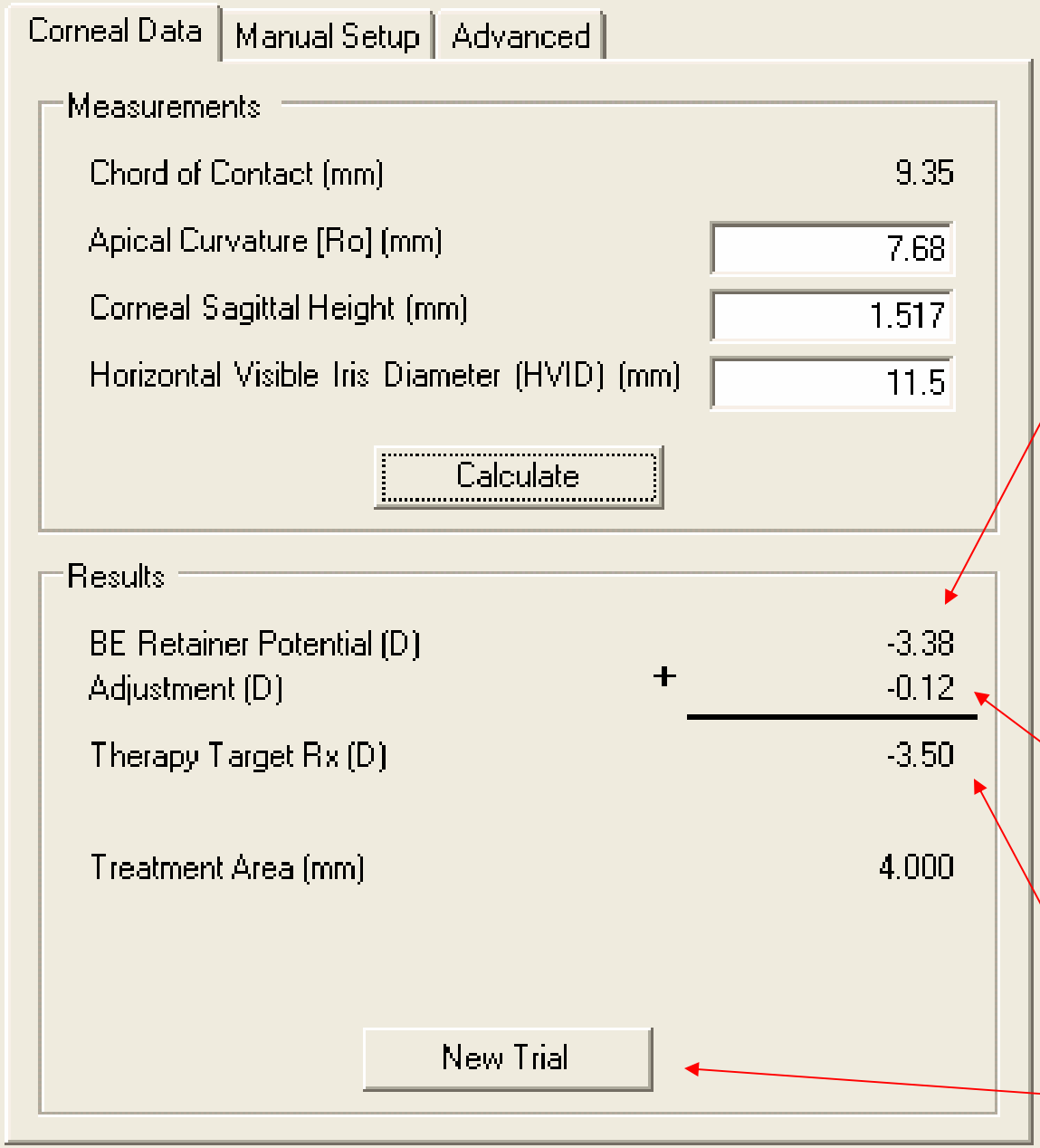
Optimal Orthokeratology Therapy Target

Default Parameters Selected: "Standard" type, 11.0mm diameter custom order, "Standard" 11.0mm Trial

Then select "New Corneal Data"


Corneal Data
Manual Setup
Advanced
Measurements
Chord of Contact (mm)
9.35
Apical Curvature [Ro] (mm)
0.00
Corneal Sagittal Height (mm)
0.000
Horizontal Visible Iris Diameter (HVID) (mm)
0.0
Calculate
Results
BE Retainer Potential (D)
0.00
Adjustment (D)
+
-3.50
Therapy Target Rx (D)
0.00
Treatment Area (mm)
0.000
New Trial
Enter Corneal Data
Apical Curvature
Sagittal Height
HVID


Corneal Data
Manual Setup
Advanced
Measurements
Chord of Contact (mm)
9.35
Apical Curvature [Ro] (mm)
7.68
Corneal Sagittal Height (mm)
1.517
Horizontal Visible Iris Diameter (HVID) (mm)
11.49
Calculate
Results
BE Retainer Potential (D)
0.00
Adjustment (D)
+
-3.50
Therapy Target Rx (D)
0.00
Treatment Area (mm)
0.000
New Trial
Enter the Corneal Data
Select "Calculate" to determine the patient's potential for Optimal Orthokeratology effect




The BE Retainer Software calculates the patient's potential for Rx change determined by the corneal data.

In this example, the patient's corneal data indicates a "-3.38D" potential for effect.

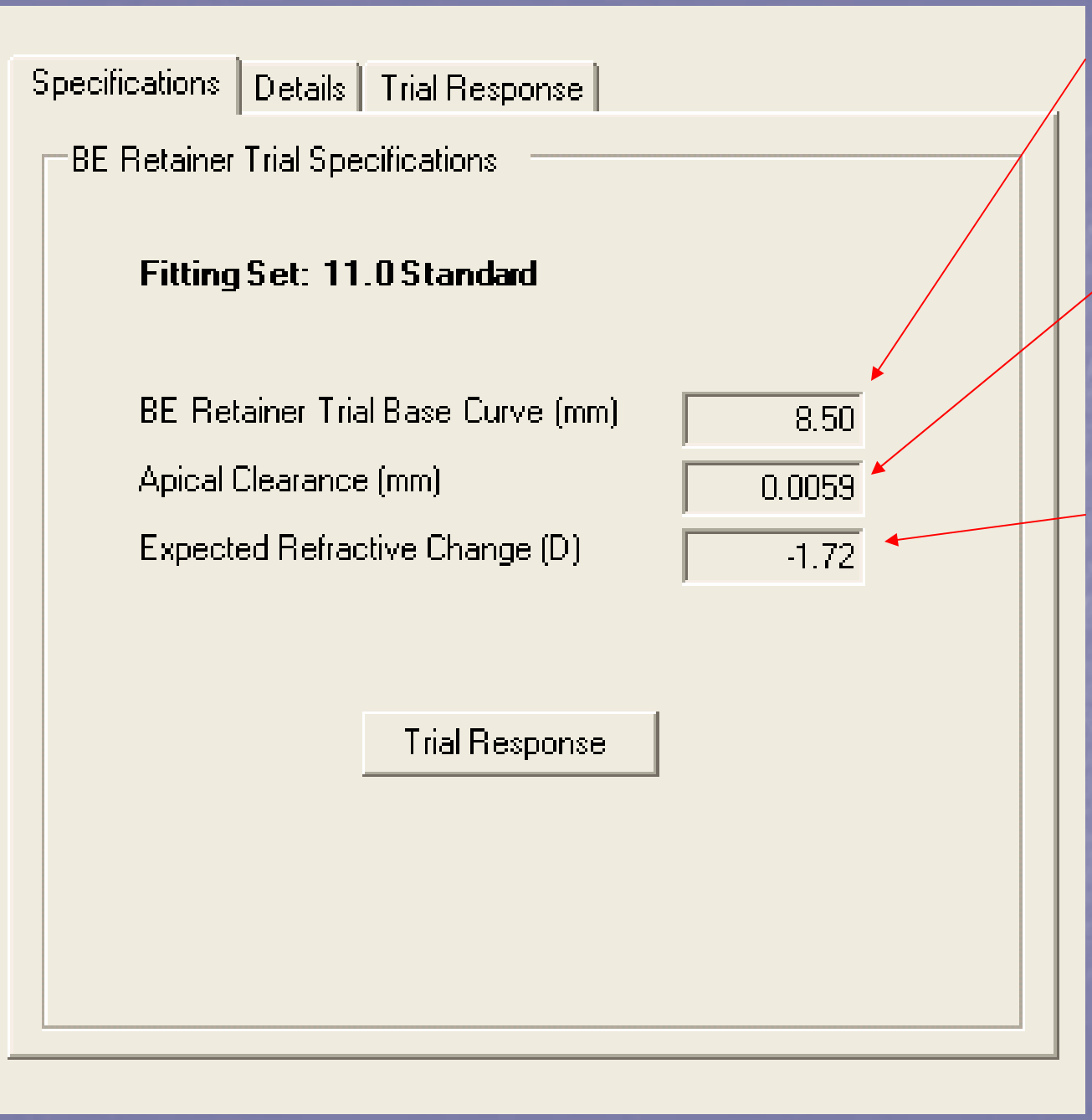
With a target of -3.50D, the "Adjustment" required to achieve target is -0.12D:

-3.38D potential
-0.12D adjustment
-3.50D Target Rx

Select "New Trial" to calculate the diagnostic

# Step 6:

# Calculate the desired BE Retainer diagnostic trial




**Calculated Trial:** Select this trial from your fitting set and dispense to the patient.

**Apical Clearance:** The predicted tear thickness between the trial and cornea. *

**Expected Refractive Change:** Predicted Rx change with the trial. *

* Indicates the predicted value IF the topography data is 100% correct. It is rare for topographers to be exact to sub-micron levels, therefore both values are purely assumptive.

# Step 7:

# Dispense and Evaluate the effects of the BE Retainer Diagnostic following wear

# Trial Evaluation

- Dispense the calculated BE Retainer diagnostic (check letter engravement)
- Instruct the patient on the proper insertion and removal techniques
- Patient inserts the BE Retainer at the end of the day
- Schedule the patient for a return to the office early in the AM

# Post-trial Evaluation

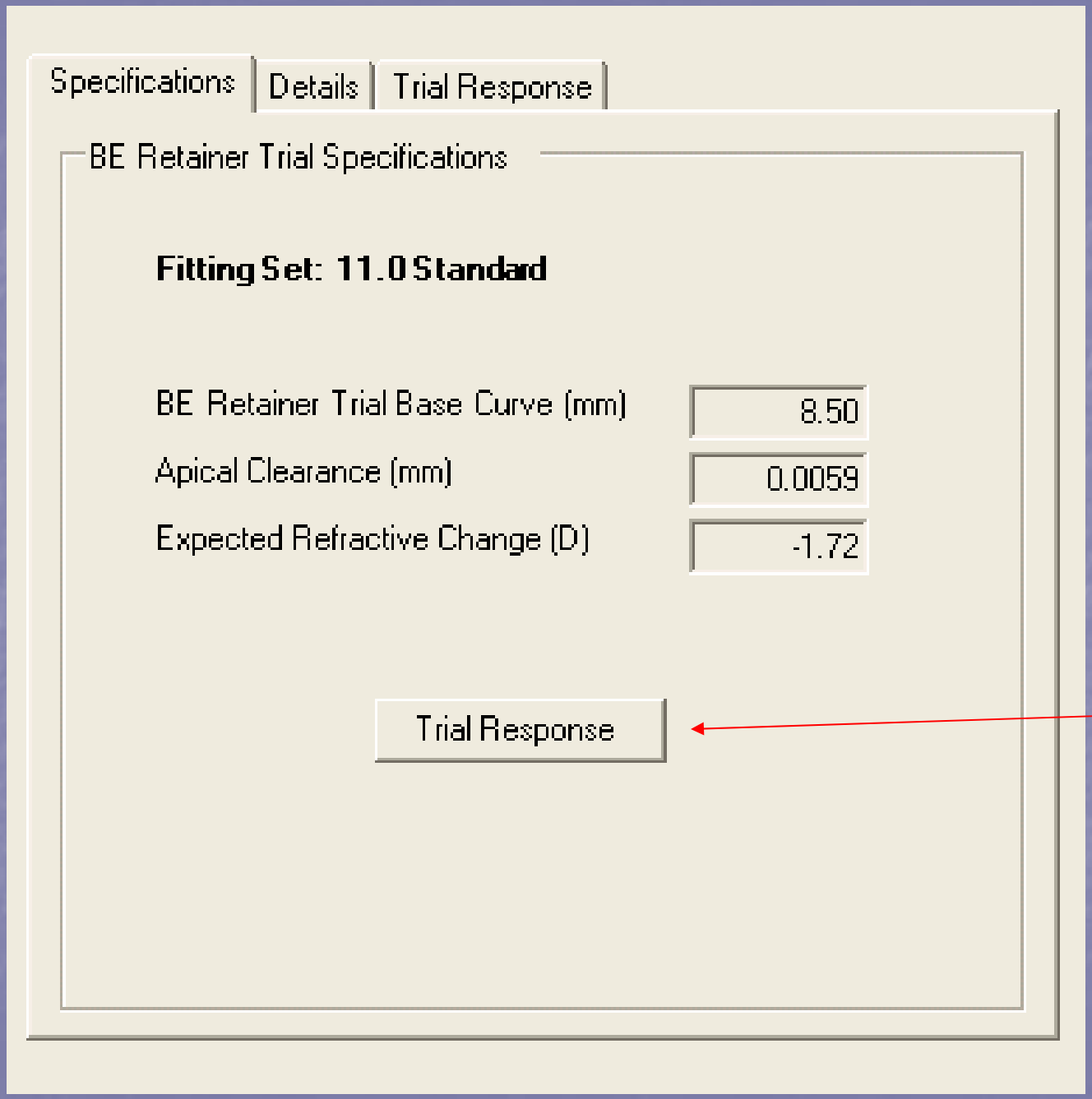
- Slit Lamp Evaluation
  - Check that the trial is not bound (press with finger on the superior and inferior sclera 3x to free)
  - Check for the proper letter engravement on each eye (correct trial in the correct eye)
  - Remove trials
  - Check, record and grade staining if present (instill artificial tears if the staining appears to be bound mucus and re-evaluate)
- Acuity and Subjective Refraction
- Perform Topography (within 20 minutes of trial removal)
  - Capture 1 good quality topography on each eye (large capture area, minimize ring jam)

# Topographical Analysis

- For each eye:
  - Select the best pretreatment map
    - Large capture area, avoid maps with anomalies due to tear inconsistency or topography error
  - Select the best post-treatment map
    - Large capture area, avoid maps with anomalies due to tear inconsistency or topography error
  - Select the “Subtractive” or “Difference” map function (comparison map option that displays the difference between pre and post corneal shape)
- What was the result?

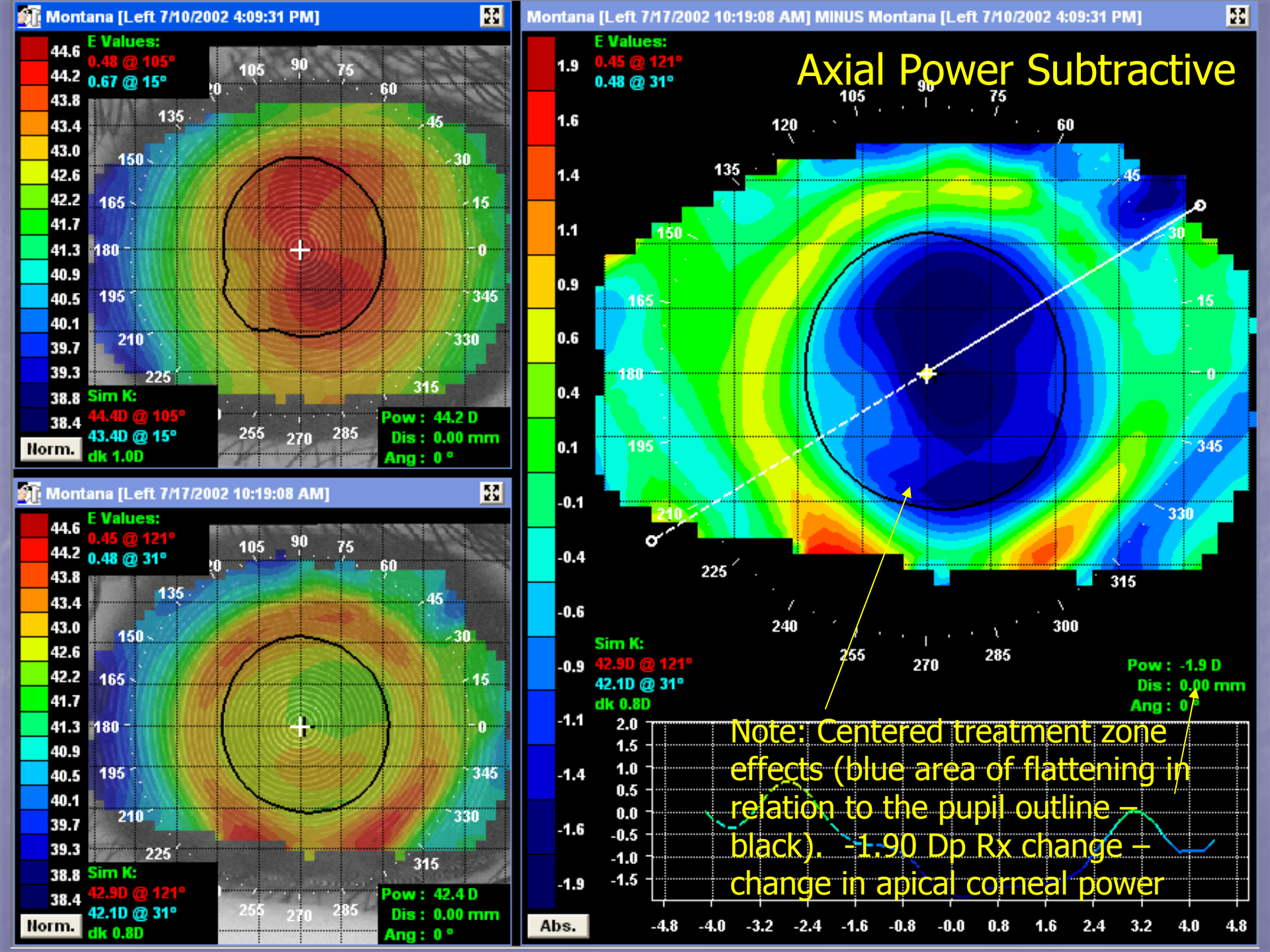
# Only 3 things can result following a BE Retainer trial:

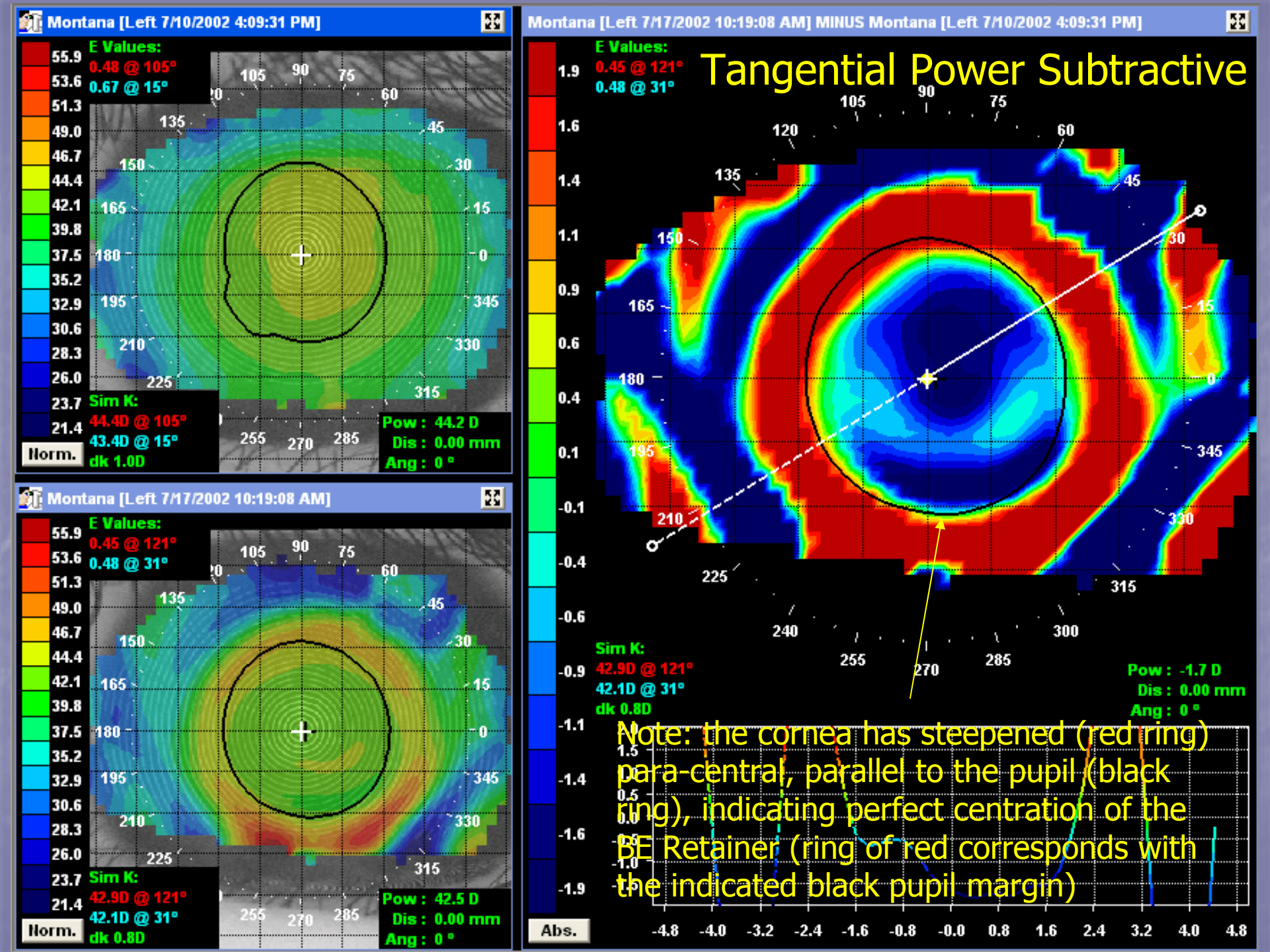
- Bulls-eye (the perfect response): topography data was accurate which resulted in an accurate trial result
- Smiley Face (requires re-trial in a steeper trial – higher sagittal height diagnostic)
- Central Island (requires re-trial in a flatter trial – lower sagittal height diagnostic)

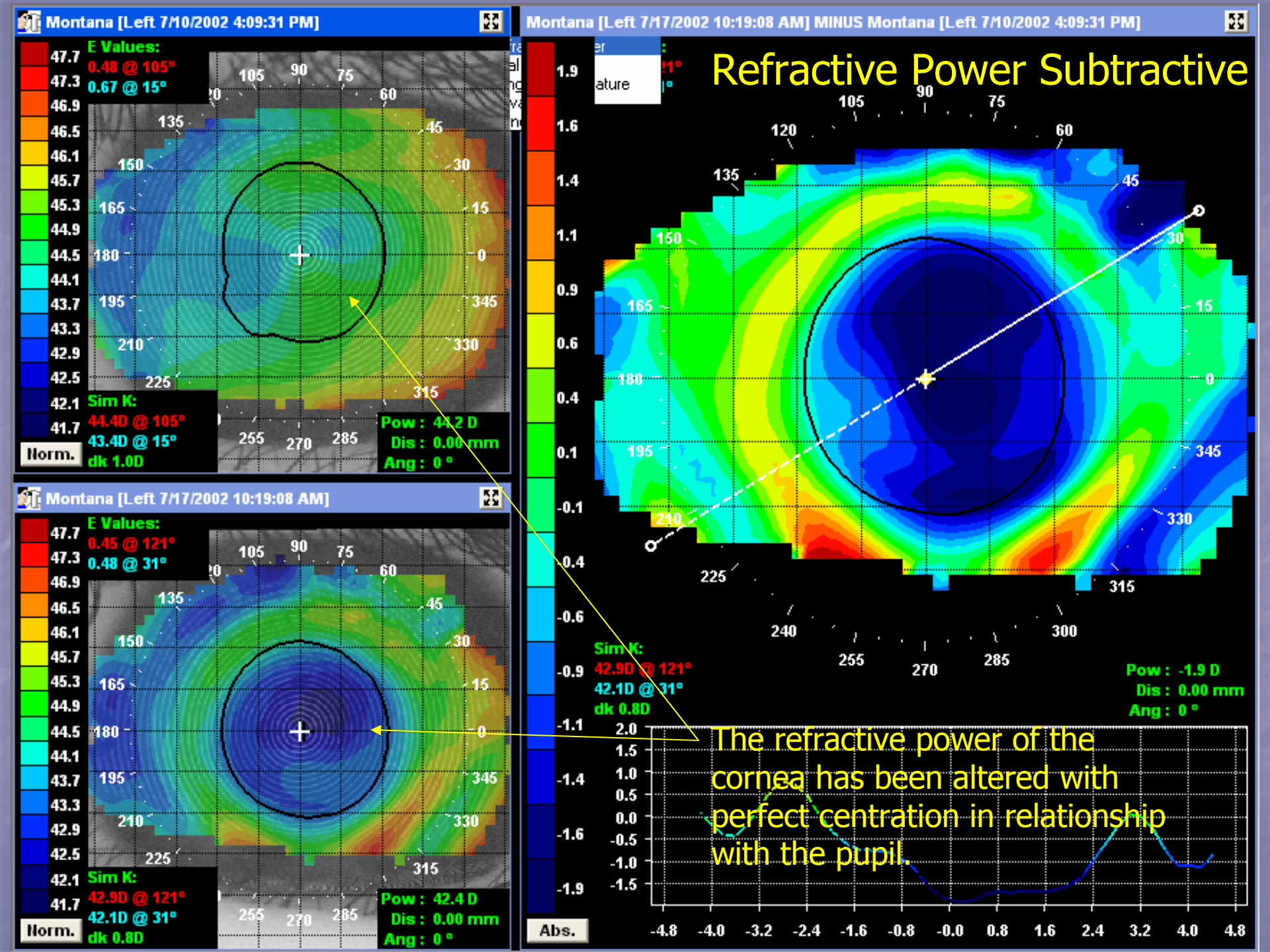



**Go back to your BE Program and Select "Trial Response"**

# What was the topographical Response? Bulls eye, Central Island or Smiley Face?


Montana [Left 7/10/2002 4:09:31 PM]
E Values:
0.48 @ 105°
0.67 @ 15°
Sim K:
44.4D @ 105°
43.4D @ 15°
dk 1.0D
Norm.
Pow : 44.2 D
Dis : 0.00 mm
Ang : 0 °
Montana [Left 7/17/2002 10:19:08 AM]
E Values:
0.45 @ 121°
0.48 @ 31°
Sim K:
42.9D @ 121°
42.1D @ 31°
dk 0.8D
Norm.
Pow : 42.4 D
Dis : 0.00 mm
Ang : 0 °
Montana [Left 7/17/2002 10:19:08 AM] MINUS Montana [Left 7/10/2002 4:09:31 PM]
Axial Power Subtractive
E Values:
0.45 @ 121°
0.48 @ 31°
Sim K:
42.9D @ 121°
42.1D @ 31°
dk 0.8D
Abs.
Pow : -1.9 D
Dis : 0.00 mm
Ang : 0°
Note: Centered treatment zone effects (blue area of flattening in relation to the pupil outline – black). -1.90 Dp Rx change – change in apical corneal power


Montana [Left 7/10/2002 4:09:31 PM]
E Values:
0.48 @ 105°
0.67 @ 15°
Sim K:
44.4D @ 105°
43.4D @ 15°
dk 1.0D
Pow : 44.2 D
Dis : 0.00 mm
Ang : 0 °
Norm.
Montana [Left 7/17/2002 10:19:08 AM]
E Values:
0.45 @ 121°
0.48 @ 31°
Sim K:
42.9D @ 121°
42.1D @ 31°
dk 0.8D
Pow : 42.5 D
Dis : 0.00 mm
Ang : 0 °
Norm.
Montana [Left 7/17/2002 10:19:08 AM] MINUS Montana [Left 7/10/2002 4:09:31 PM]
Tangential Power Subtractive
E Values:
0.45 @ 121°
0.48 @ 31°
Sim K:
42.9D @ 121°
42.1D @ 31°
dk 0.8D
Pow : -1.7 D
Dis : 0.00 mm
Ang : 0 °
Abs.
Note: the cornea has steepened (red ring) para-central, parallel to the pupil (black ring), indicating perfect centration of the BE Retainer (ring of red corresponds with the indicated black pupil margin)


Montana [Left 7/10/2002 4:09:31 PM]
E Values:
0.48 @ 105°
0.67 @ 15°
Sim K:
44.4D @ 105°
43.4D @ 15°
dk 1.0D
Norm.
Pow : 44.2 D
Dis : 0.00 mm
Ang : 0 °
Montana [Left 7/17/2002 10:19:08 AM]
E Values:
0.45 @ 121°
0.48 @ 31°
Sim K:
42.9D @ 121°
42.1D @ 31°
dk 0.8D
Norm.
Pow : 42.4 D
Dis : 0.00 mm
Ang : 0 °
Montana [Left 7/17/2002 10:19:08 AM] MINUS Montana [Left 7/10/2002 4:09:31 PM]
Refractive Power Subtractive
Sim K:
42.9D @ 121°
42.1D @ 31°
dk 0.8D
Pow : -1.9 D
Dis : 0.00 mm
Ang : 0 °
Abs.
The refractive power of the cornea has been altered with perfect centration in relationship with the pupil.

# Step 8:

# Calculate the Custom BE Retainer

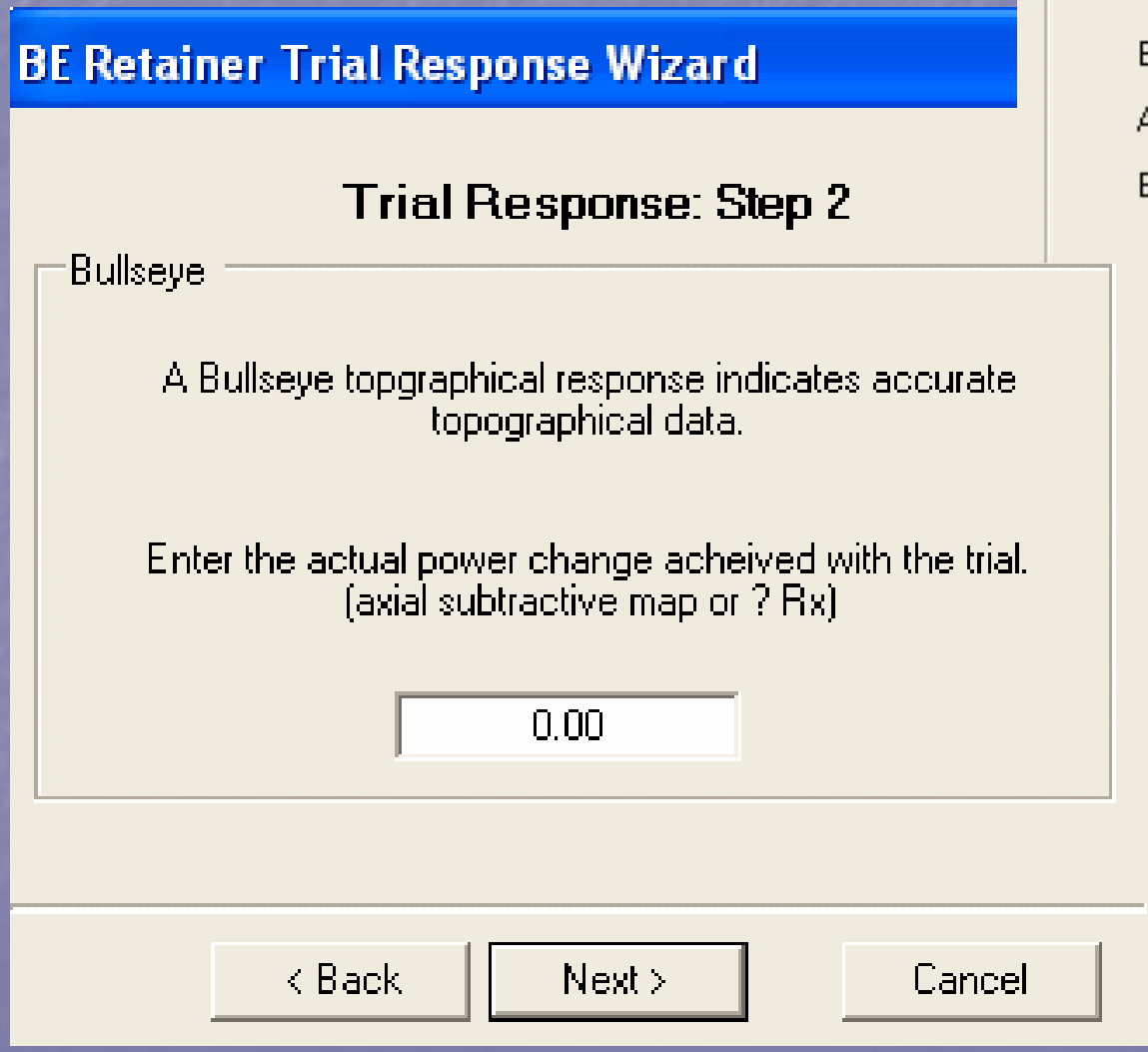
# What was the topographical response?

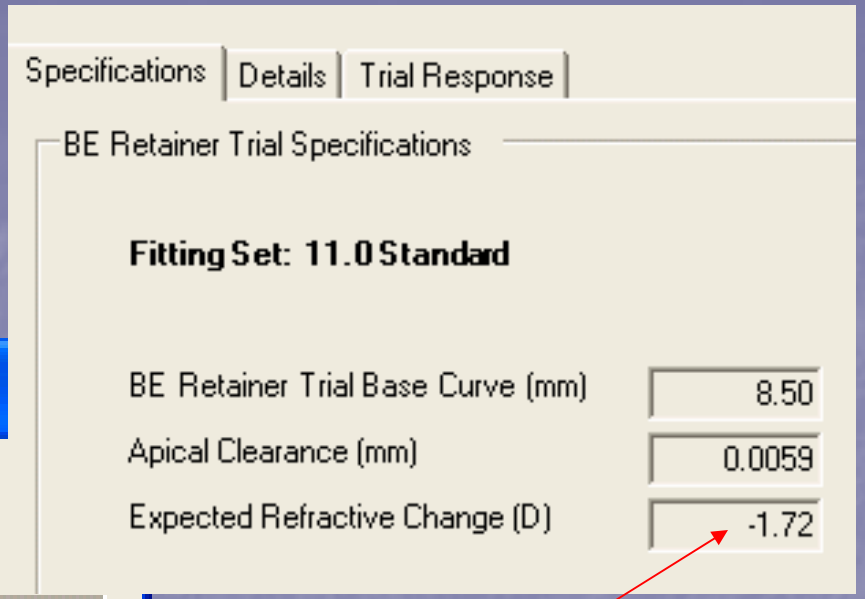
In this case, the topography indicates a perfect "Bulls eye" corneal response on each subtractive map:

- Axial
- Tangential
- Refractive

Select "Bulls-eye" response and "Next"

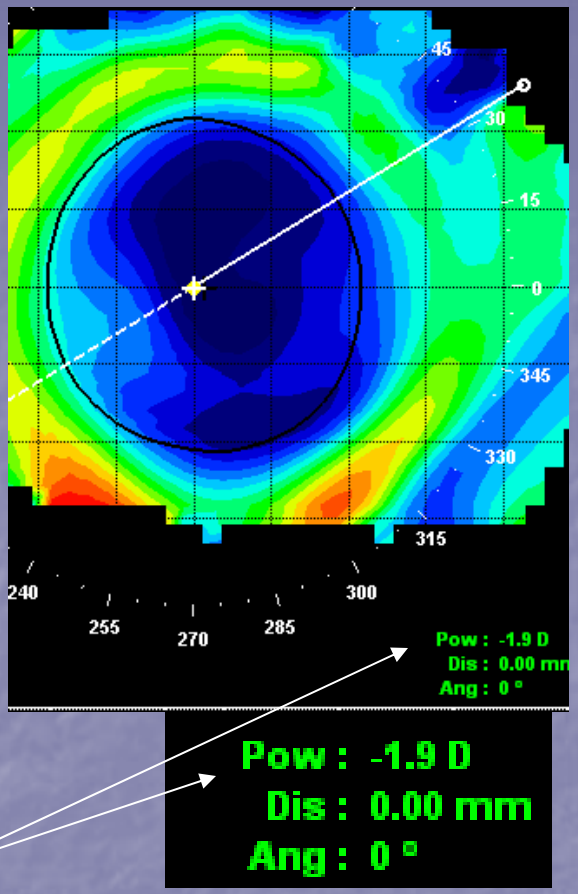
# Did the trial perform as predicted?

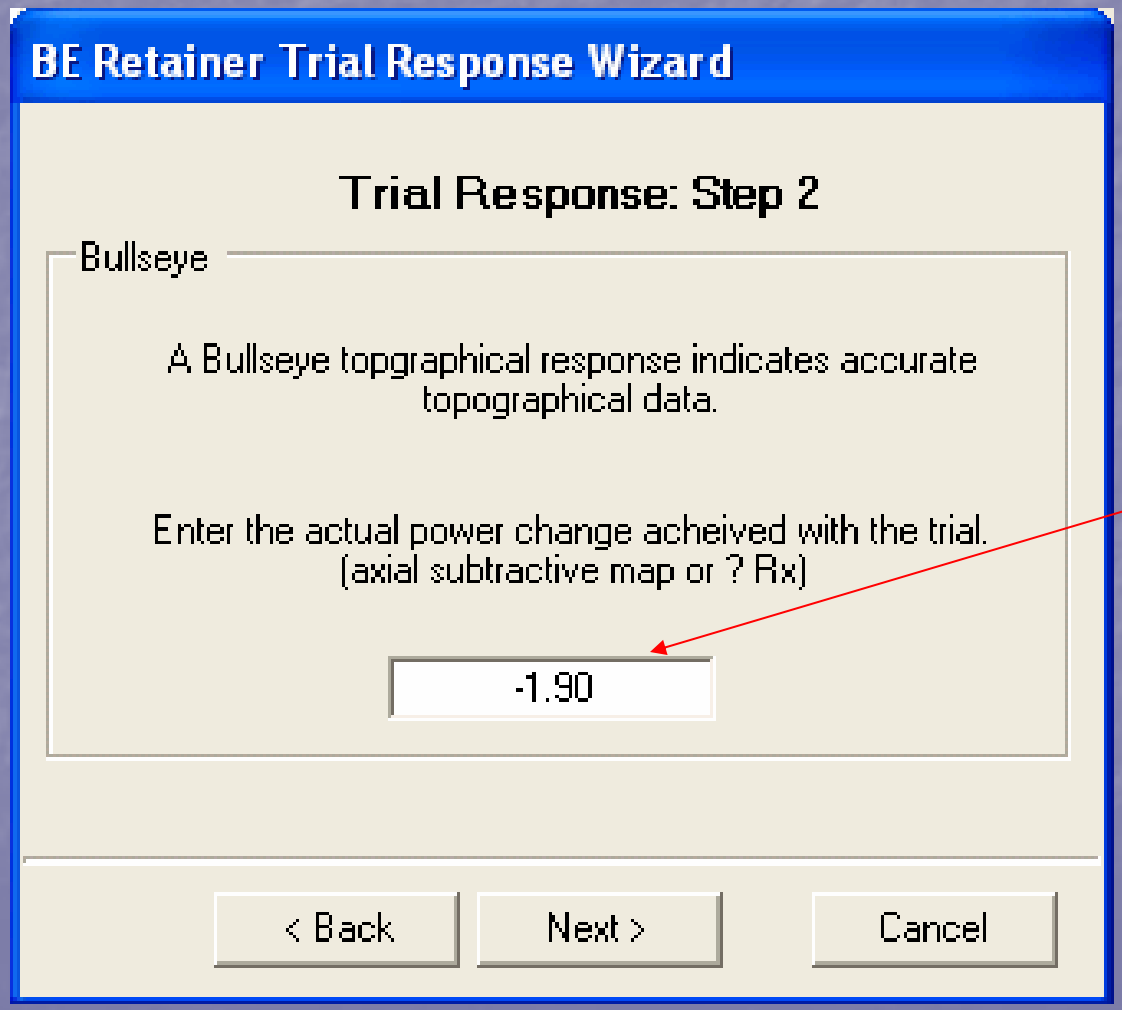



The trial was "predicted" to result with a certain Rx change. If the trial performed as predicted, the corneal data was 100% correct. If the trial performed outside of refractive expectation, the corneal data was slightly in error. The BE Retainer software will account for this error and adjust the custom order parameters to result in the ideal Optimal Orthokeratology effect.

# What was the actual Rx change achieved with the trial?



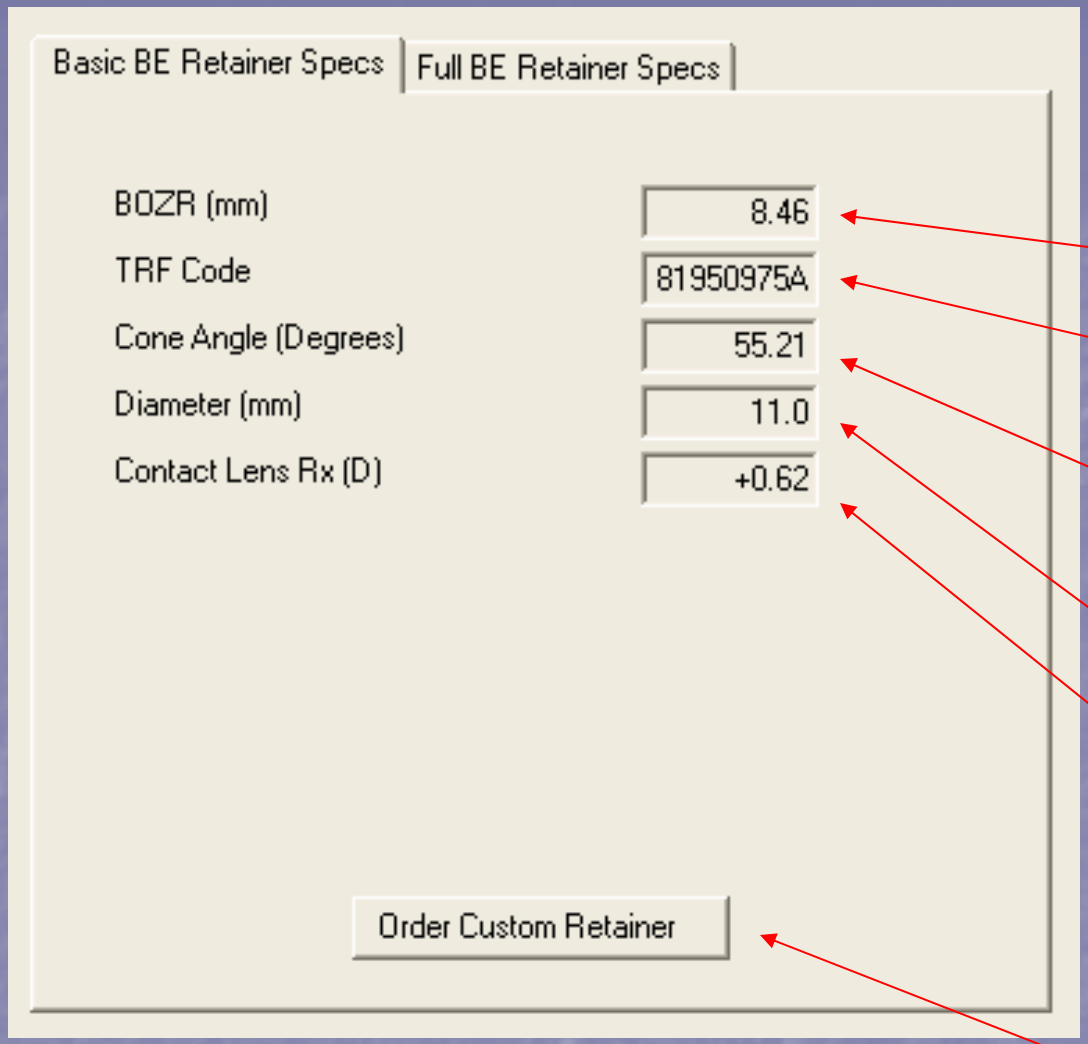




Pow : -1.9 D
Dis : 0.00 mm
Ang : 0 °

Select the "axial power subtractive" map to display the change in apical corneal power. There is a 1:1 relationship between the change in ACP and the Rx change. Another method would be to measure the difference in pre and post treatment Rx.

The Rx change with the trial results in one of two responses. Either the trial performed within the expectation/prediction or it did not. If the diagnostic performed within refractive range of the trial prediction, the upper left message would appear. If the diagnostic refractively performed outside of the trial prediction, then the upper right message would appear.

The BE Retainer software takes either of the above responses and calculates the appropriate custom BE Retainer. This step completes the trial process. Select "Finish" to calculate the custom BE Retainer parameters.




Custom BE Retainer parameters:

Base Curve

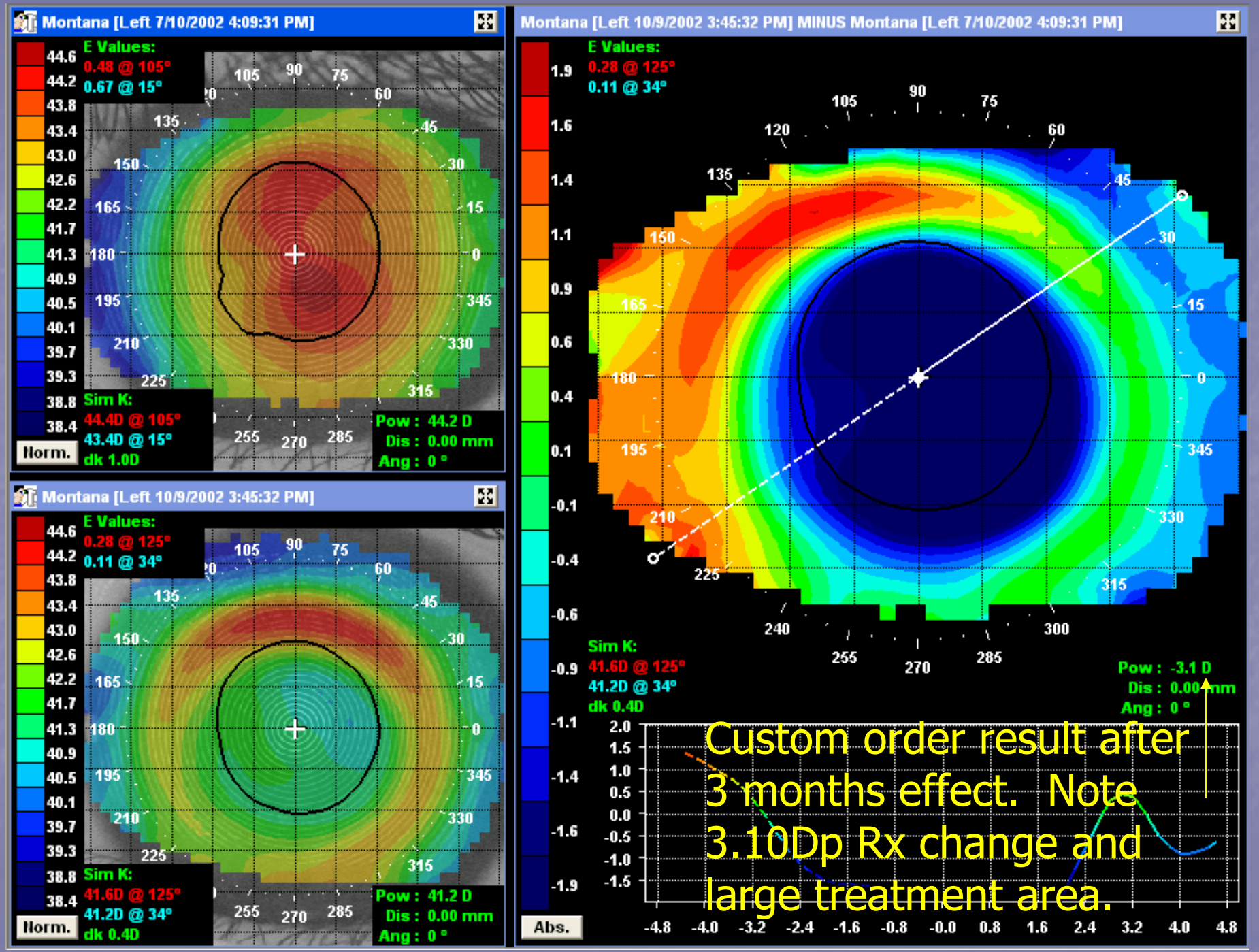
Reverse curves manufacturing code

Angle of fitting zone curve (angle of tangent)

Diameter of retainer

Power of retainer

Select "Order Custom Retainer" to generate the BE Retainer order form


Montana [Left 7/10/2002 4:09:31 PM]
E Values:
0.48 @ 105°
0.67 @ 15°
Sim K:
44.4D @ 105°
43.4D @ 15°
dk 1.0D
Norm.
Pow : 44.2 D
Dis : 0.00 mm
Ang : 0 °
Montana [Left 10/9/2002 3:45:32 PM]
E Values:
0.28 @ 125°
0.11 @ 34°
Sim K:
41.6D @ 125°
41.2D @ 34°
dk 0.4D
Norm.
Pow : 41.2 D
Dis : 0.00 mm
Ang : 0 °
Montana [Left 10/9/2002 3:45:32 PM] MINUS Montana [Left 7/10/2002 4:09:31 PM]
E Values:
0.28 @ 125°
0.11 @ 34°
Sim K:
41.6D @ 125°
41.2D @ 34°
dk 0.4D
Abs.
Pow : -3.1 D
Dis : 0.00 mm
Ang : 0 °
Custom order result after 3 months effect. Note 3.10Dp Rx change and large treatment area.

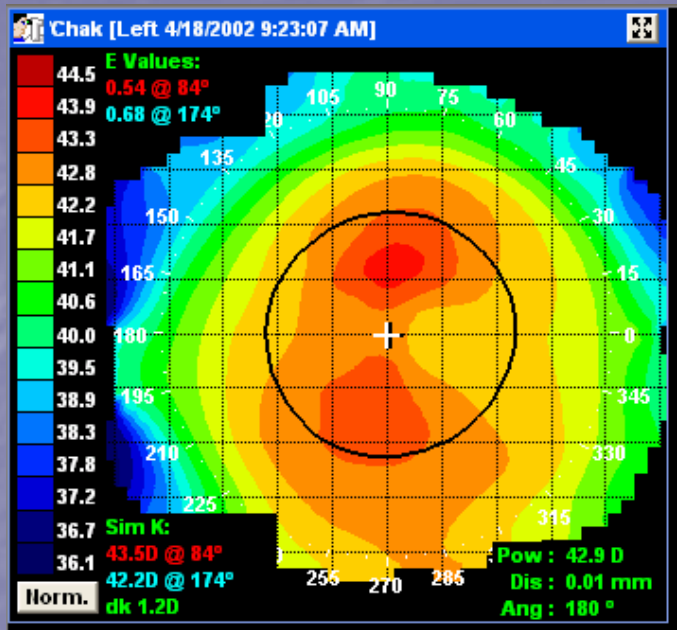
# Only 3 Things Can Happen following Optimal Orthokeratology

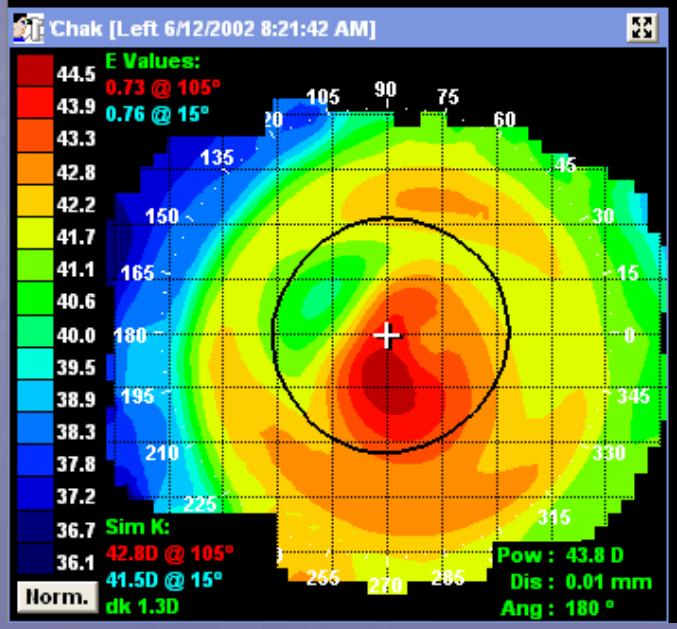
Bulls-Eye,

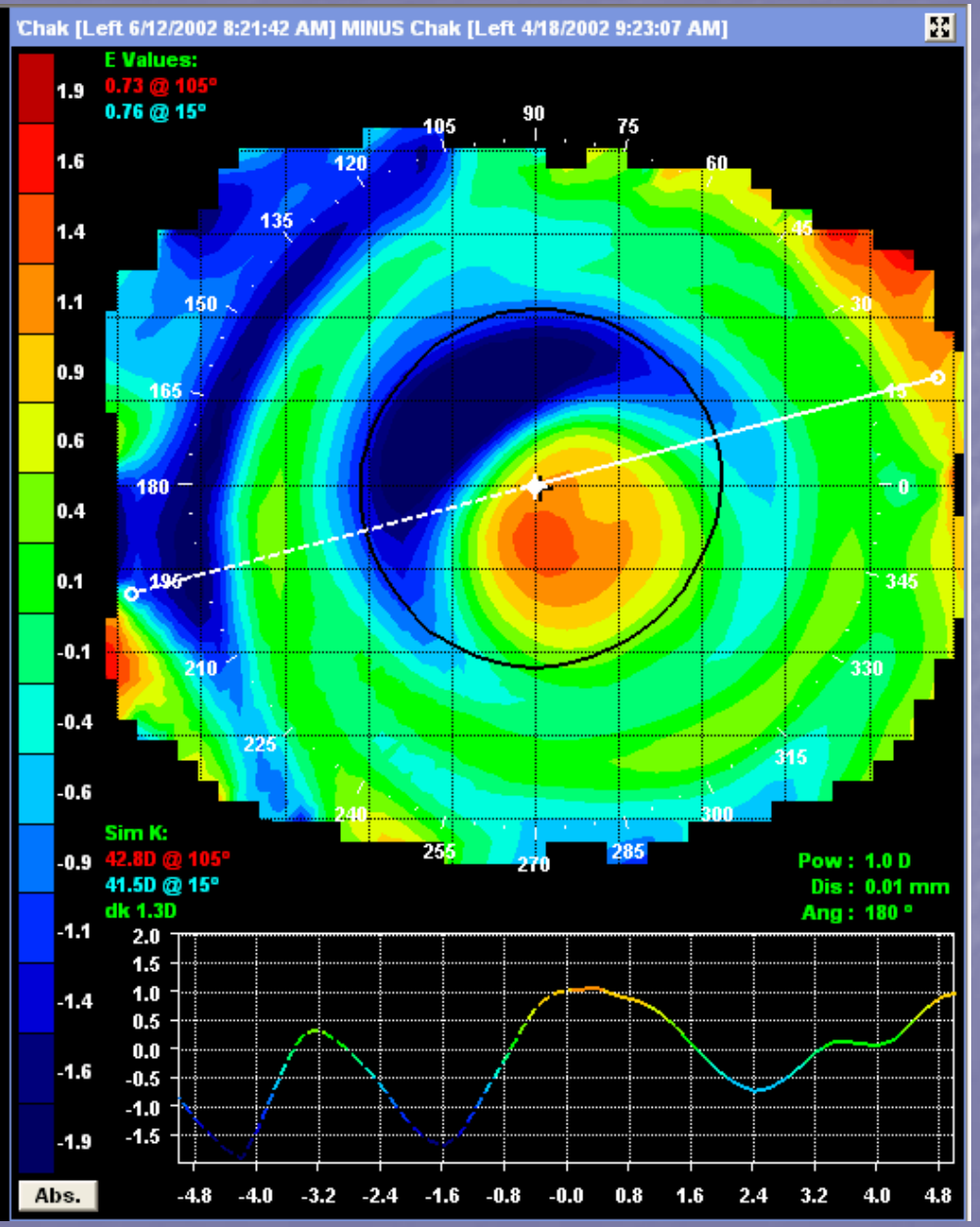
Central Island or

Smiley Face

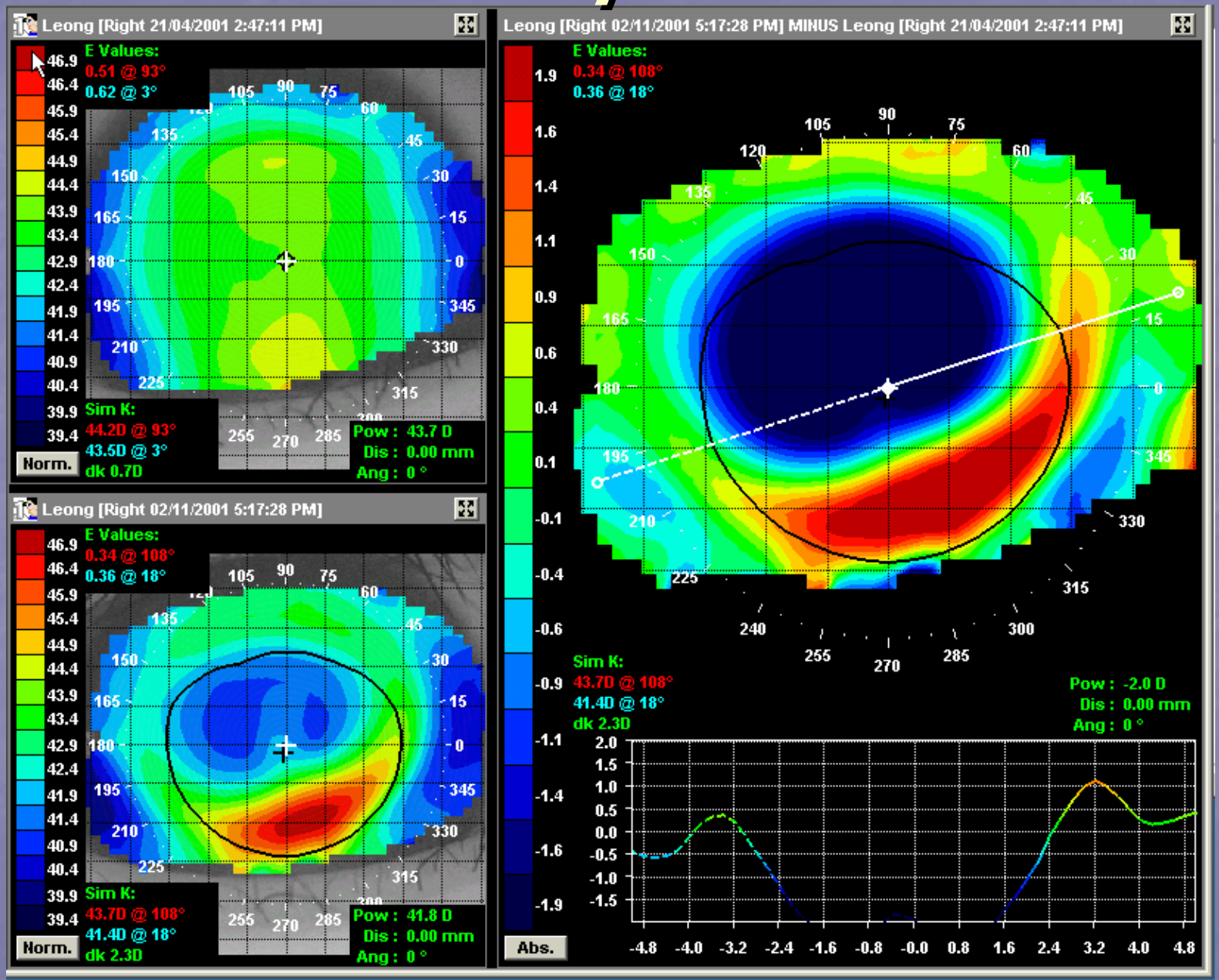
# Central Island



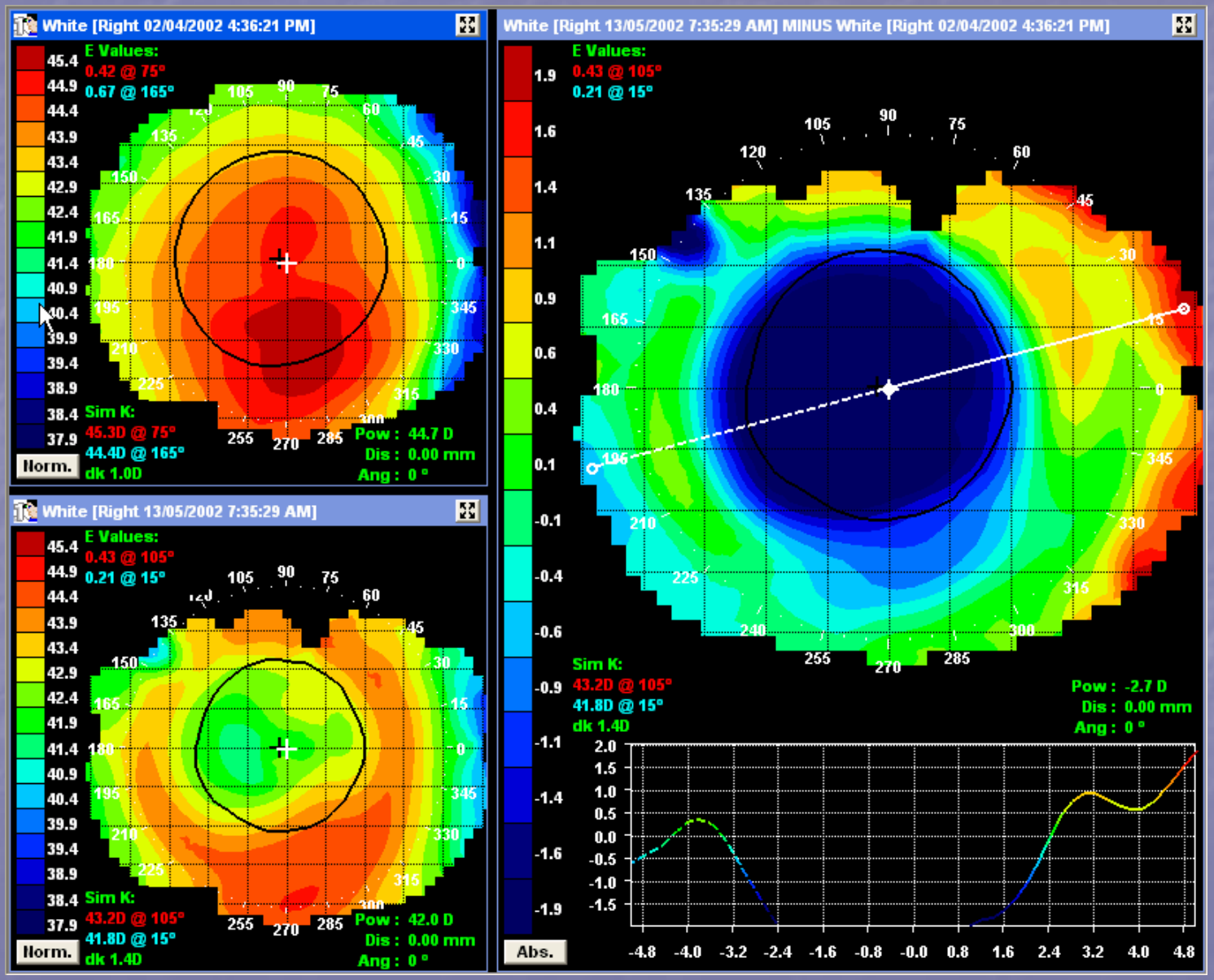



# Smiley Face


Leong [Right 21/04/2001 2:47:11 PM]
E Values:
0.51 @ 93°
0.62 @ 3°
Sim K:
44.2D @ 93°
43.5D @ 3°
dk 0.7D
Pow : 43.7 D
Dis : 0.00 mm
Ang : 0 °
Norm.
Leong [Right 02/11/2001 5:17:28 PM]
E Values:
0.34 @ 108°
0.36 @ 18°
Sim K:
43.7D @ 108°
41.4D @ 18°
dk 2.3D
Pow : 41.8 D
Dis : 0.00 mm
Ang : 0 °
Norm.
Leong [Right 02/11/2001 5:17:28 PM] MINUS Leong [Right 21/04/2001 2:47:11 PM]
E Values:
0.34 @ 108°
0.36 @ 18°
Sim K:
43.7D @ 108°
41.4D @ 18°
dk 2.3D
Pow : -2.0 D
Dis : 0.00 mm
Ang : 0 °
Abs.

# Bulls-eye


White [Right 02/04/2002 4:36:21 PM]
E Values:
0.42 @ 75°
0.67 @ 165°
Sim K:
45.3D @ 75°
44.4D @ 165°
dk 1.0D
Norm.
Pow : 44.7 D
Dis : 0.00 mm
Ang : 0 °
White [Right 13/05/2002 7:35:29 AM]
E Values:
0.43 @ 105°
0.21 @ 15°
Sim K:
43.2D @ 105°
41.8D @ 15°
dk 1.4D
Norm.
Pow : 42.0 D
Dis : 0.00 mm
Ang : 0 °
White [Right 13/05/2002 7:35:29 AM] MINUS White [Right 02/04/2002 4:36:21 PM]
E Values:
0.43 @ 105°
0.21 @ 15°
Sim K:
43.2D @ 105°
41.8D @ 15°
dk 1.4D
Pow : -2.7 D
Dis : 0.00 mm
Ang : 0 °
Abs.

# Optimal Orthokeratology Flow sheet

- Patient Work-up (Evaluate for candidacy)
- Perform Topography (4 captures per eye)
- Evaluate Maps (accuracy and consistency)
- Record
  - Apical Curvature (Ro)
  - Sagittal Height (Sag) OR Eccentricity
  - Horizontal Visible Iris Diameter (HVID)
  - Rx (Therapy target – add regression factor)

# Optimal Orthokeratology Flow sheet (continued)

- Enter corneal data in the BE Retainer Software
- Calculate and evaluate corneal potential for effect (discontinue if the patient is not an Rx or Treatment zone candidate)
- Calculate trials
- Schedule trial & evaluation
- Dispense trials

# Optimal Orthokeratology Flow sheet (continued)

- Evaluation
  - Evaluate movement (free if bound)
  - Check letter engravement (correct trial in the correct eye)
  - Remove trials
  - Check for staining and evaluate physiological response
  - Acuity
- Perform topography (1 quality capture on each eye – within 20 minutes of retainer removal)

# Optimal Orthokeratology Flow sheet (continued)

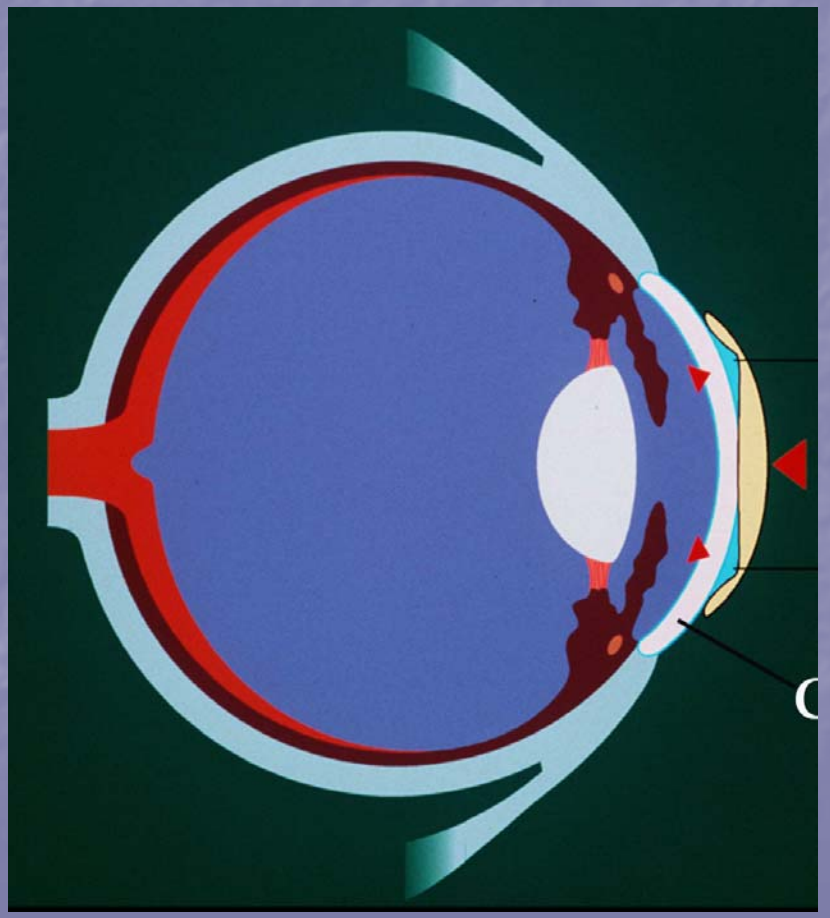
- Evaluate topographical response (Subtractive/Difference maps – axial, tangential, refractive)
- Continue trial if inconclusive (2-7 days)
- Discontinue trial if obvious Bulls-eye, Central Island or Smiley Face
- Trial fit to achieve a Bulls-eye topographical response
- Record Rx change with the trial (apex of Axial power subtractive map or Δ in Rx)
- Calculate Custom order BE Retainer once a Bulls-eye has been achieved

# Optimal Orthokeratology Flow sheet (continued)

- Dispense custom BE Retainer
- Schedule patient for:
  - 1 day in custom order (AM evaluation)
  - 1 week (AM Evaluation)
  - 1 month (PM) – dispense back-up and review wear schedule
  - 6 months – review wear schedule
  - 12 month – check for deposits

# *The BE Retainer:* Optimal Orthokeratology Concepts

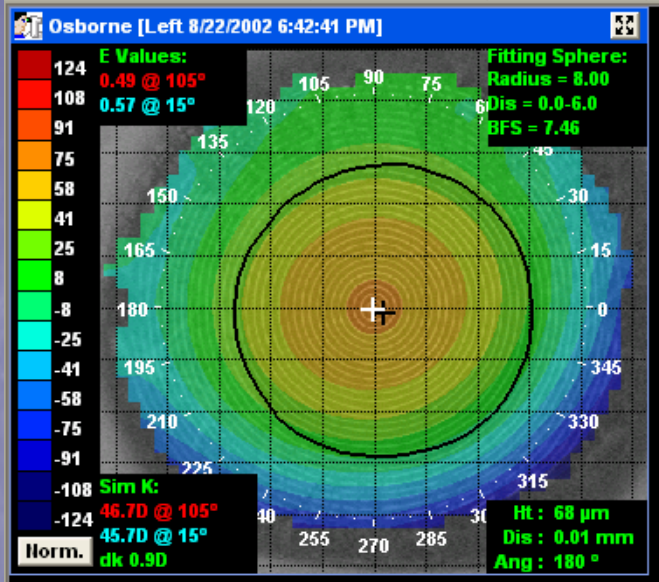
- Epithelial Displacement
- Treatment Zone Size
- Sphericalization
- Eccentricity
- Squeeze Film Force

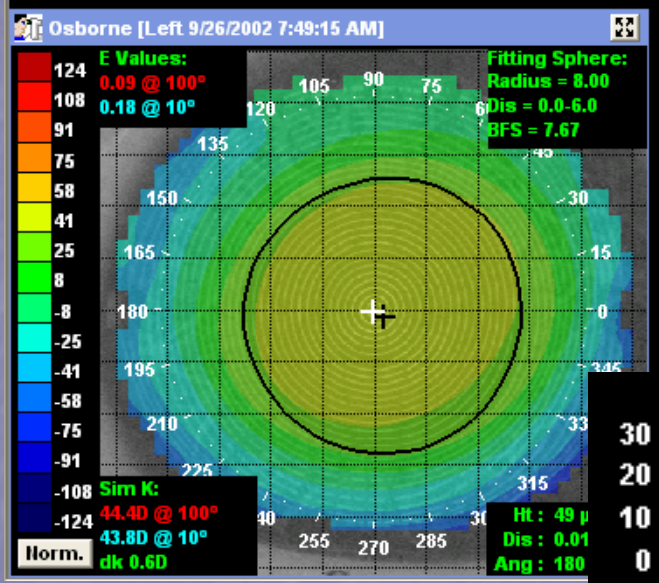


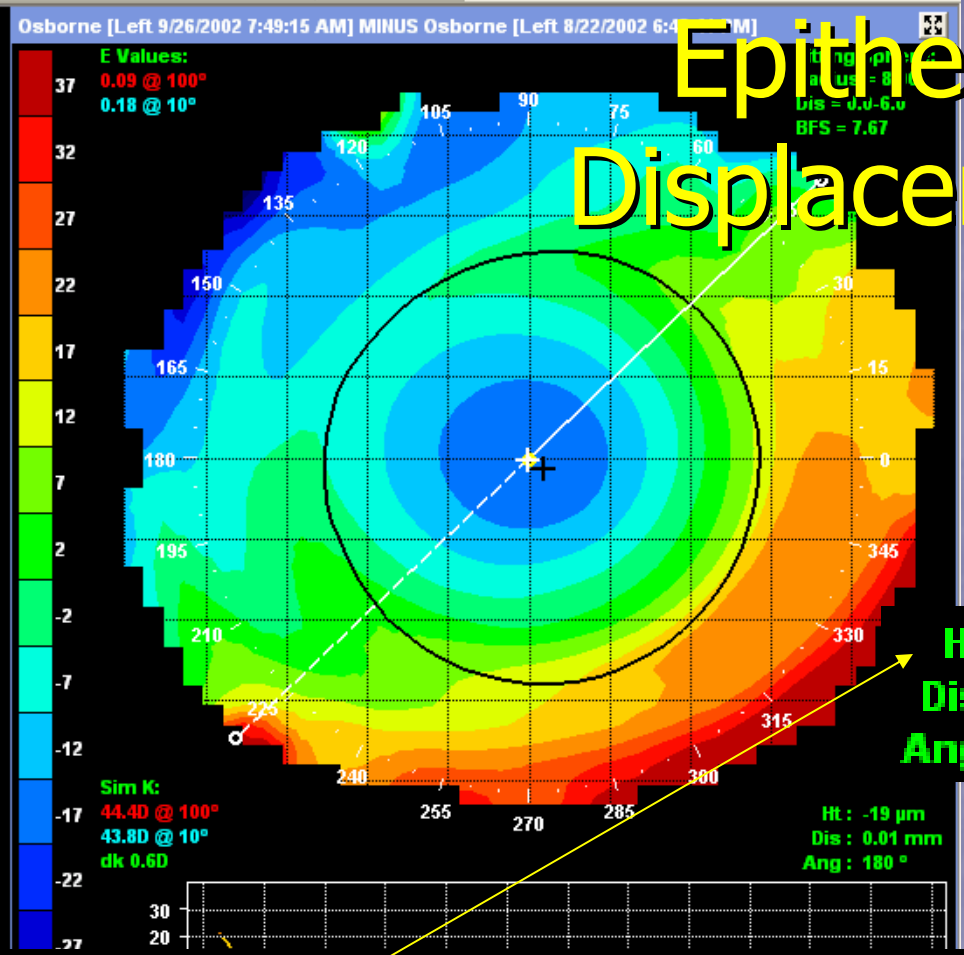
# *The BE Retainer:* Epithelial Displacement

- Optimal Orthokeratology involves the movement of epithelium tissue
- Epithelium is 50um thick (0.05mm)
- Consists of 5-6 layers of cells which behave like fluid when tangential forces are applied
- Epithelium has an ability to compress or displace
- Studies indicate that the maximum "thinning" of the epithelium following orthokeratology is 20um (Alhabri, Swarbrick - 2003)

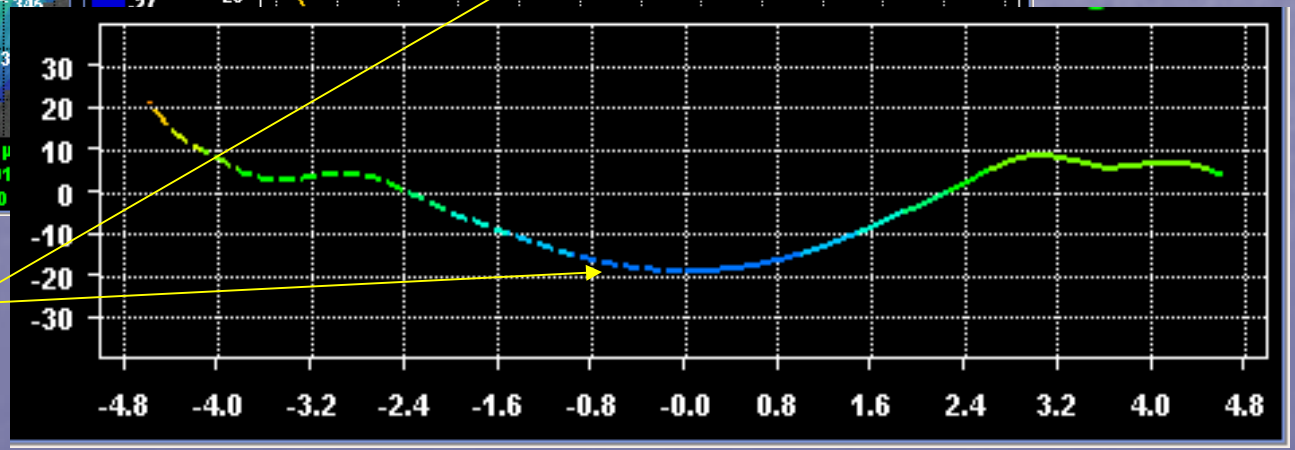
# Epithelial Displacement



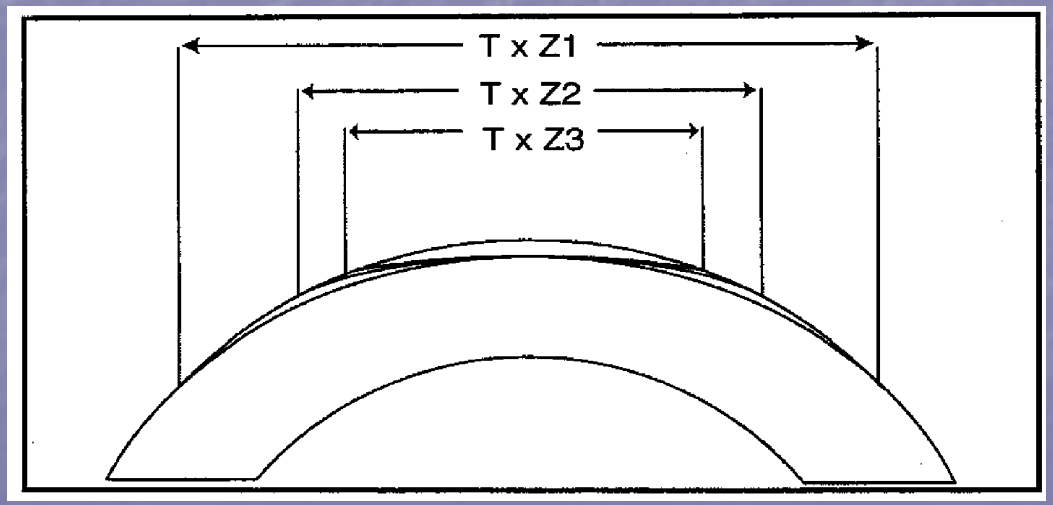

Ht : -19 µm
Dis : 0.01 mm
Ang : 180 °




- Maximum epithelial displacement is 20um

# *The BE Retainer:* Treatment Zones

- If the maximum displacement is 20um, any additional flattening of the apical curvature must occur over a smaller area (Munnerlyn's Formula)




The higher the Rx change desired, the smaller the treatment zone must become

# *The BE Retainer:* Treatment Zones & Rx Change

- Flat K = 43.00Dp
- Sag over 9.35mm Cord = 1500 microns

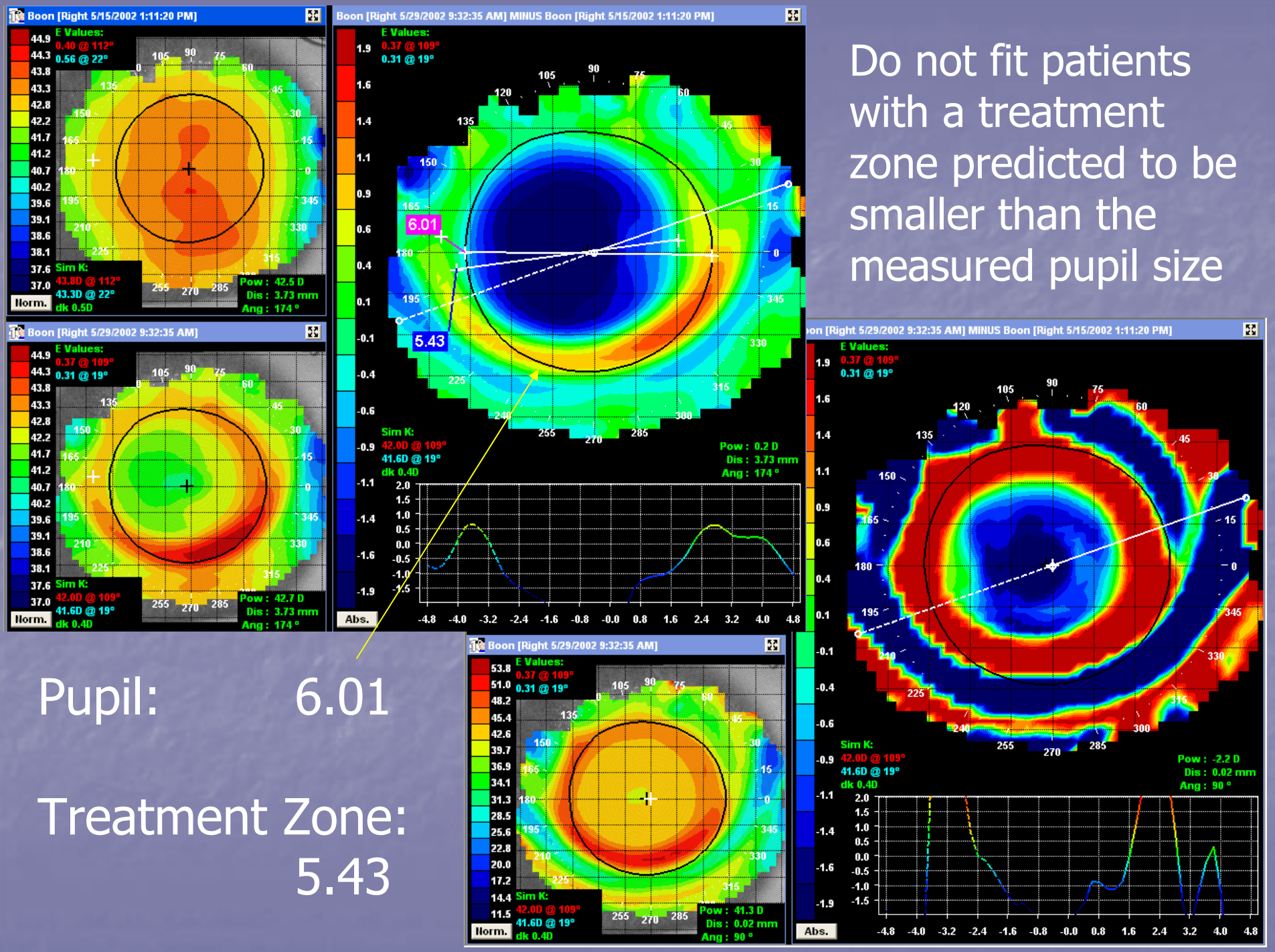
| Desired Rx Change | Resultant Treatment zone |
|---|---|
| -0.50 | +7.0mm |
| -1.00 | 6.8 |
| -2.00 | 6.4 |
| -3.00 | 5.2 |
| -4.00 | 4.7 |
| -5.00 | 4.2 |
| -6.00 | 3.7 |

The higher the Rx change, the smaller the treatment zone

# Treatment Zone following Optimal Orthokeratology Therapy

The higher the refractive change required, the smaller the treatment zone.

The lower the refractive change required, the larger the treatment zone




Do not fit patients with a treatment zone predicted to be smaller than the measured pupil size

Pupil: 6.01

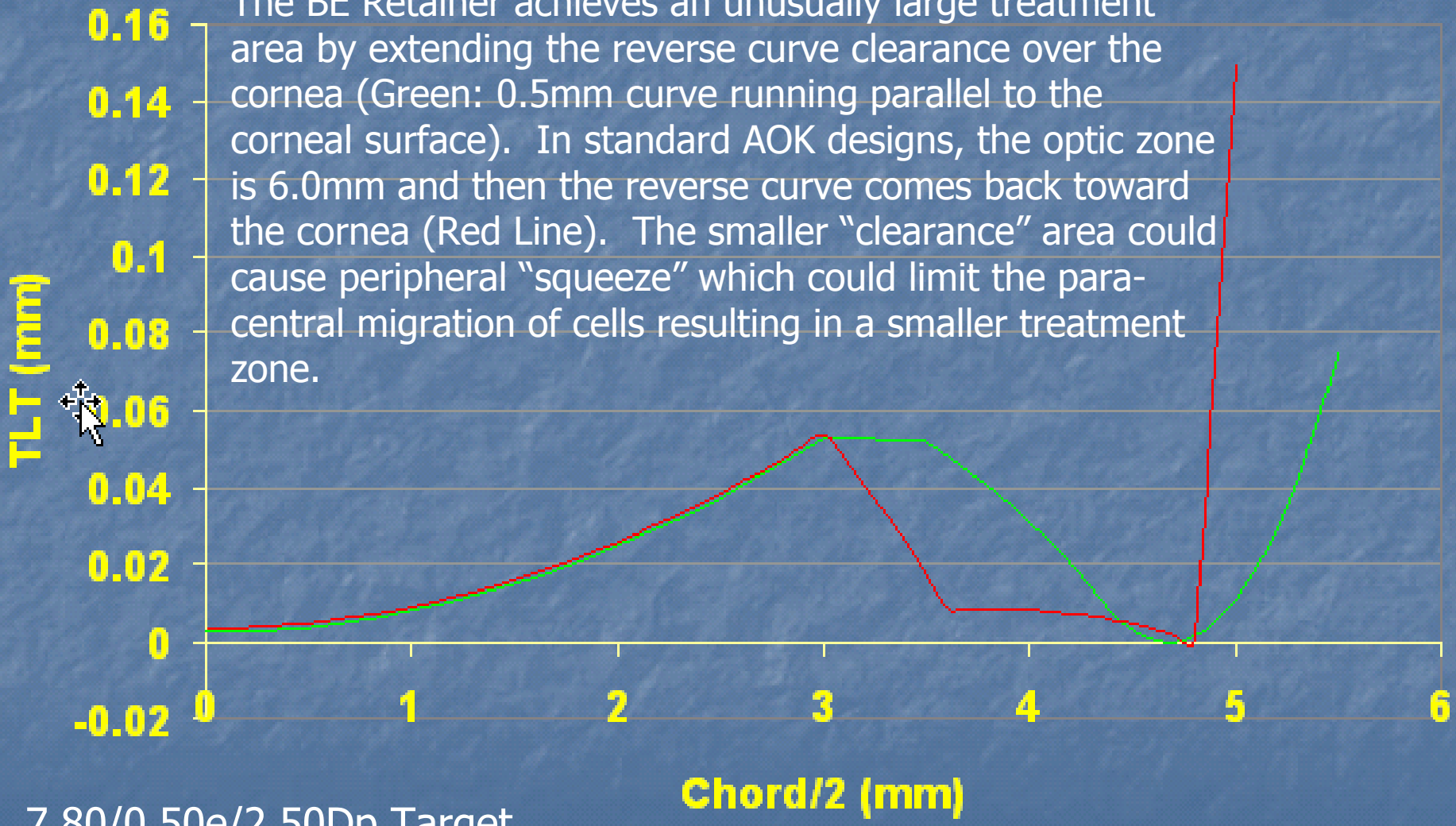
Treatment Zone: 5.43

# Why is treatment zone important?

Too small a treatment zone results in flare, glare and reduced visual acuity!

# BE Retainer vs. AOK

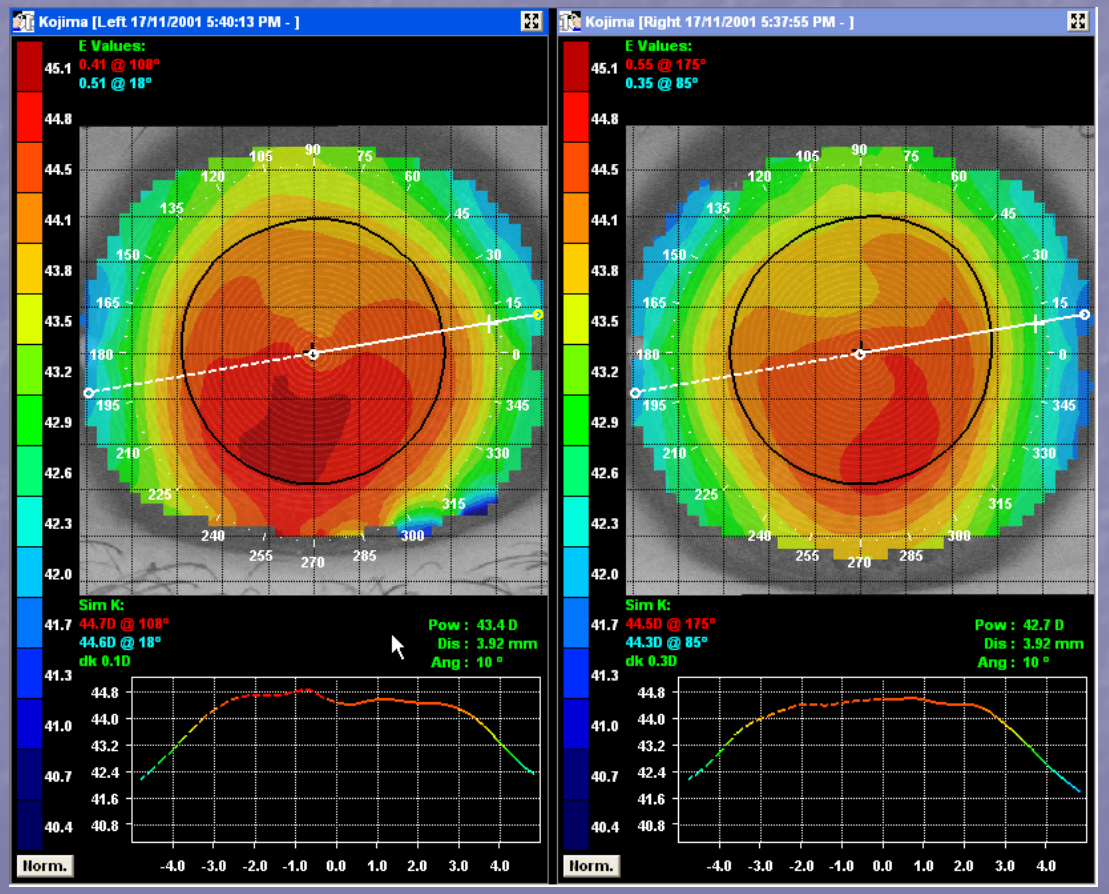
The BE Retainer achieves an unusually large treatment area by extending the reverse curve clearance over the cornea (Green: 0.5mm curve running parallel to the corneal surface). In standard AOK designs, the optic zone is 6.0mm and then the reverse curve comes back toward the cornea (Red Line). The smaller "clearance" area could cause peripheral "squeeze" which could limit the para-central migration of cells resulting in a smaller treatment zone.




7.80/0.50e/2.50Dp Target

# *The BE Retainer:* Sphericalization

What is the shape of the cornea?

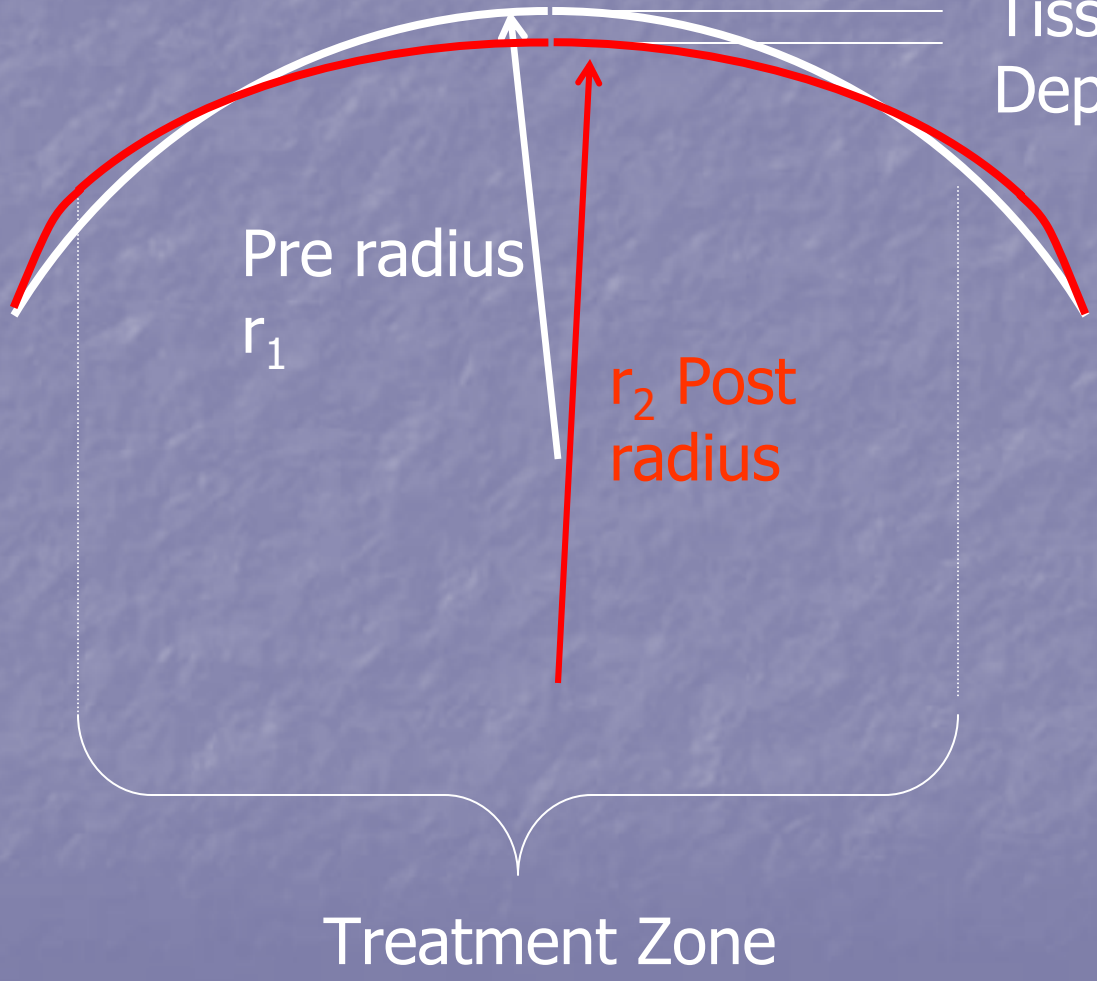


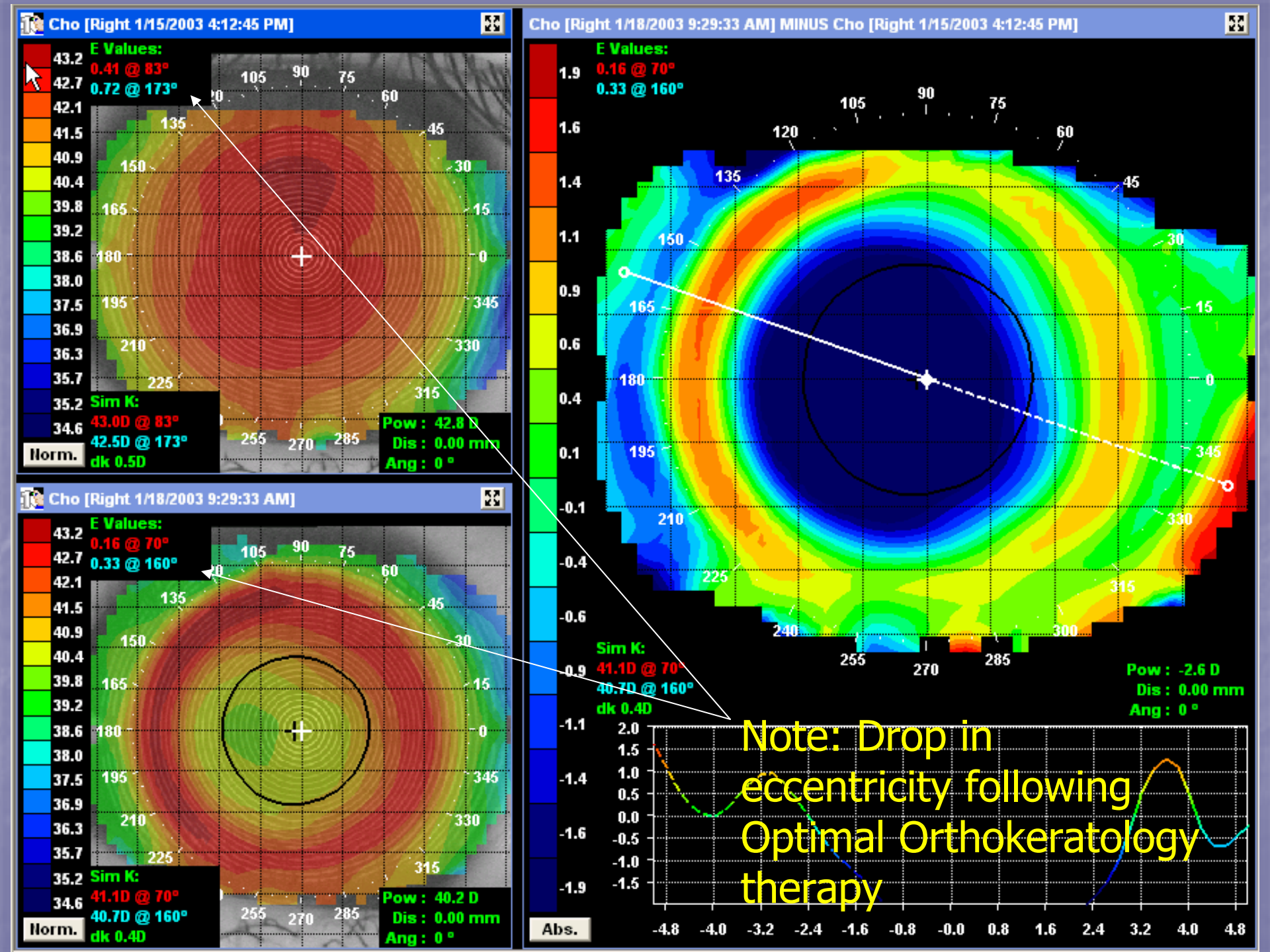
-Orthokeratology involves the sphericalization of the cornea

Epithelial cells are shifted from the center to the periphery, creating our required minus correction through tissue displacement and therefore the change in corneal refractive power

-Regardless of the design, all Orthokeratology, AOK, OOK results are the same: Sphericalization!

# Sphericalization

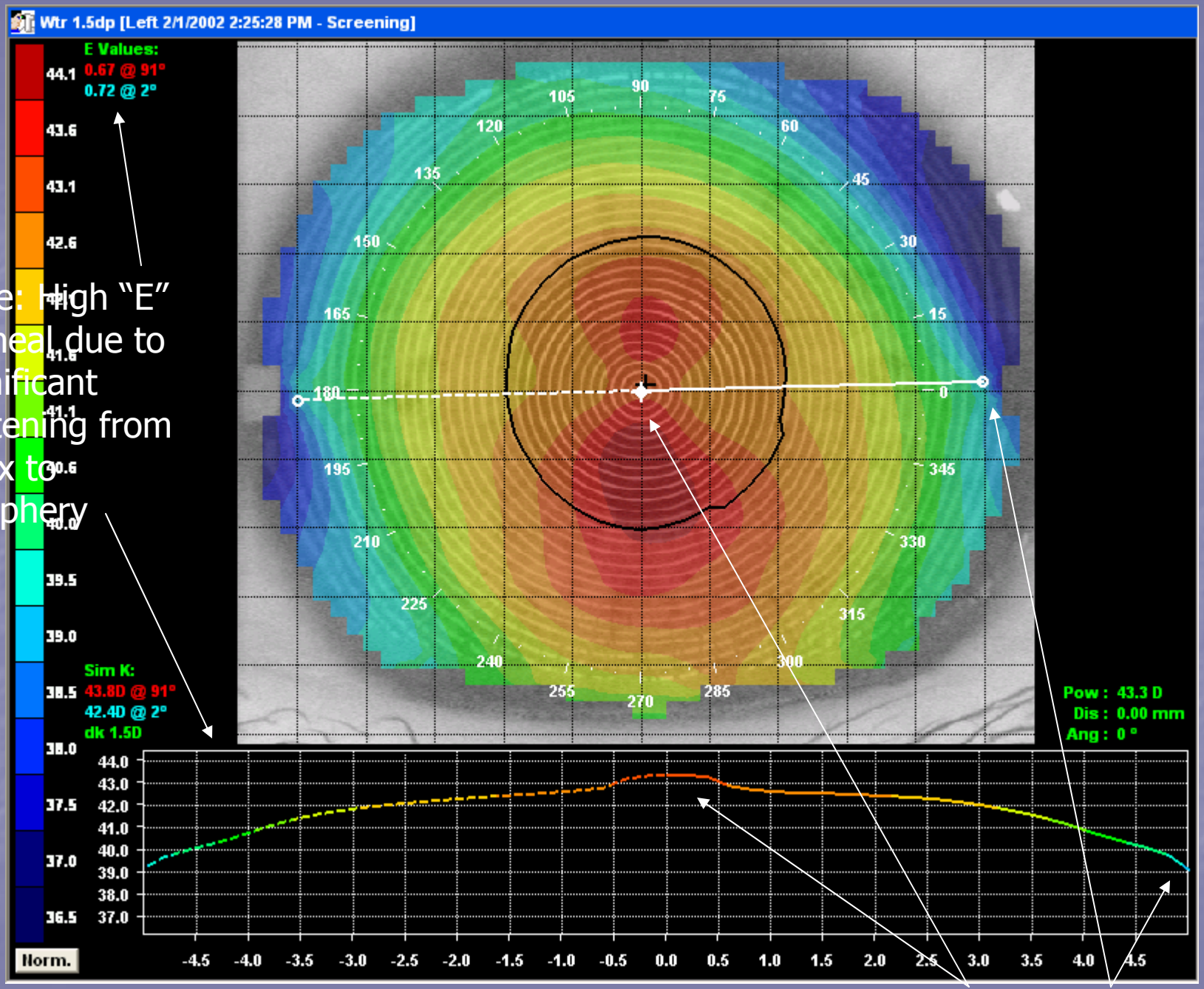



Cho [Right 1/15/2003 4:12:45 PM]
E Values:
0.41 @ 83°
0.72 @ 173°
Sim K:
43.0D @ 83°
42.5D @ 173°
dk 0.5D
Pow : 42.8 D
Dis : 0.00 mm
Ang : 0 °
Norm.
Cho [Right 1/18/2003 9:29:33 AM]
E Values:
0.16 @ 70°
0.33 @ 160°
Sim K:
41.1D @ 70°
40.7D @ 160°
dk 0.4D
Pow : 40.2 D
Dis : 0.00 mm
Ang : 0 °
Norm.
Cho [Right 1/18/2003 9:29:33 AM] MINUS Cho [Right 1/15/2003 4:12:45 PM]
E Values:
0.16 @ 70°
0.33 @ 160°
Sim K:
41.1D @ 70°
40.7D @ 160°
dk 0.4D
Pow : -2.6 D
Dis : 0.00 mm
Ang : 0 °
Abs.
Note: Drop in eccentricity following Optimal Orthokeratology therapy

Orthokeratology takes a Prolate aspheric shape and Sphericalizes the cornea (Reduces Eccentricity, Shape Factor and Asphericity)

# *The BE Retainer:* Eccentricity

- Eccentricity is the mathematic description of the corneal shape from the apex to the periphery (E-Value)
- Shape Factor is "E" squared
- If the cornea is already spherical, then little epithelial displacement is possible
- Most patients have an e-value = 0.55
- E-value is not to be confused with spherical k-readings as measured by a keratometer




Note: High "E" corneal due to significant flattening from apex to periphery

Eccentricity: How much does the cornea flatten from apex to periphery?

# Eccentricity & Apical Radius

- The greater the Eccentricity the greater the RX Change Potential
- The Steeper the cornea the greater the Rx Change Potential

Mountford/Noack (1997), El Hage (1999)

| Initial Ro | Ecc= 0.40 Rx reduction | Ecc= 0.50 Rx reduction | Ecc=0.60 Rx reduction |
|---|---|---|---|
| 41.00 | -1.39 | -2.08 | -2.86 |
| 42.00 | -1.50 | -2.23 | -3.07 |
| 43.00 | -1.62 | -2.41 | -3.30 |
| 44.00 | -1.75 | -2.60 | -3.54 |
| 45.00 | -1.88 | -2.79 | -3.79 |
| 46.00 | -2.02 | -2.99 | -4.06 |

# *The BE Retainer:* Eccentricity and Apical Radius

- The higher the e-value the greater the Rx change possible (Mountford '97, El Hage '99)
- The steeper the apex corneal curvature, the greater the Rx change possible
- There is a linear relationship between e-value, apical curvature (Ro), lamellar fiber length and refractive change/potential (Mountford/Noack '98)

# The best candidates for Optimal Orthokeratology therapy are:

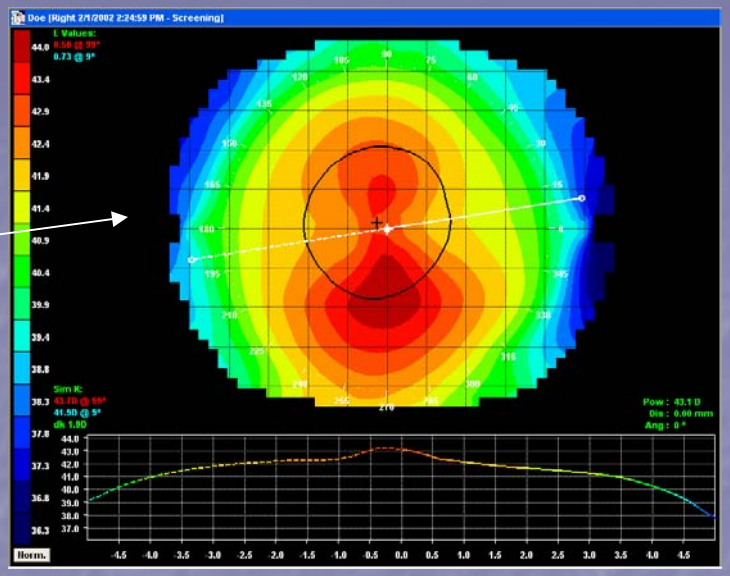
- High eccentricity (>0.50)
- Steep Apical Curvatures (>42.00Dp)

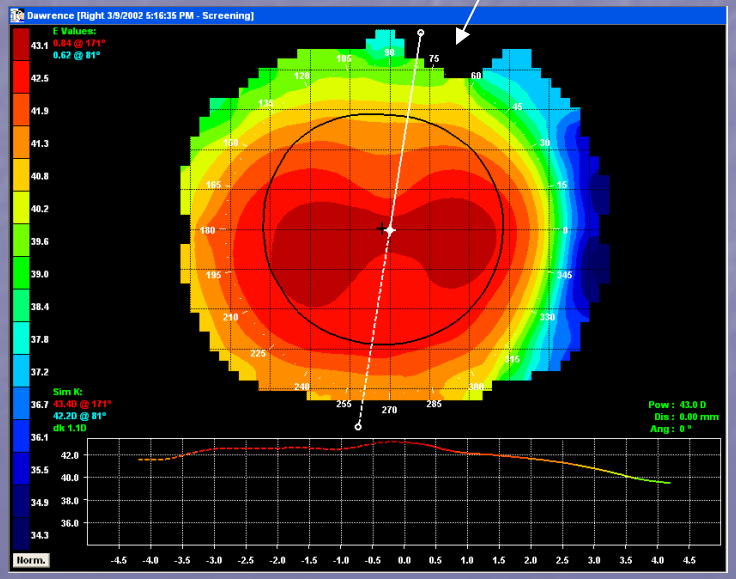
# *The BE Retainer:* Orthokeratology Limitations

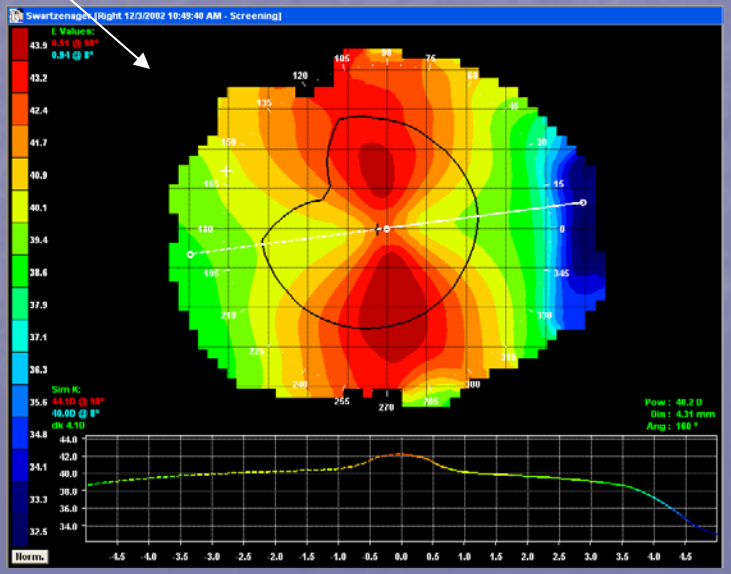
- Treatment zone: The higher the desired Rx change, the smaller the treatment zone (as determined by Munnerlyn's Formula)
- Apical Curvature (Ro). The flatter the cornea, the lower the potential for Rx change possible
- Astigmatism: >-1.50 WTR, >-0.75 ATR or limbus to limbus

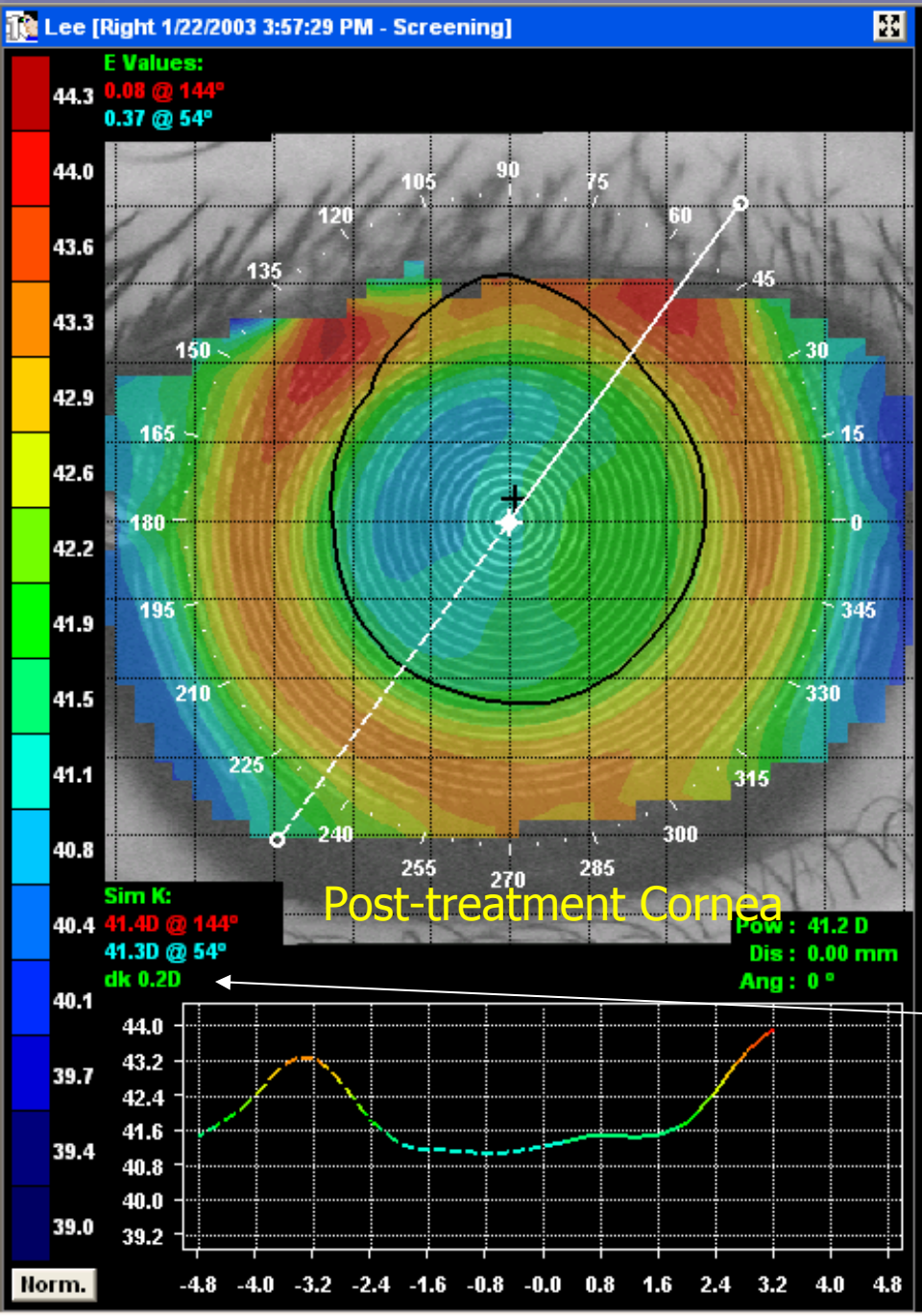
# Astigmatism and OOK

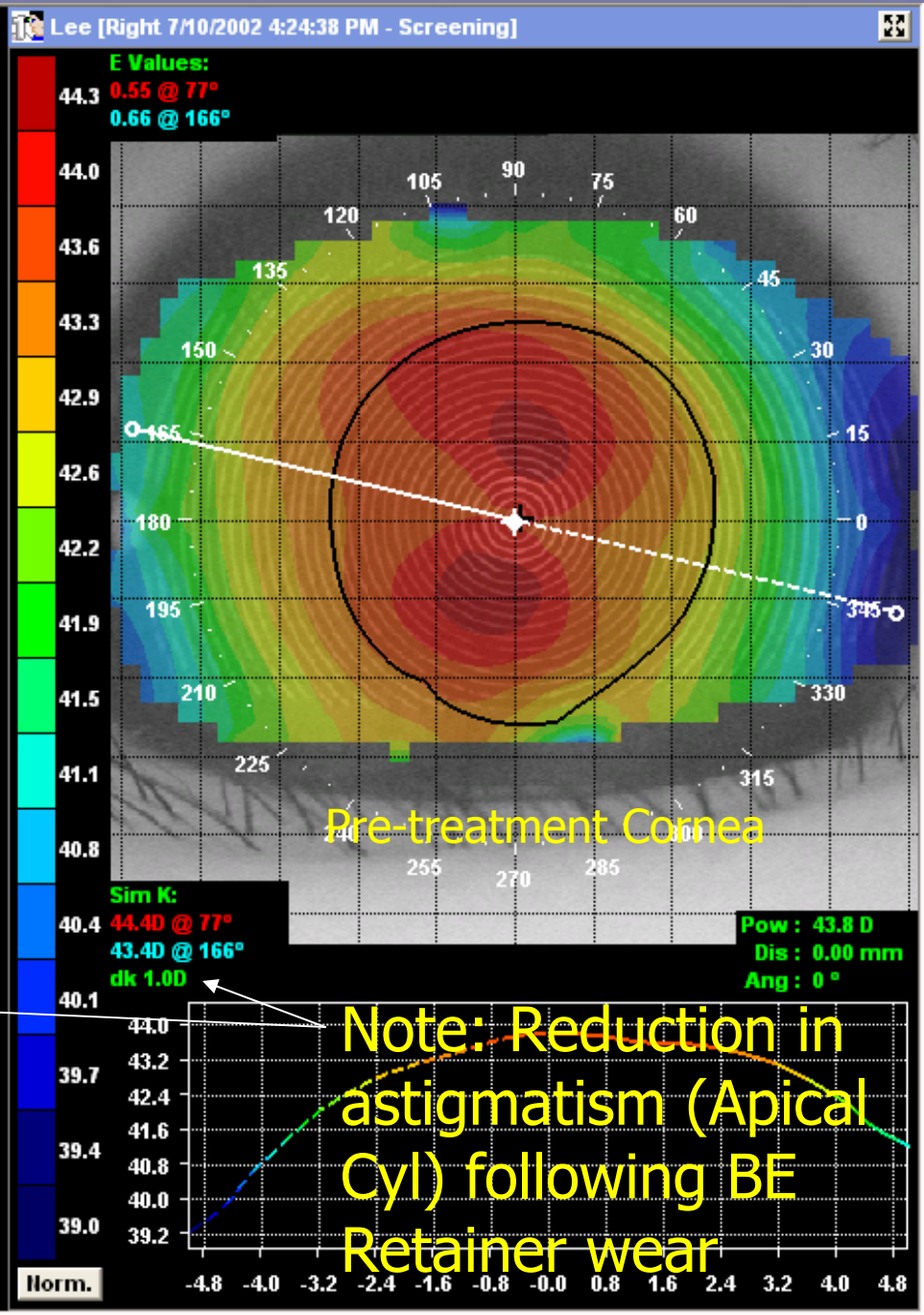
- Apical (Ideal)
- Limbus to Limbus (Avoid)
- <-1.75 WTR
- <-1.00 ATR



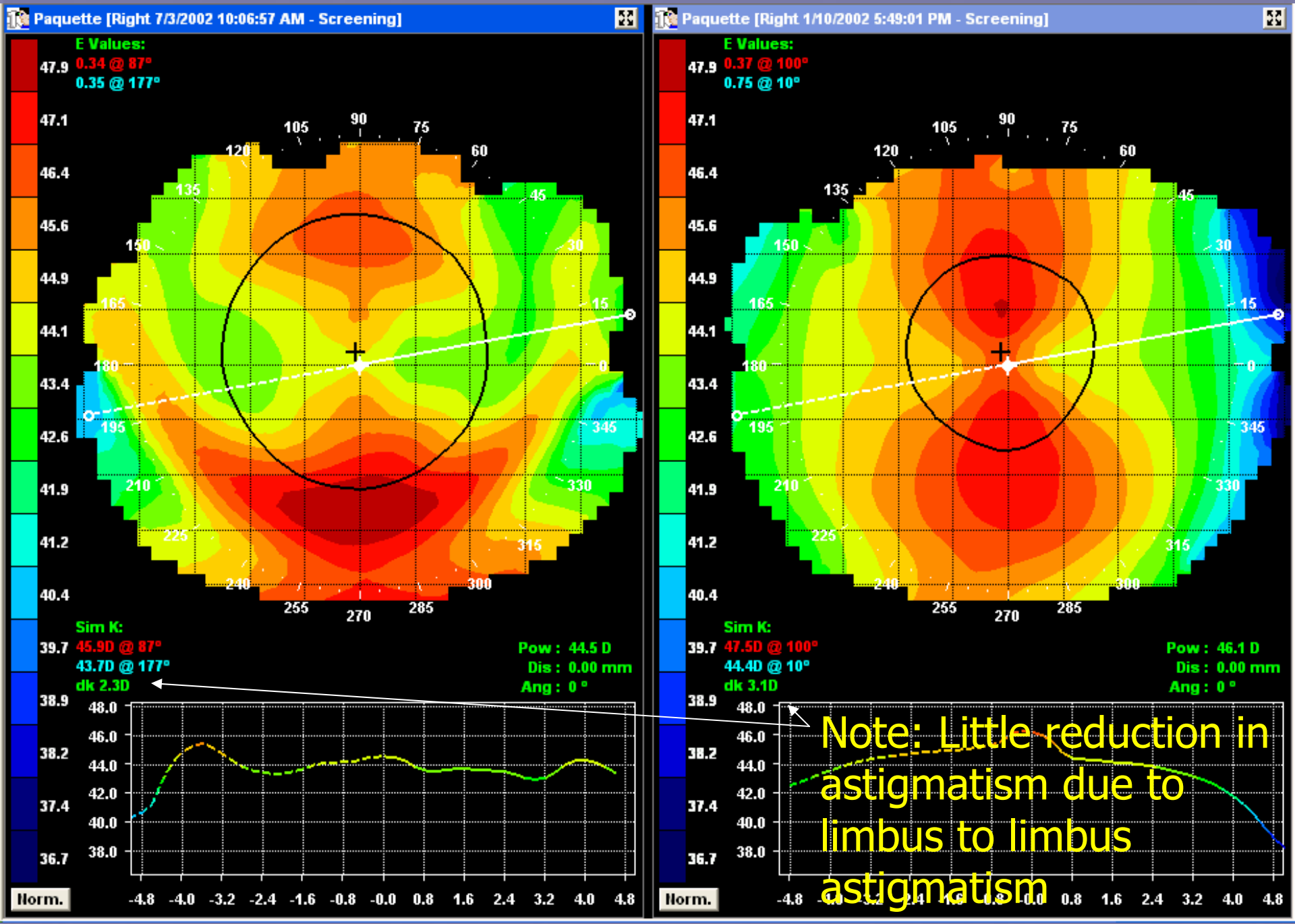



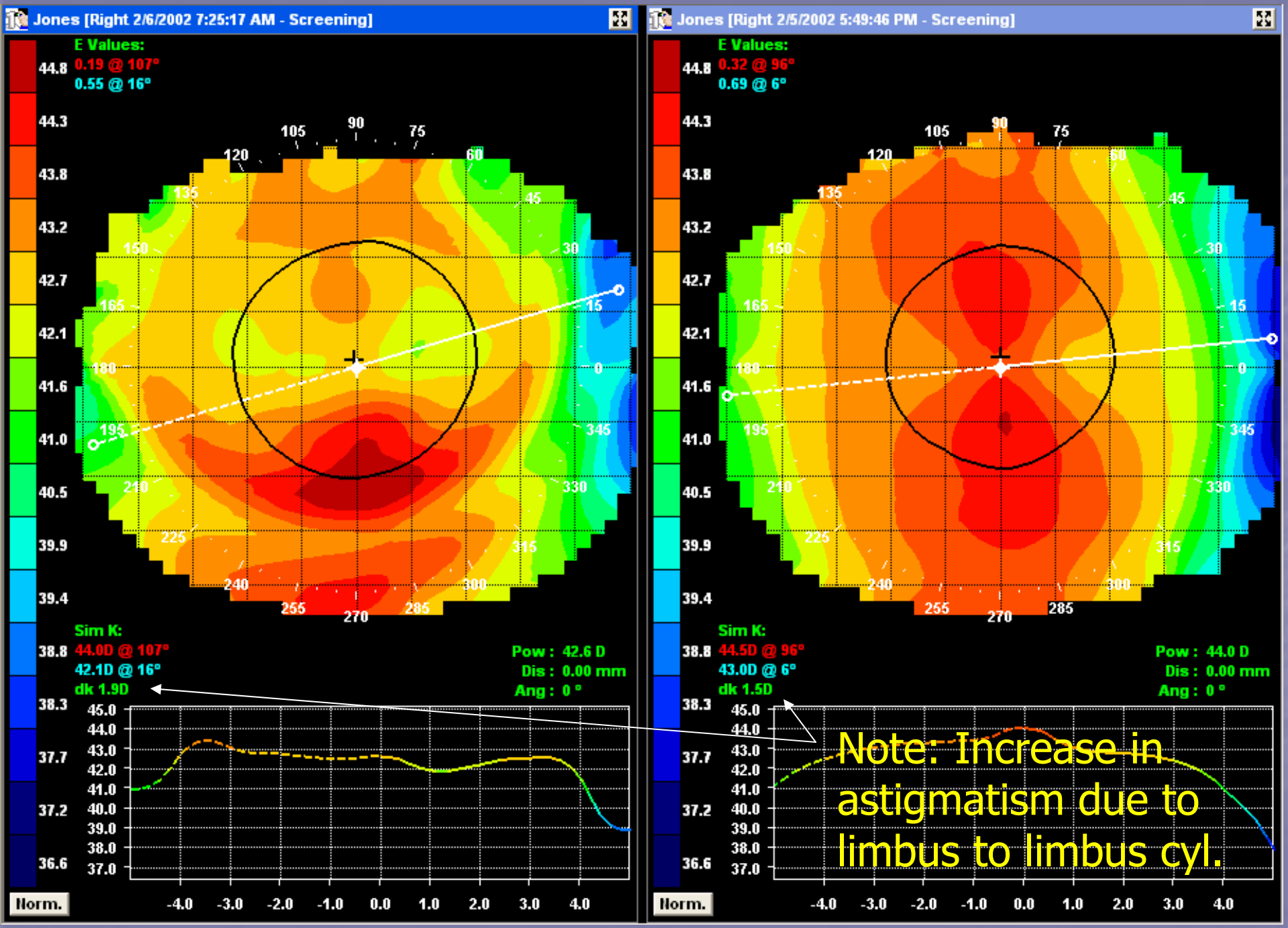






Note: Reduction in astigmatism (Apical Cyl) following BE Retainer wear


Paquette [Right 7/3/2002 10:06:57 AM - Screening]
E Values:
0.34 @ 87°
0.35 @ 177°
Sim K:
45.9D @ 87°
43.7D @ 177°
dk 2.3D
Pow : 44.5 D
Dis : 0.00 mm
Ang : 0 °
Norm.
Paquette [Right 1/10/2002 5:49:01 PM - Screening]
E Values:
0.37 @ 100°
0.75 @ 10°
Sim K:
47.5D @ 100°
44.4D @ 10°
dk 3.1D
Pow : 46.1 D
Dis : 0.00 mm
Ang : 0 °
Norm.
Note: Little reduction in astigmatism due to limbus to limbus astigmatism


Jones [Right 2/6/2002 7:25:17 AM - Screening]
E Values:
0.19 @ 107°
0.55 @ 16°
Sim K:
44.0D @ 107°
42.1D @ 16°
dk 1.9D
Pow : 42.6 D
Dis : 0.00 mm
Ang : 0 °
Norm.
Jones [Right 2/5/2002 5:49:46 PM - Screening]
E Values:
0.32 @ 96°
0.69 @ 6°
Sim K:
44.5D @ 96°
43.0D @ 6°
dk 1.5D
Pow : 44.0 D
Dis : 0.00 mm
Ang : 0 °
Norm.
Note: Increase in astigmatism due to limbus to limbus cyl.

# Astigmatism

- Fit Apical Astigmats!!!
- "Against the rule" can be challenging
- Limbus to Limbus cylinder is very difficult to eliminate

# *The BE Retainer:* The SqueezeFilm Force Model

Developed by:
Dr.'s John Mountford
& Don Noack

The basis for understanding BE Retainer Optimal Orthokeratology is the Squeeze Film Force Model

Understanding this concept is key to understanding the mechanism which creates the corneal change and therefore refractive change

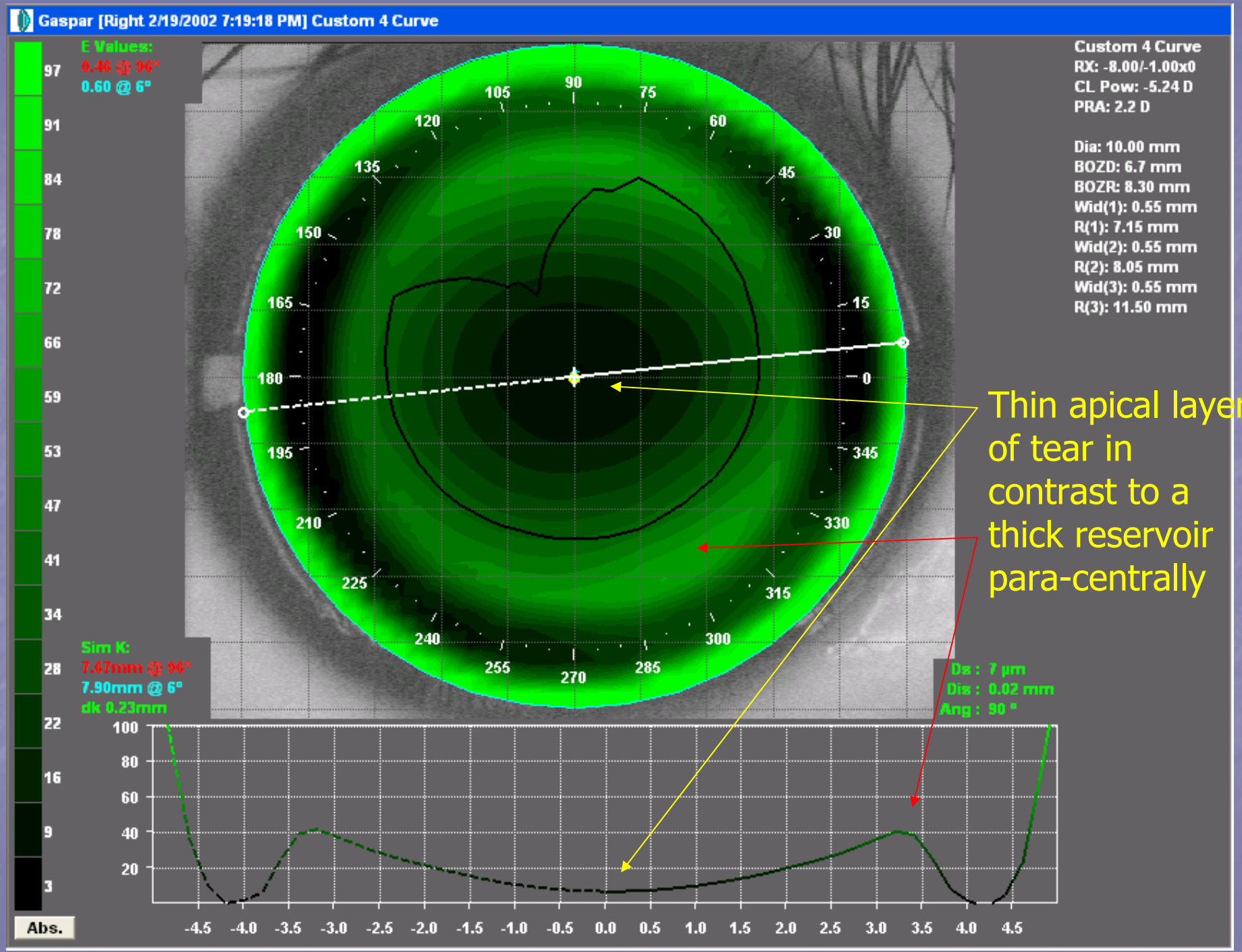
# *The BE Retainer:* The Epithelial Sandwich

- The RGP lens is rigid
- Bowman's membrane and stroma is rigid (resistant to tangential forces)
- Tear layer is incompressible
- The very fluid Epithelium MUST displace!

# *The BE Retainer:* Squeeze Film Force

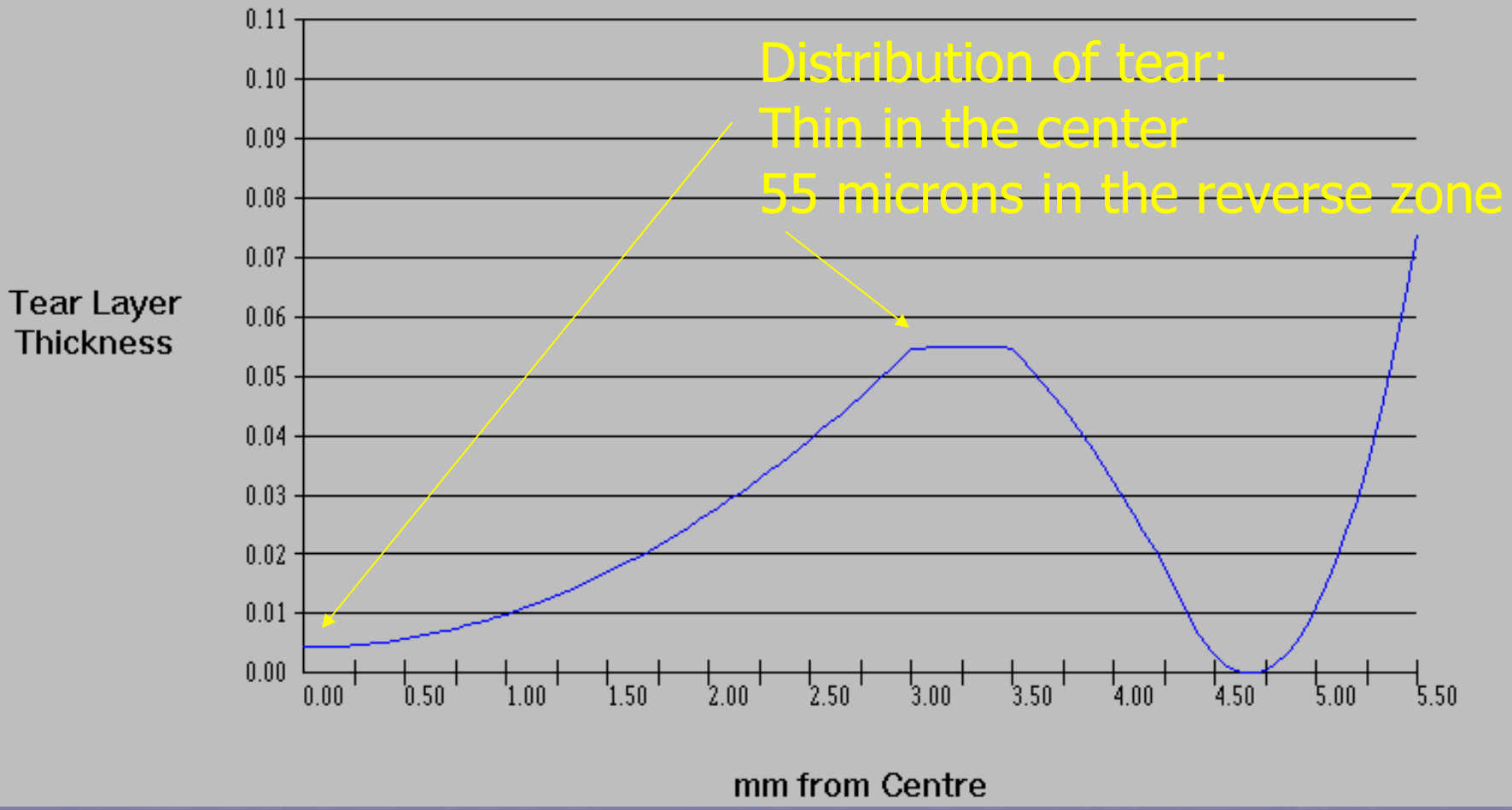
When a fluid (tear) is distributed unequally across a surface area in an enclosed system, the fluid will try to find equilibrium. In other words, if we distribute tear layer across the cornea behind a reverse geometry BE Retainer, a pressure is created while the tear "works" to find equilibrium.

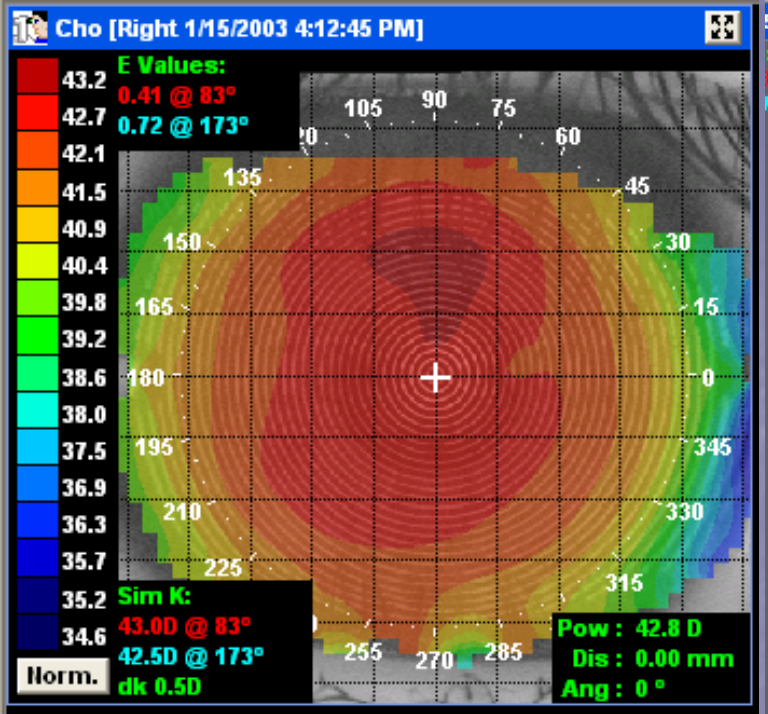
This pressure is either a negative (pull/tension) or positive (push/compression) force.

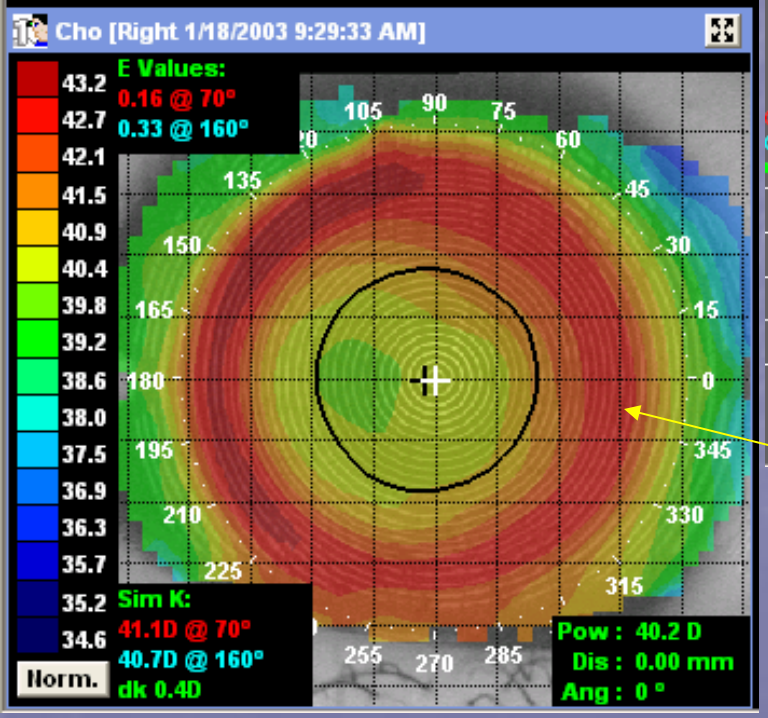

Gaspar [Right 2/19/2002 7:19:18 PM] Custom 4 Curve
E Values:
0.46 @ 96°
0.60 @ 6°
Custom 4 Curve
RX: -8.00/-1.00x0
CL Pow: -5.24 D
PRA: 2.2 D
Dia: 10.00 mm
BOZD: 6.7 mm
BOZR: 8.30 mm
Wid(1): 0.55 mm
R(1): 7.15 mm
Wid(2): 0.55 mm
R(2): 8.05 mm
Wid(3): 0.55 mm
R(3): 11.50 mm
Thin apical layer of tear in contrast to a thick reservoir para-centrally
Sim K:
7.67mm @ 96°
7.90mm @ 6°
dk 0.23mm
Ds : 7 µm
Dis : 0.02 mm
Ang : 90 °
Abs.

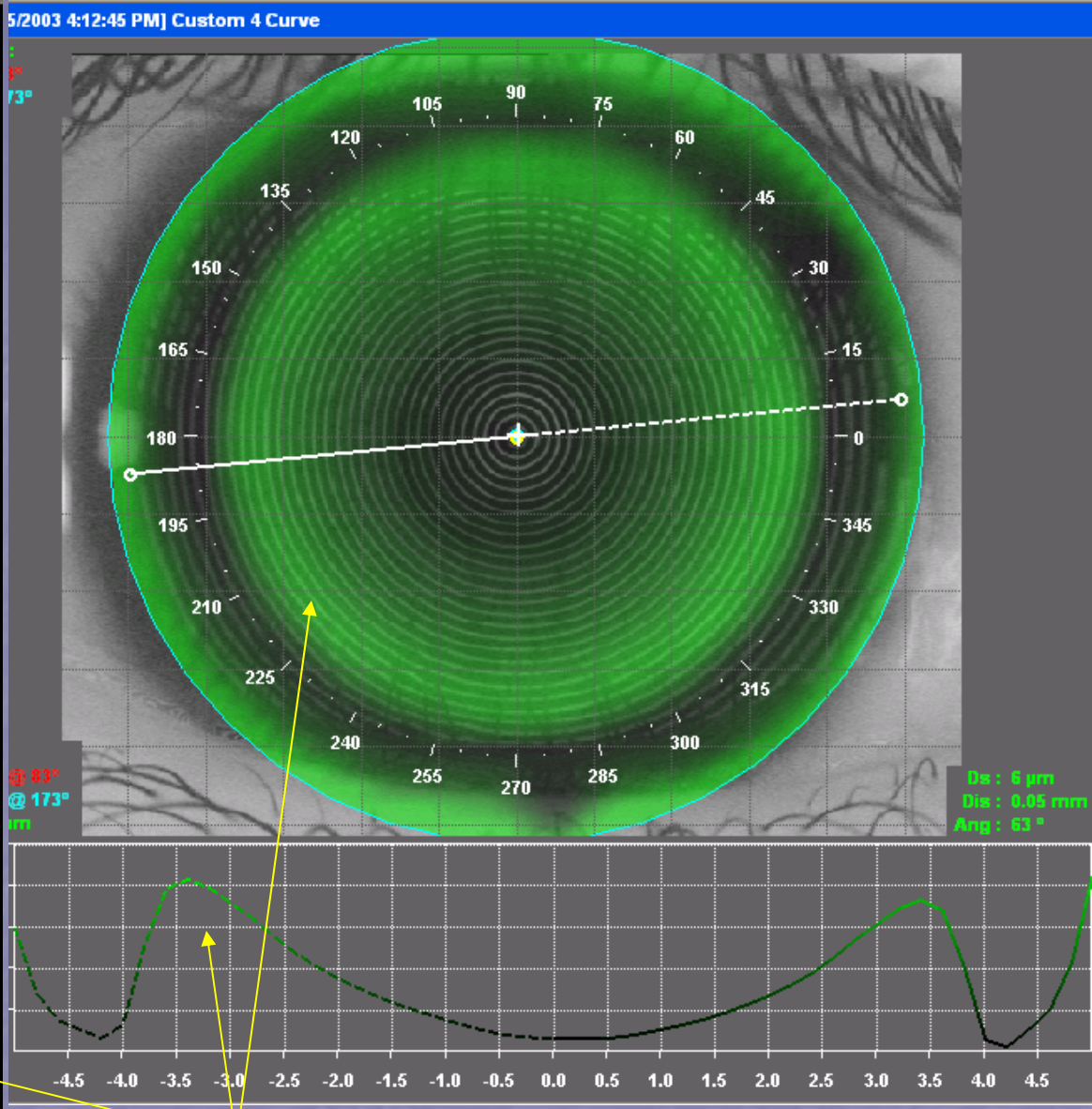
©jd1997

# Tear Layer Profile






The epithelium is "pulled" para-central where the tear is thickest (most tension force)

Tear layer must exist between the BE Retainer and the cornea for the tear forces to work properly.  A BE Retainer "in touch" with the central cornea will not create the desired Squeeze Film Force

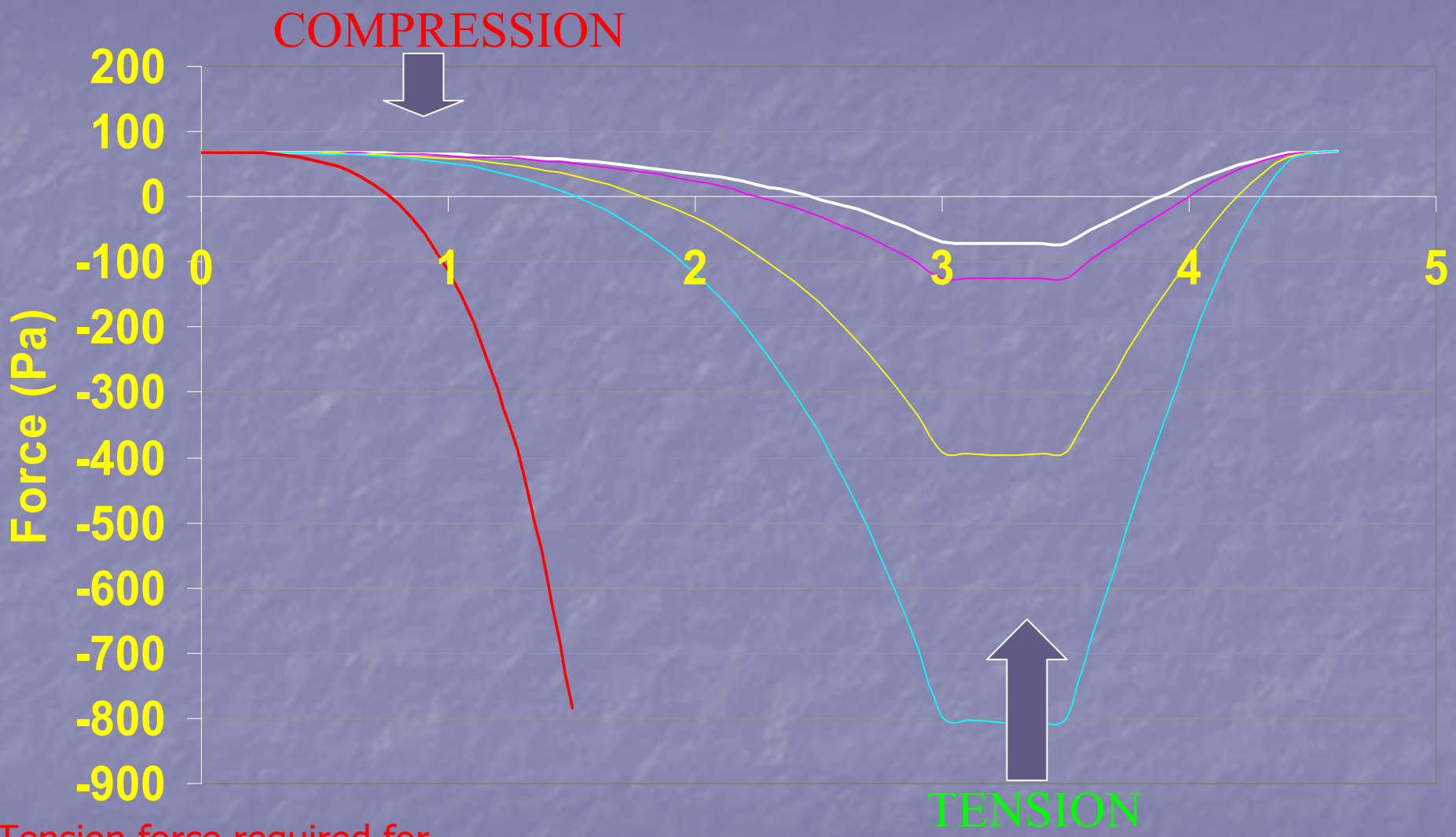
# *The BE Retainer*
# Force Requirements

Tear Layer Clearance

| Rx Change | Apical tear thickness |
|---|---|
| -0.50 to -1.00 | 14.3um |
| -2.00 | 5.3 |
| -3.00 | 3.9 |
| -4.00 | 3.3 |

- The Squeeze Film Force increases exponentially as the clearance decreases
- The thinner the apical tear thickness, the greater the Rx change
- The thicker the apical tear thickness, the lower the Rx change

# Variation in Force



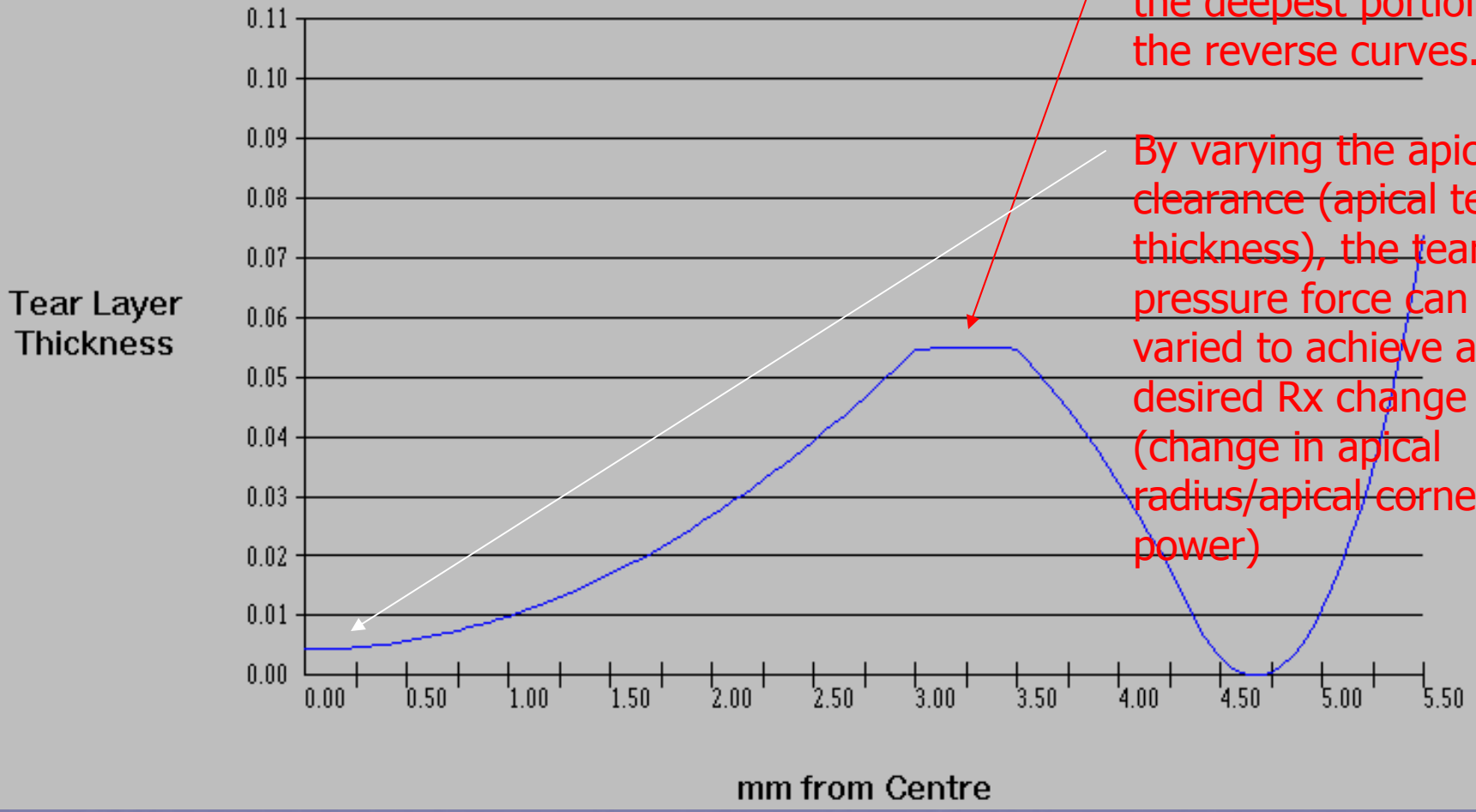

Tension force required for various Rx changes:

LF6 -1.00Dp LF8 -3.00Dp

LF7 -2.00Dp LF9 -4.00Dp

©jd1997

# Tear Layer Profile




55 microns of tear in the deepest portion of the reverse curves.

By varying the apical clearance (apical tear thickness), the tear pressure force can be varied to achieve a desired Rx change (change in apical radius/apical corneal power)

The thinner the apical tear layer, the greater the refractive change. The thicker the apical tear layer, the lower the refractive change.

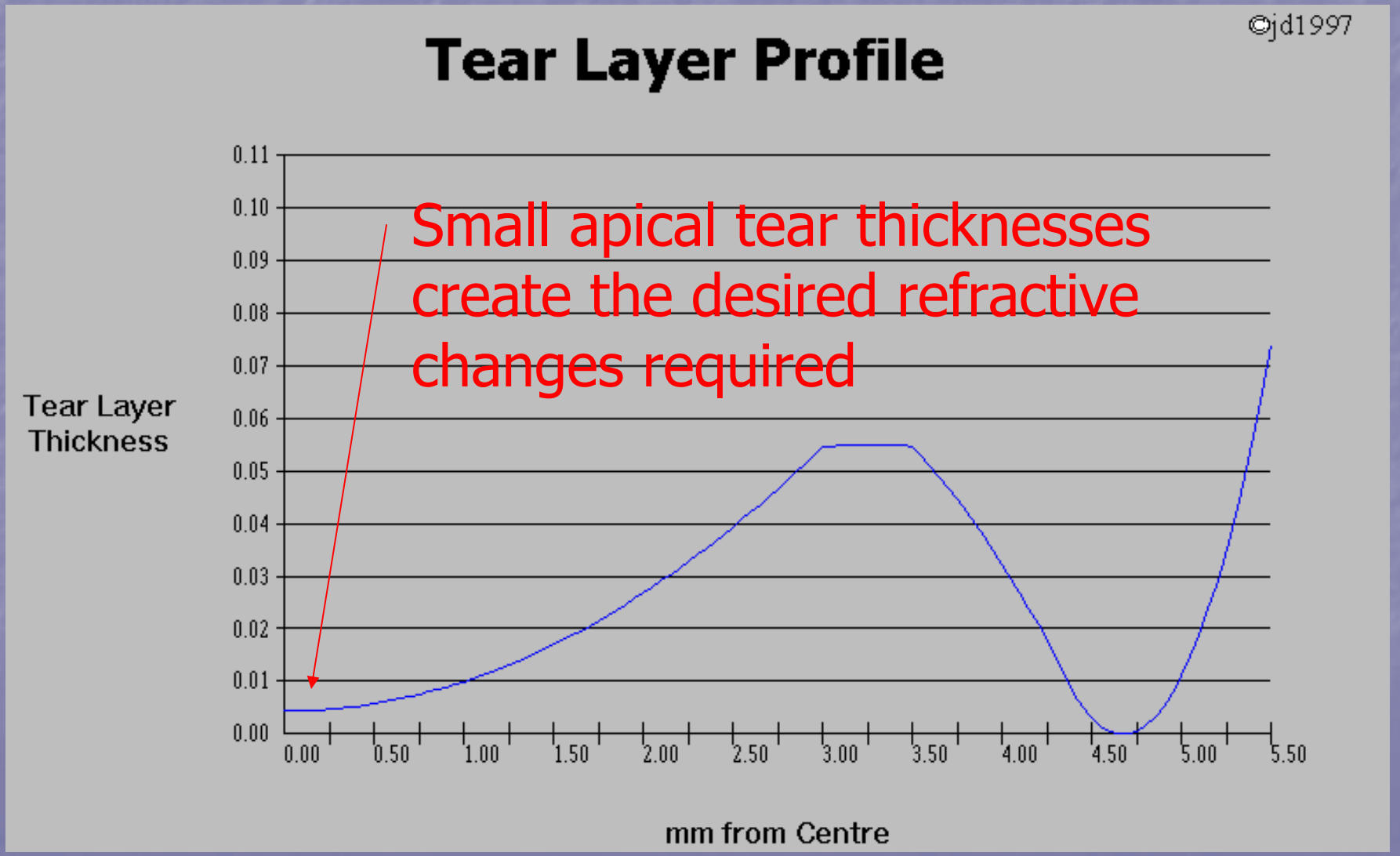
# Think Differently About:

- Flatter than K philosophy
- Keratometer
- Fluorescein
- Base curve
- Steep & Flat

# "Fitting orthokeratology lenses Flatter than K"

- Jessen Formula has not been scientifically validated
- Doesn't equate to apical refractive power change
- Flatter than K could result in touch
- Touch results in epithelial disruption and potential for ulceration

# Forget Flatter than "K"... Think Tear Layer Profile



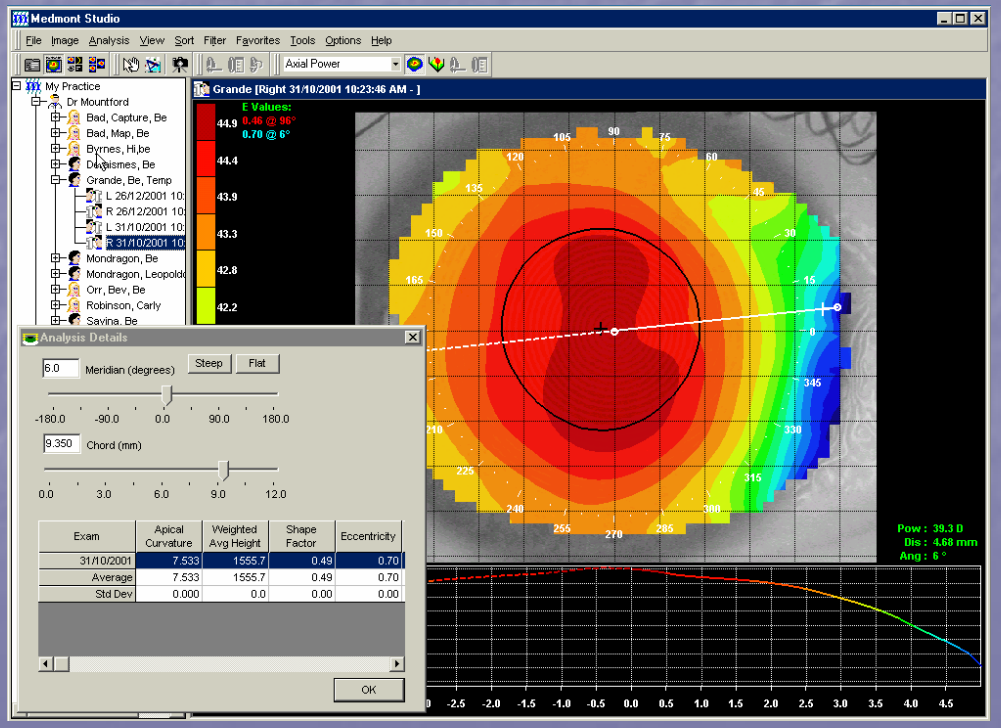
# The Keratometer

## Limited information:

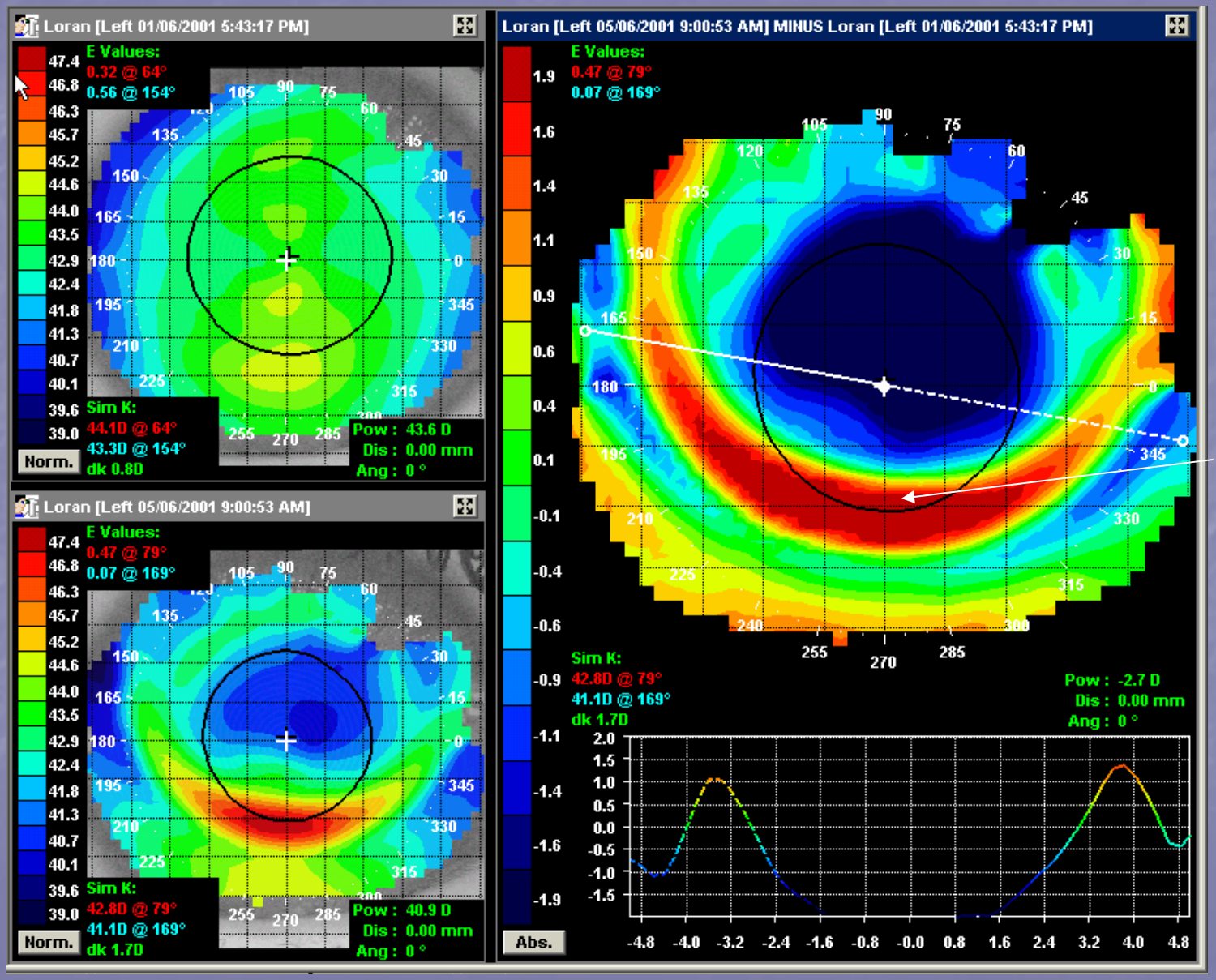
- 4 points (1 placido ring)
-Doesn't provide Shape information (Eccentricity, Shape Factor or Asphericity
-Doesn't provide Shape change analysis

## Topographer:
## Required Equipment

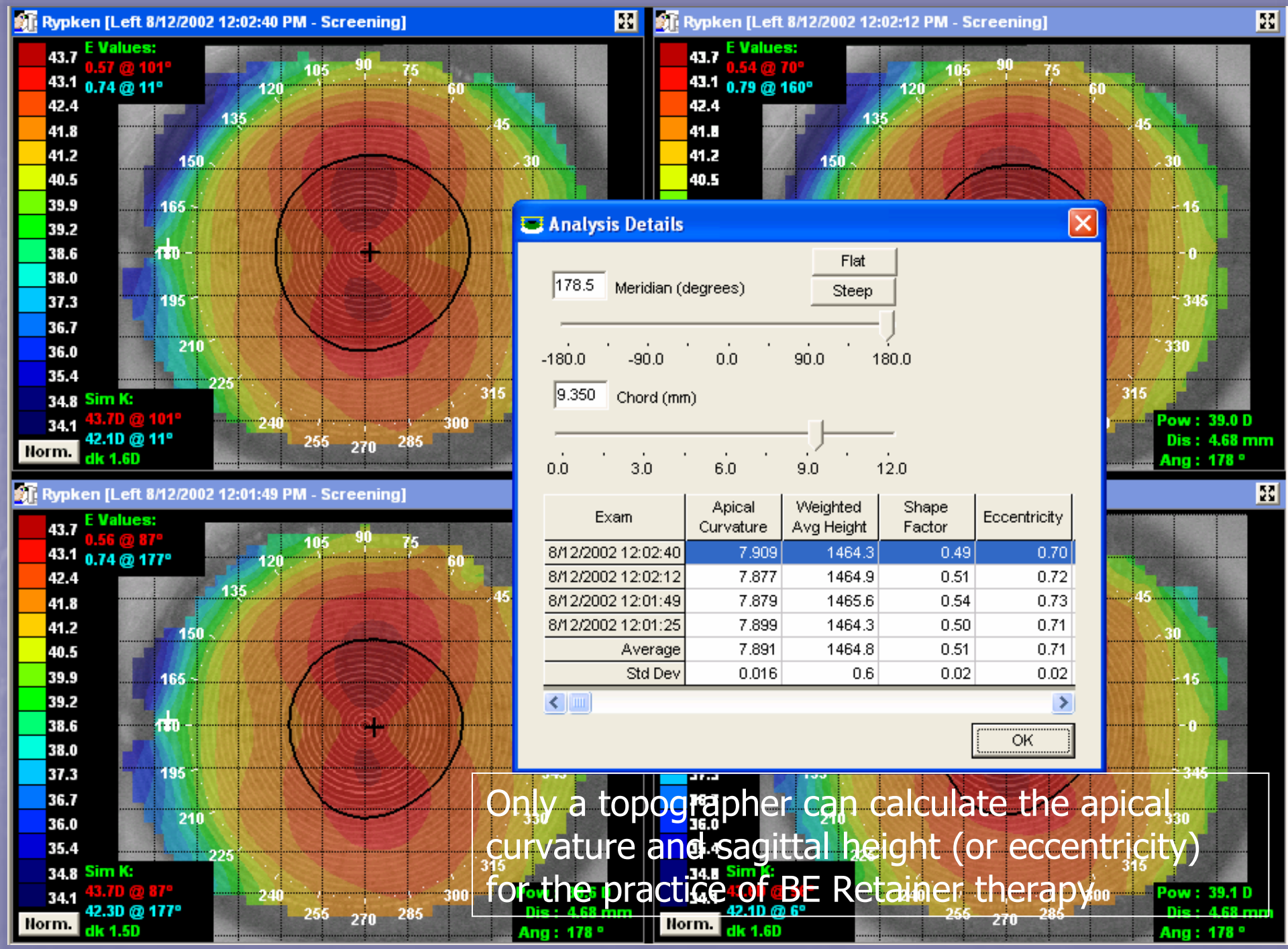
-Shape Data (apical curvature, sagittal height, eccentricity, shape factor, asphericity)
-Diagnostic functions
-treatment zone size
-position
-Rx change
-shape change



# What's going on with the cornea?




This patient would respond well following the removal of the BE Retainer. However, the inferior "smile" inside the pupil would cause distortion of vision in the PM. Only a topographer can show the treatment zone size and position.

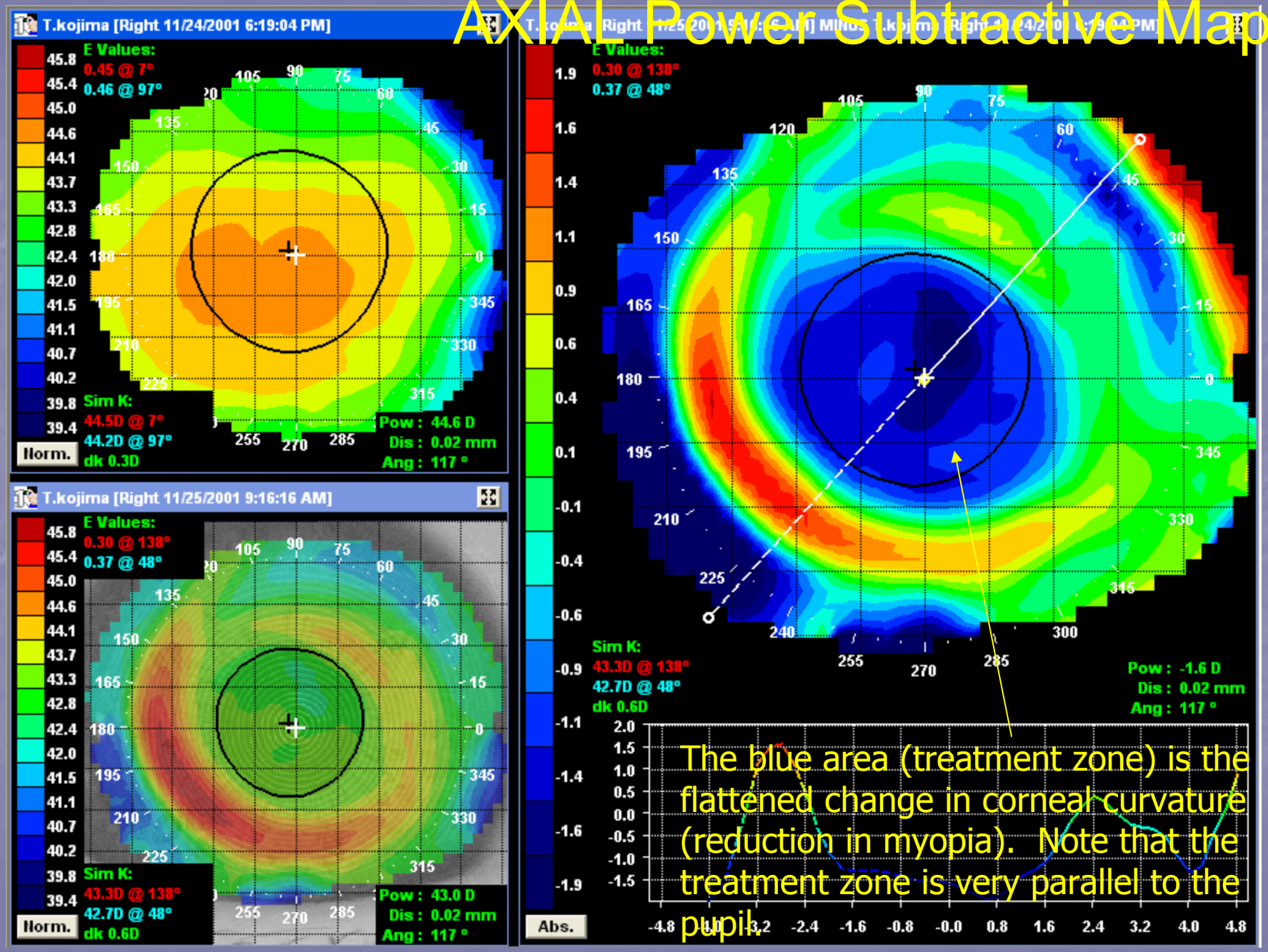



Only a topographer can calculate the apical curvature and sagittal height (or eccentricity) for the practice of BE Retainer therapy.

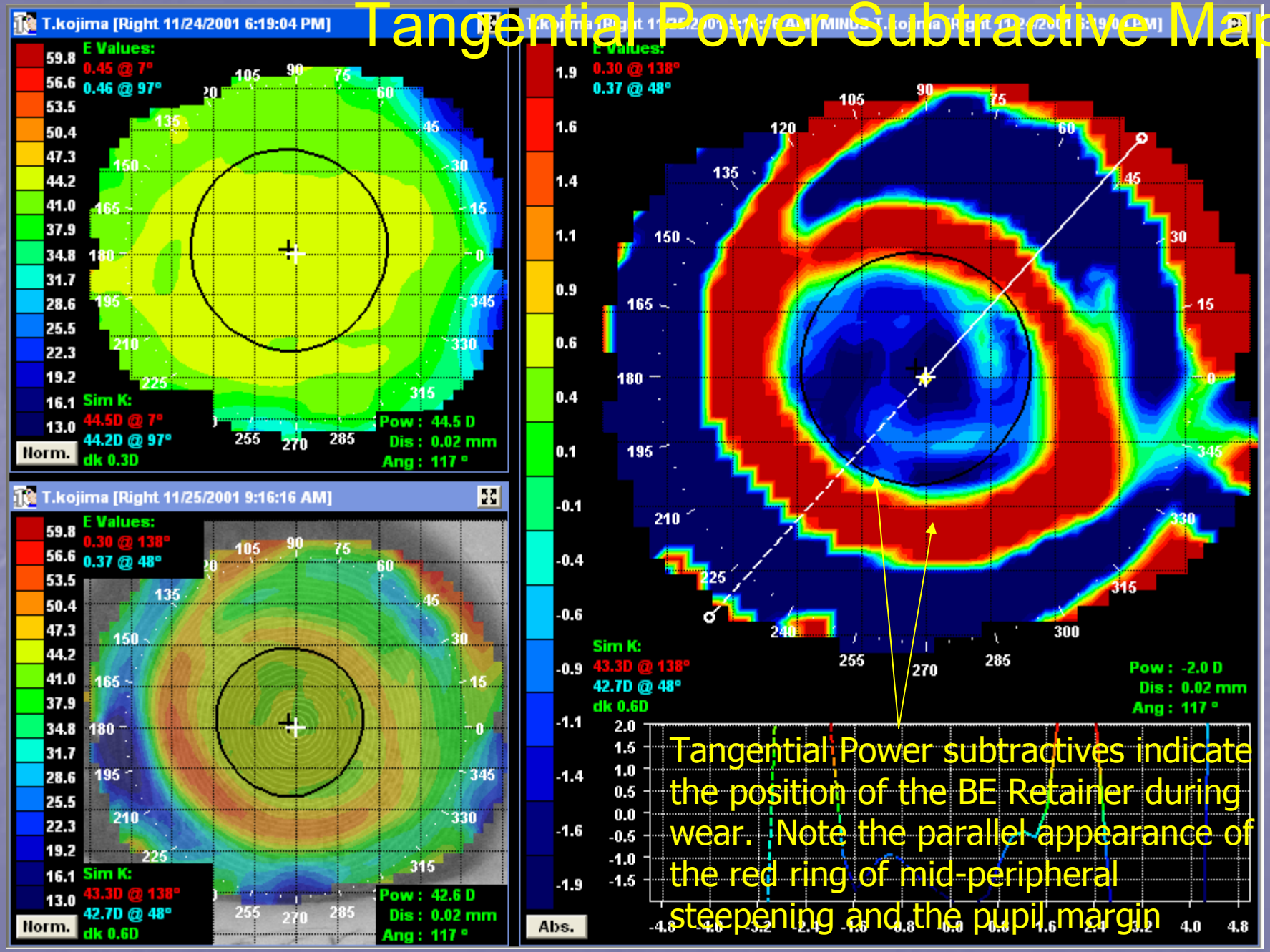
# Subtractive/Difference Maps

- Critical to the success of Optimal Orthokeratology is the topographers Subtractive or Difference Map function
- Defines the effects/results of wear:
  - Axial Power: Shows treatment zone position and refractive change
  - Tangential Power: Shows the position of the BE Retainer
  - Refractive Power: Displays the treatment zone size and Rx effect to the cornea

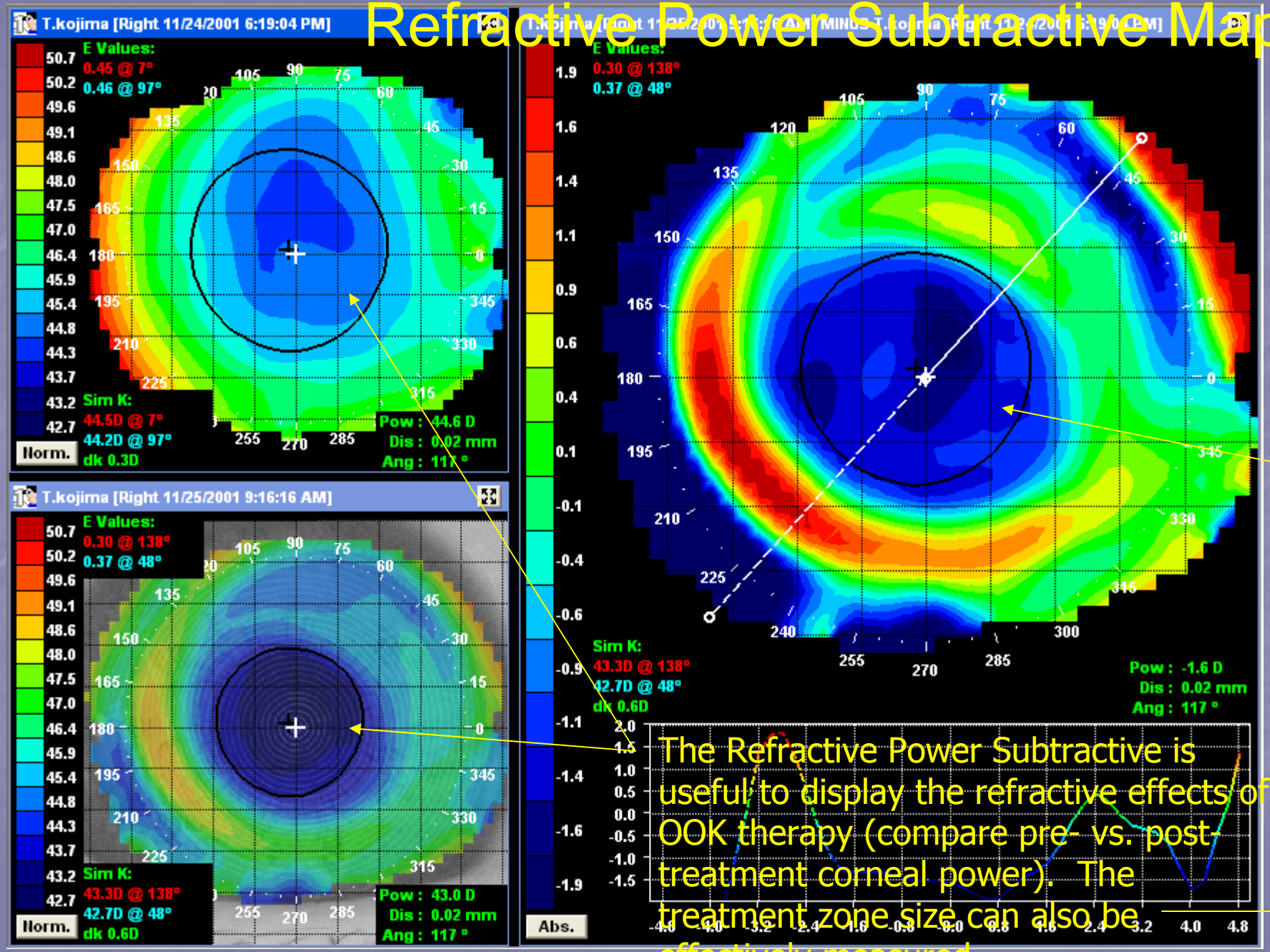
# AXIAL Power Subtractive Map



# Tangential Power Subtractive Map



# Refractive Power Subtractive Map



A topographer is necessary equipment and critical for the practice of BE Retainer Optimal Orthokeratology

# Topography Requirements

- Accuracy is imperative
  - Determines the first fit accuracy and ultimately the success
  - Diagnoses the response of therapy
  - Inaccurate topography results in multiple trials (instead of only 1) and difficulty in determining the response of treatment (if you cannot diagnose the response, what do you do next?).
- Must display
  - Apical Curvature
  - Sagittal Height, Eccentricity, Shape Factor or Asphericity
  - Axial, Tangential & Refractive Subtractive/Difference maps
- The Medmont is the recommended topographer of BE Retainer Optimal Orthokeratology due to its accuracy and ease of use/analysis

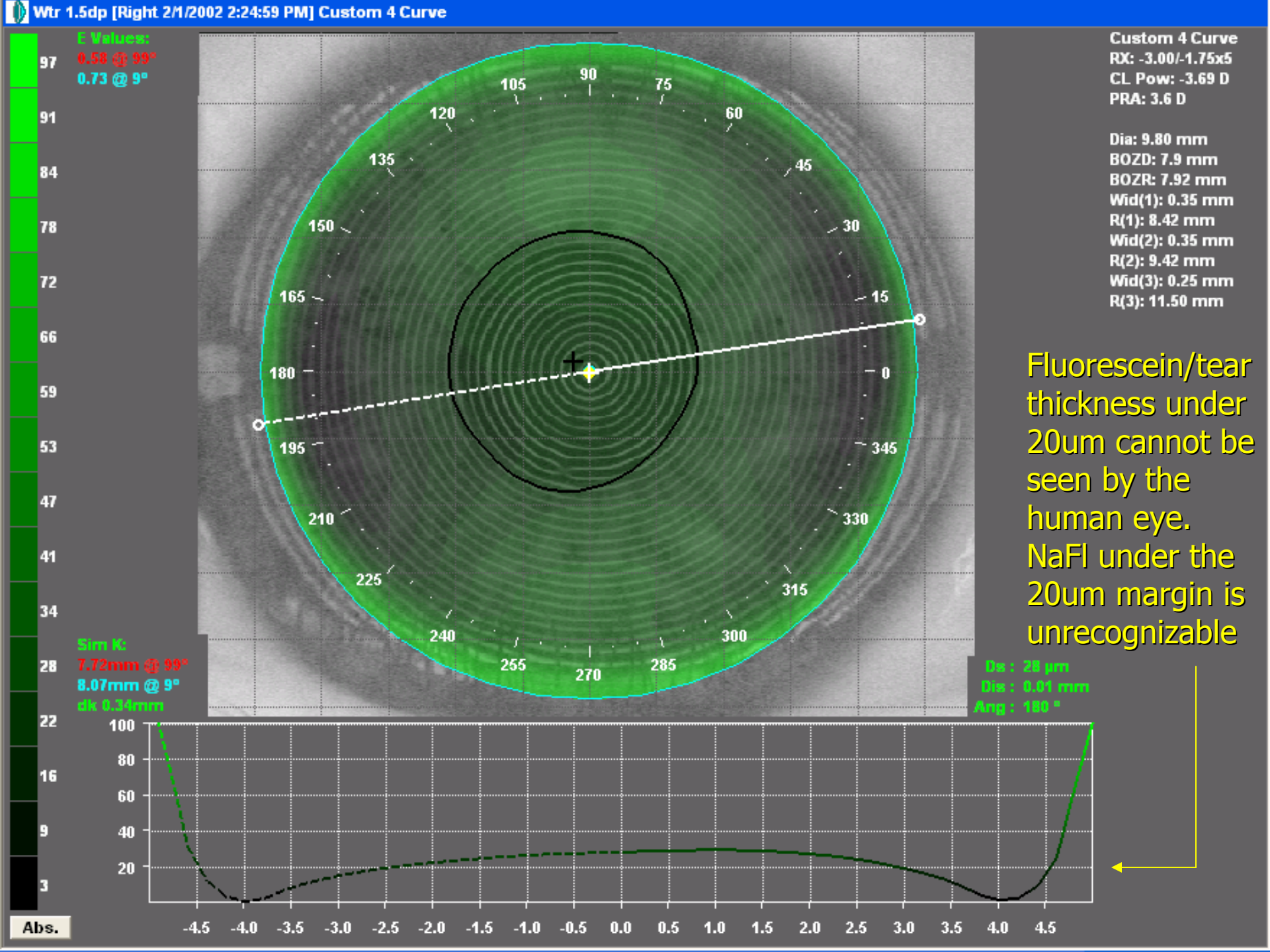
# Fluorescein

- Optimal Orthokeratology involves the fitting of a BE Retainer to accuracies of 1-2 microns (um)
- Studies indicate that practitioners can only recognize NaFl at +20um of tear thickness

  (Carney, LG. (1972); Young, G (1998); Young, G (1998))

# Related Studies


- 1. Carney, LG. (1972) Luminance of Fluorescein solutions. Am. J. Optom&Arch.Am.Acad.Optom. 3; 200-204.
- 2. Young, G (1998) The effect of rigid lens design on Fluorescein fit. C.L and Ant Eye;21:2, 41-46.
- 3. Young, G (1998) Fluorescein fit in rigid lens evaluation. Int. C.L Clin. 15:3, 95-100.


Wtr 1.5dp [Right 2/1/2002 2:24:59 PM] Custom 4 Curve
E Values:
0.58 @ 99°
0.73 @ 9°
97
91
84
78
72
66
59
53
47
41
34
28
22
16
9
3
Abs.
Custom 4 Curve
RX: -3.00/-1.75x5
CL Pow: -3.69 D
PRA: 3.6 D
Dia: 9.80 mm
BOZD: 7.9 mm
BOZR: 7.92 mm
Wid(1): 0.35 mm
R(1): 8.42 mm
Wid(2): 0.35 mm
R(2): 9.42 mm
Wid(3): 0.25 mm
R(3): 11.50 mm
90
75
60
45
30
15
0
345
330
315
300
285
270
255
240
225
210
195
180
165
150
135
120
105
Sim K:
7.72mm @ 99°
8.07mm @ 9°
dk 0.34mm
Ds : 28 µm
Dis : 0.01 mm
Ang : 180 °
100
80
60
40
20
-4.5
-4.0
-3.5
-3.0
-2.5
-2.0
-1.5
-1.0
-0.5
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
Fluorescein/tear thickness under 20um cannot be seen by the human eye. NaFl under the 20um margin is unrecognizable

- Expert RGP practitioners can recognize 10um differences in NaFl thickness

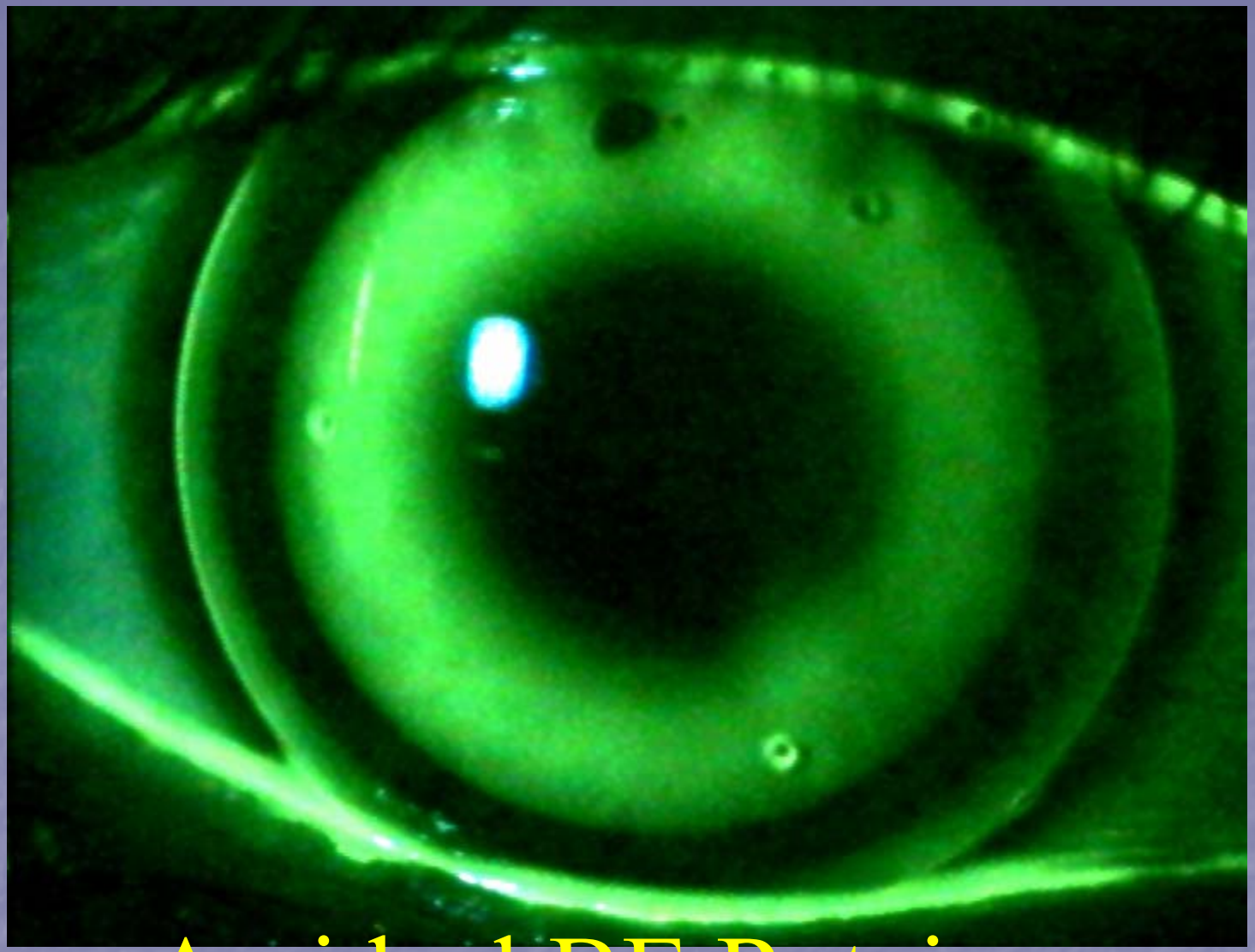
  (Brungardt, T. (1961); Mandell, RB (1974); Osbourne, GN, Zantos, SG, Godio, LB, Jones, WF, Barr, JT. (1989))

- How do you analyze the fit of the BE Retainer when you need to achieve apical clearances of 1-16 microns (um), but you can't see any NaFl under 20 microns?

- Fluorescein is only effective for showing staining. NaFl analysis does not provide accurate BE Retainer fitting information.

# Related Studies


- 1. Brungardt, T. (1961) Fluorescein patterns: they are accurate and they can be mastered. J. Am. Optom. Assoc. 32;973-974.
- 2. Mandell, RB (1974) How valid is the fluorescein test? Int. Contact Lens Clin. 1. Fall, 25-27.
- 3. Osbourne, GN, Zantos, SG, Godio, LB, Jones, WF, Barr, JT. (1989) Aspheric rigid gas permeable contact lenses: practitioner discrimination of base curve increments using fluorescein pattern evaluation. Opt. Vis. Sc. 66: 4 209-213.



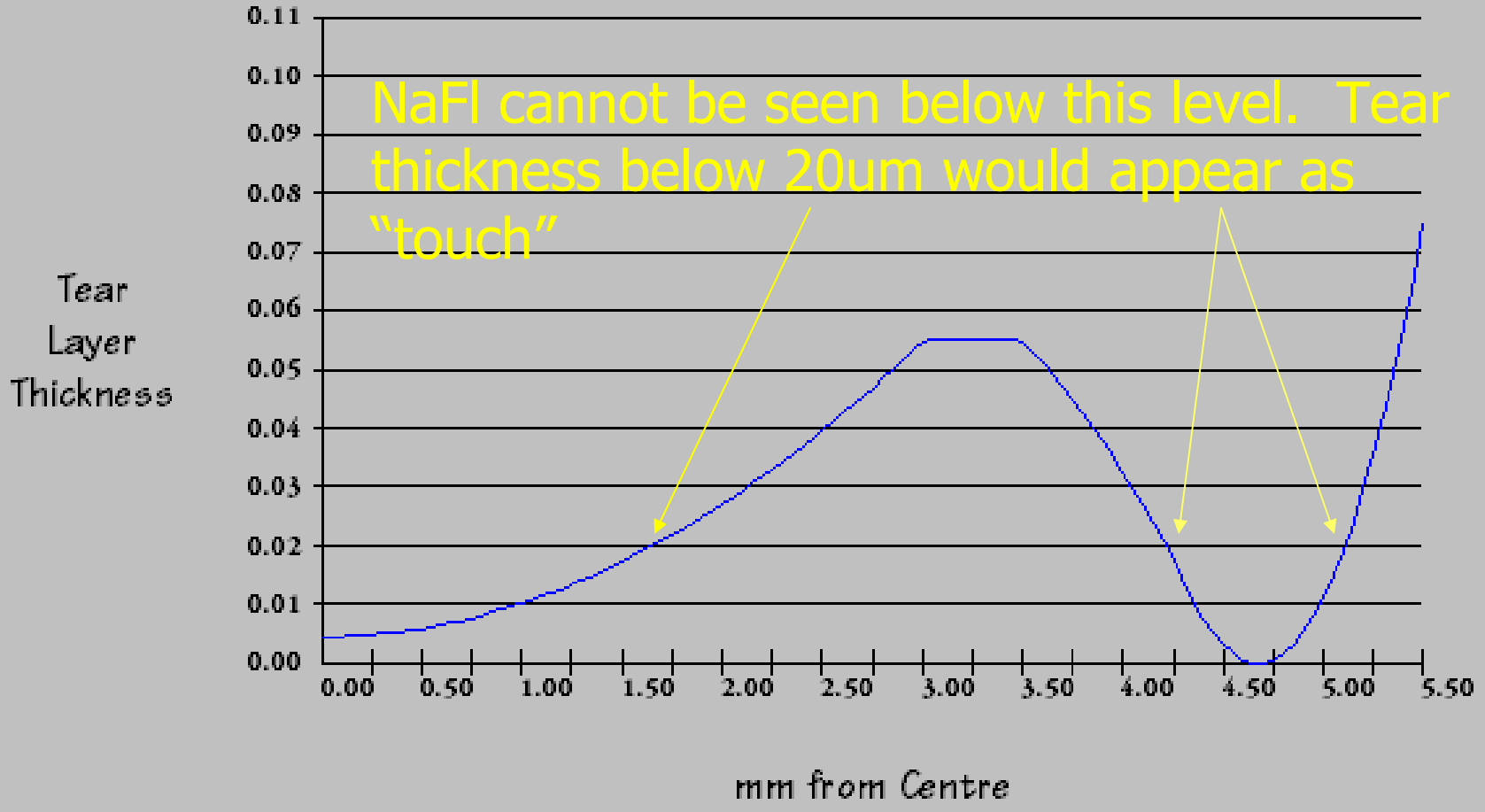
# An ideal BE Retainer

Note: the retainer appears in touch with the cornea but is actually a perfect fit with 7um of apical clearance

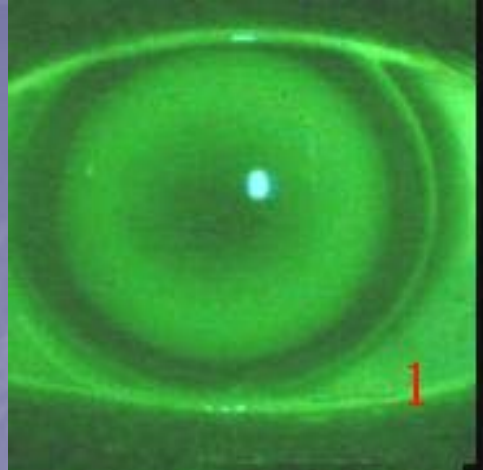
BE Lens Calculation

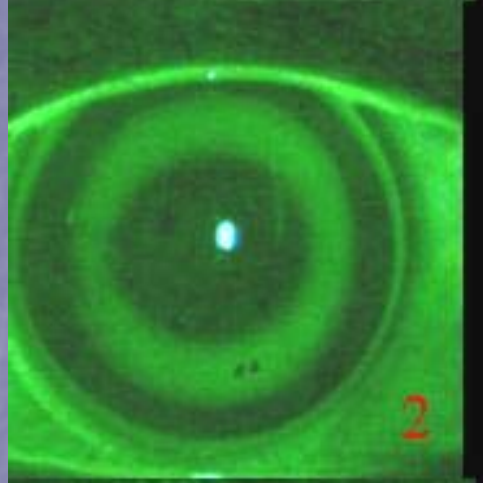
©dbn1998

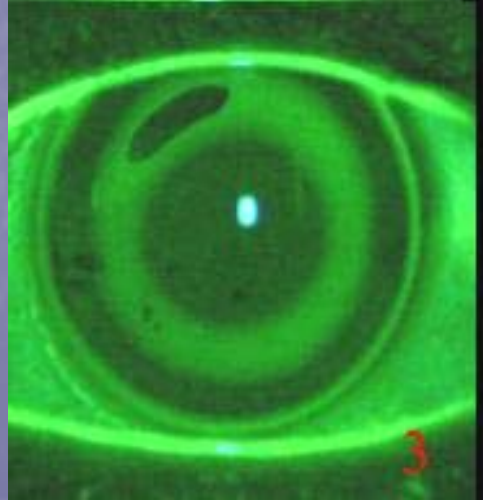
# Tear Layer Profile

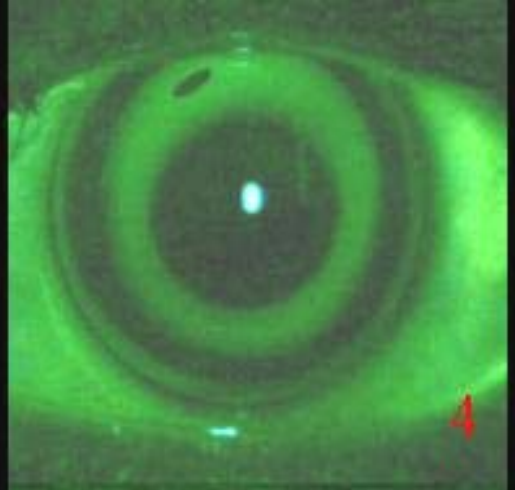


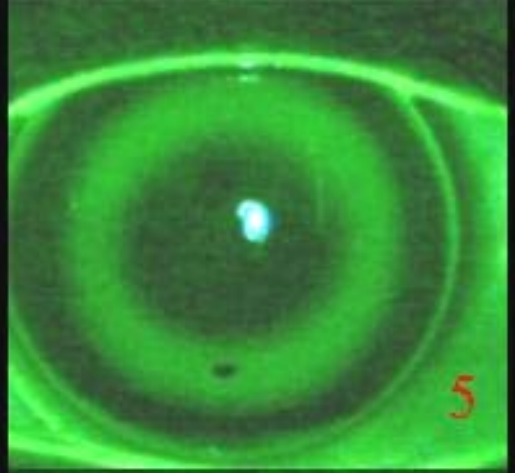

Print | Show Graph | Return to Input | Quit

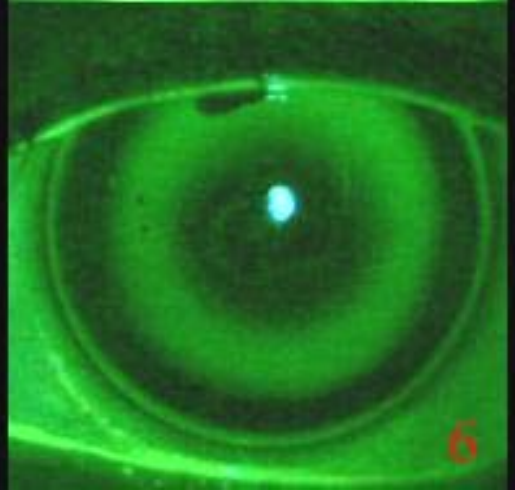


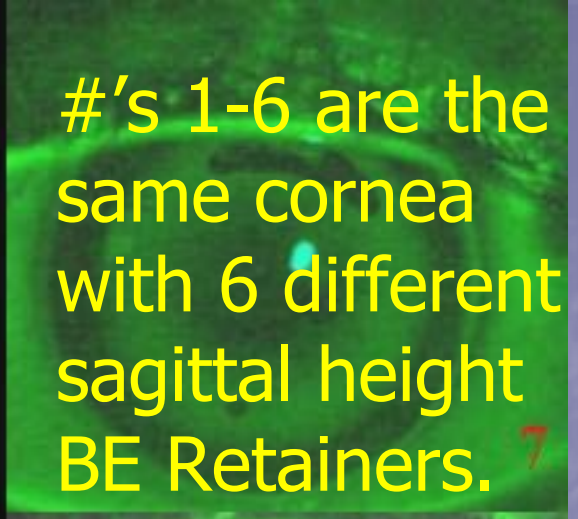



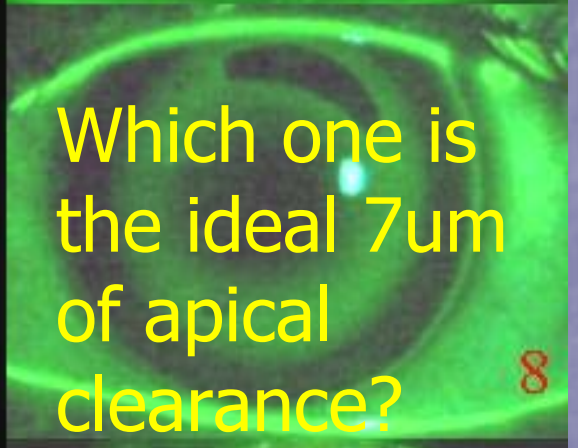



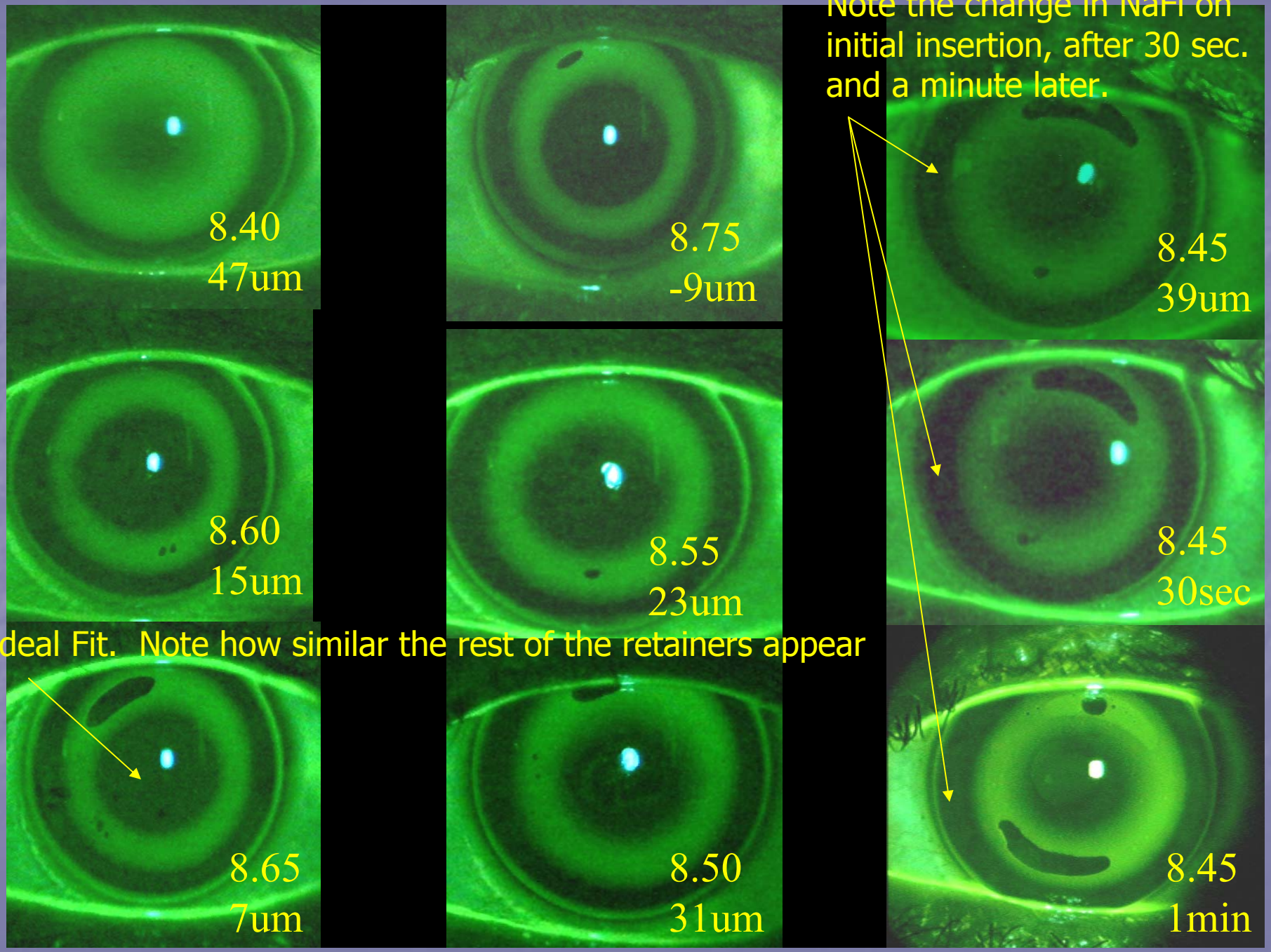

#’s 1-6 are the same cornea with 6 different sagittal height BE Retainers.




Which one is the ideal 7um of apical clearance?



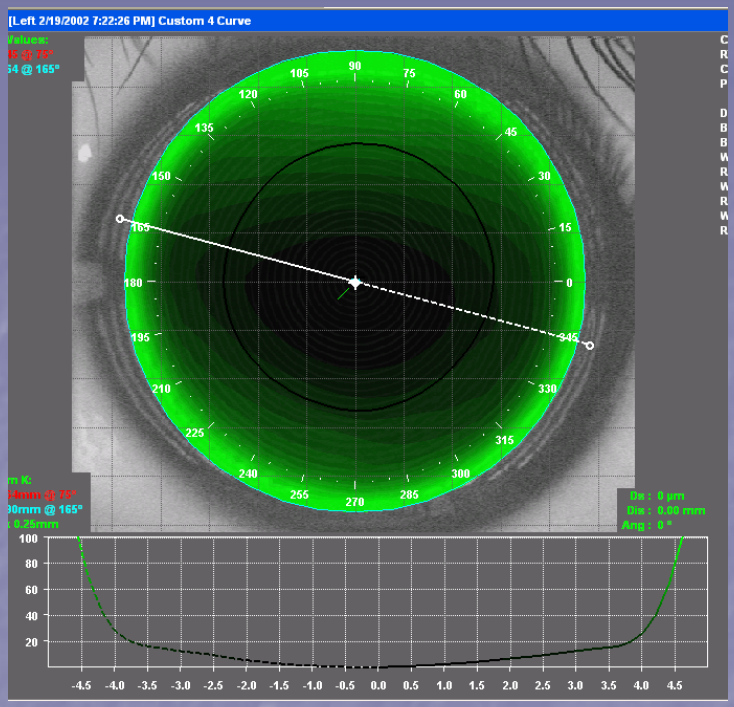

Note how similar the patterns look other than #1!

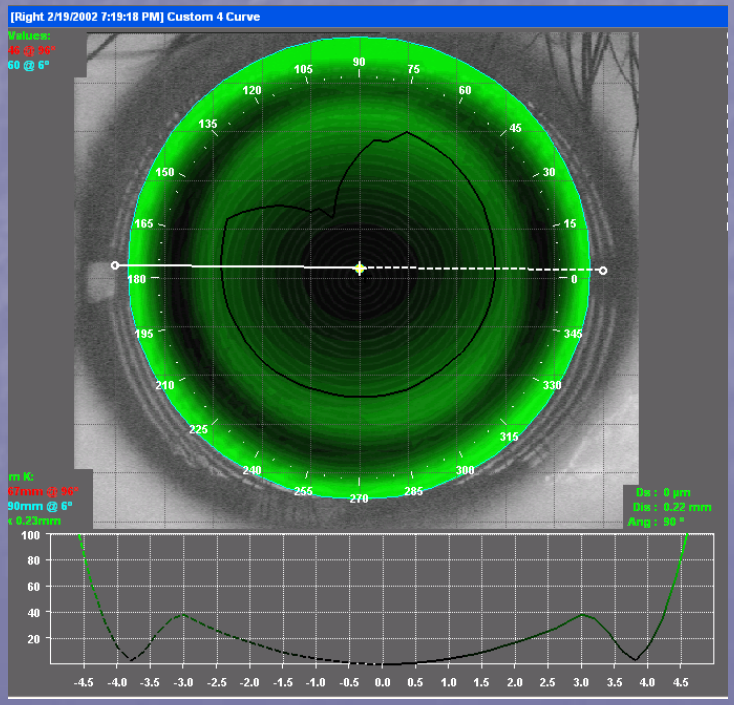

Note the change in NaFl on initial insertion, after 30 sec. and a minute later.
8.40
47um
8.75
-9um
8.45
39um
8.60
15um
8.55
23um
8.45
30sec
Ideal Fit. Note how similar the rest of the retainers appear
8.65
7um
8.50
31um
8.45
1min

Fluorescein pattern analysis is NOT used in the BE Retainer fitting process

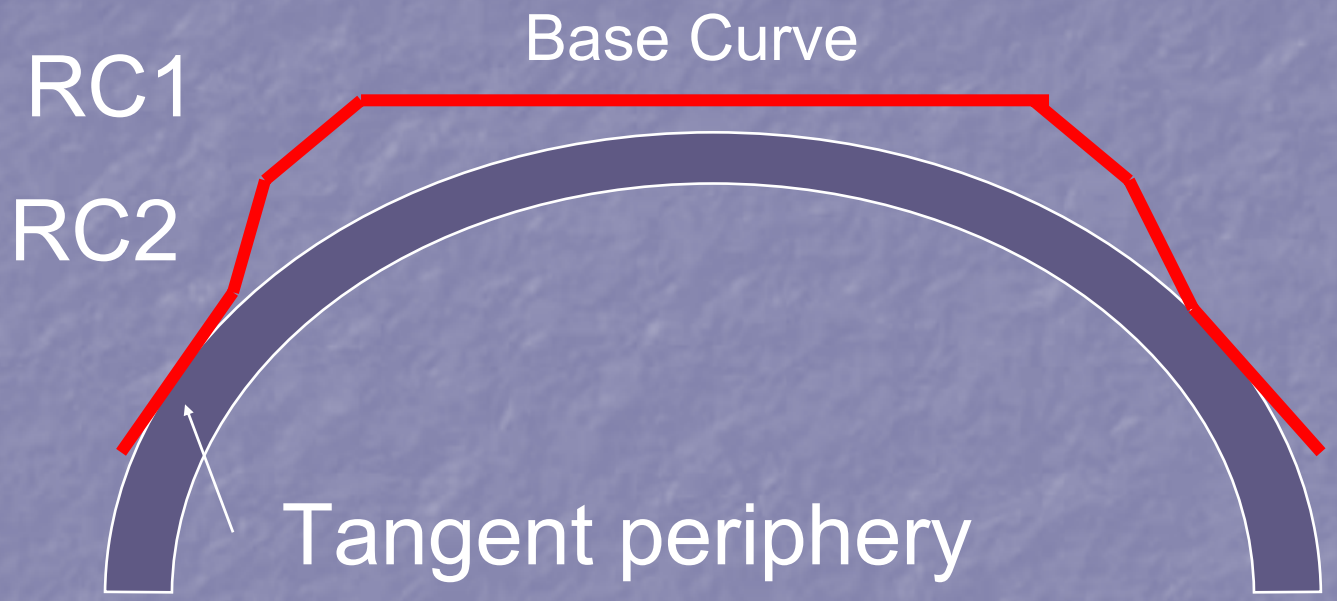
# Base Curve

- Jessen Formula has NOT shown a 1:1 relationship in the selected Base curve and Apical Radius change
- In BE Retainer therapy, the base curve radius exists ONLY to provide the correct tear clearance



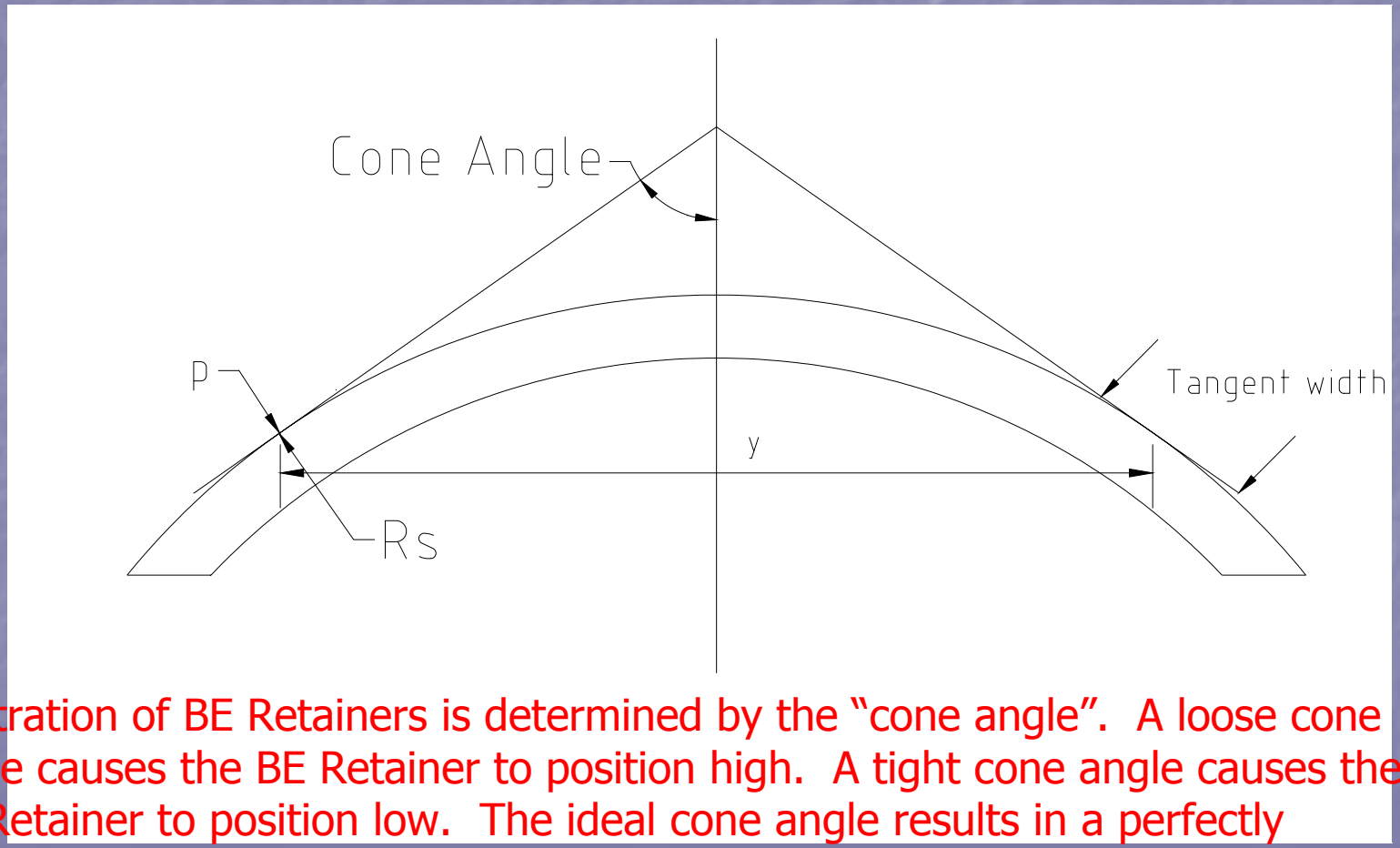



# The BE Retainer




BE Retainers start with the determination of the cone angle (fitting curve). The reverse curves are chosen next followed last by the base curve. The base curve is calculated to provide the ideal apical clearance. The apical clearance determines the Squeeze Film Force as required by the Rx target.

# Tangential Cone Angle Periphery




Centration of BE Retainers is determined by the "cone angle". A loose cone angle causes the BE Retainer to position high. A tight cone angle causes the BE Retainer to position low. The ideal cone angle results in a perfectly positioned BE Retainer.

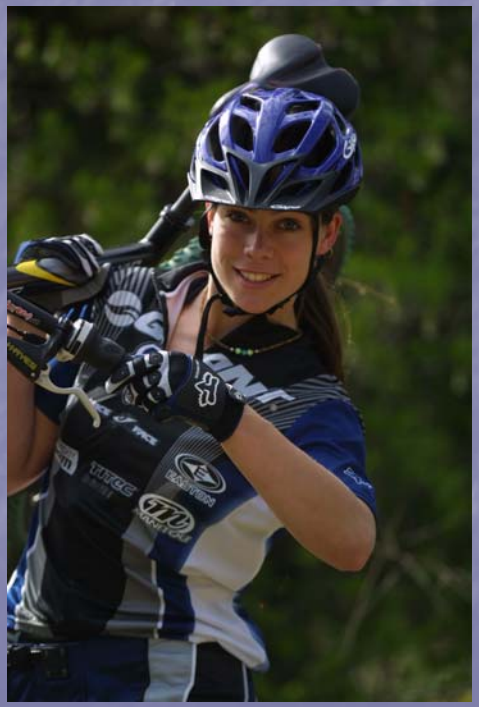
# Patient Selection

# Optimal Orthokeratology for Adults

- Uncomfortable C/L patients
  - Dry Eye
  - Workplace conditions
- Surgical concerns
- Active Lifestyles
- Wanting Freedom from Glasses and Contacts

# Optimal Orthokeratology Therapy for Athletes

Speed & Conditions



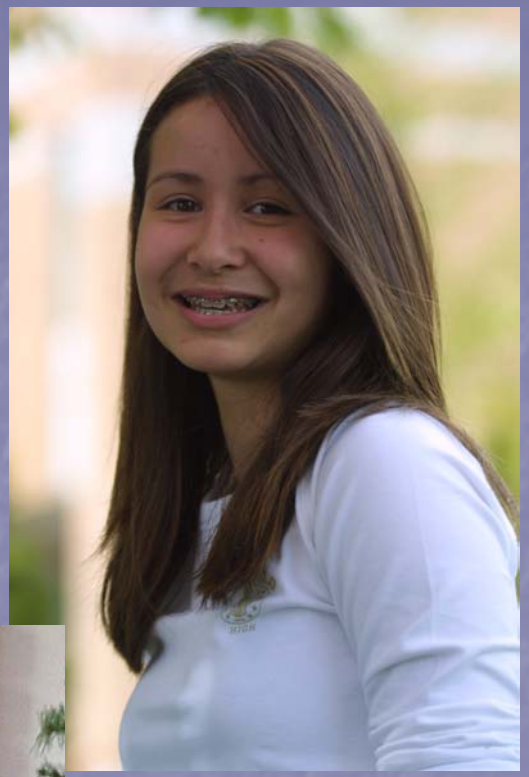
Dusty/Muddy

Water & Spray

# Optimal Orthokeratology for Adolescents

- Myopia Control?
- There are no age limits but compliance is critical

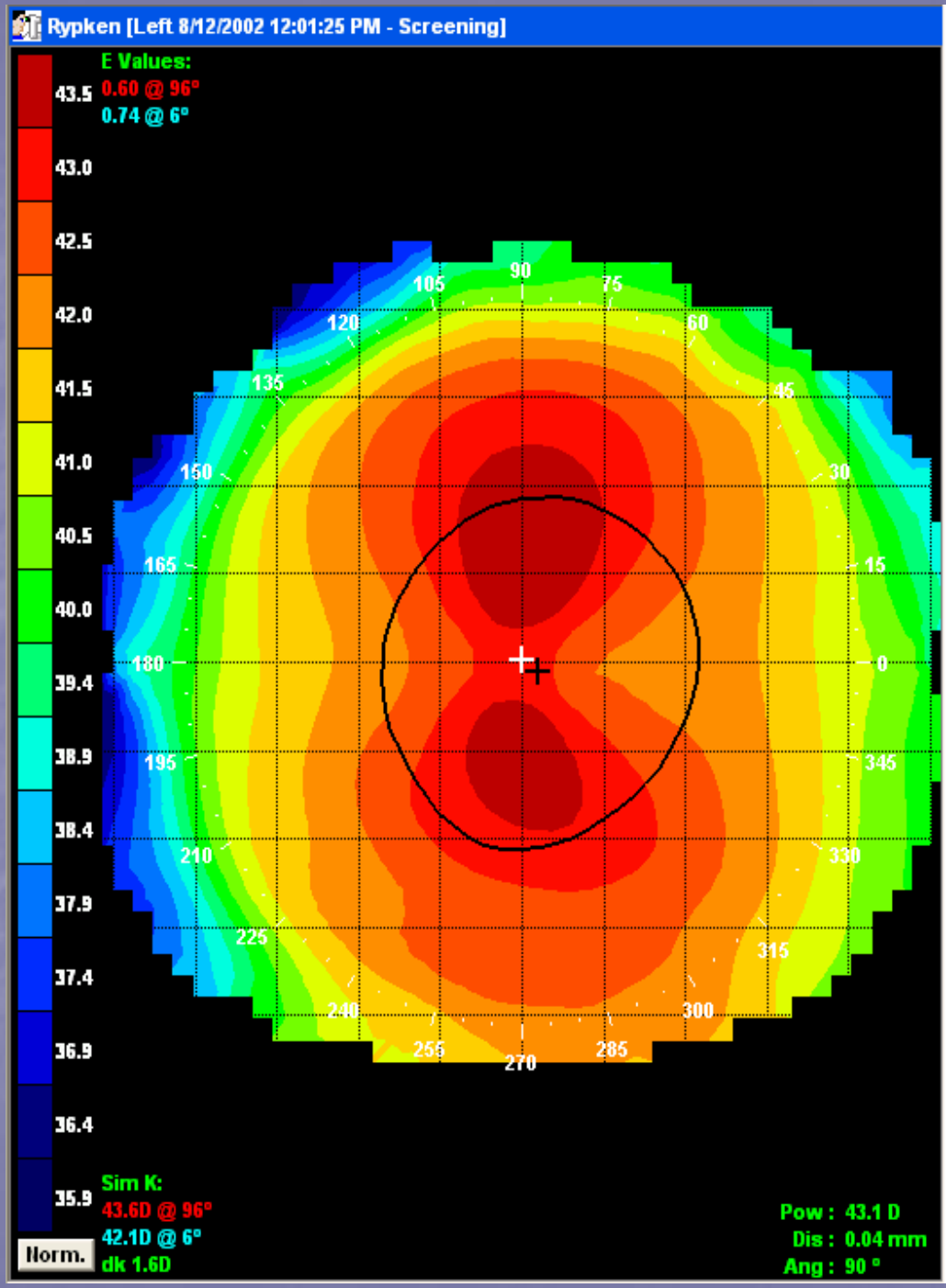
# *The BE Retainer:* Ideal Candidates



- Ages 8 – 50 years old (6-60+)
- < -4.00 Sphere
- < -1.50 Cyl WTR
- < -1.00 Cyl ATR
- Cylinder not greater than ½ the sphere

# Rx Limitations

- Corneal Shape (Eccentricity)
- Treatment zone size
- Pupil Size
- Apical clearance/ manufacturing accuracies
- Astigmatism type (Apical or Limbus-Limbus)
- Net astigmatic power required (sphere + cyl)



# *The BE Retainer:* Ideal Candidates

- People looking for an alternative to glasses, contacts or Laser surgery
- Sports and Active Lifestyles
- Environmental Dry Eye (SCL wearers)
- Children of highly myopic parents

# *The BE Retainer:* Contra-Indications

- Active/recurrent ocular surface disease
- Keratoconus/corneal thinning disorders
- Extreme Dry Eye (KCS)
- Herpetic corneal scars
- Previous Refractive Surgery patients
- Large pupils (>6mm in dim illumination)

# *The BE Retainer:* Challenges

- High myopia (>3.50Dp)
- Current conventional OK patients & OOK enhancements
- Current RGP wearers: discontinue 1 week per year of lens wear up to 6 wks
- Young Adults: Less concerned with risk, demand complete convenience, irregular patterns!

# *BE Retainer:*
# Patient Work-up

# *BE Retainer:* Patient Work-up

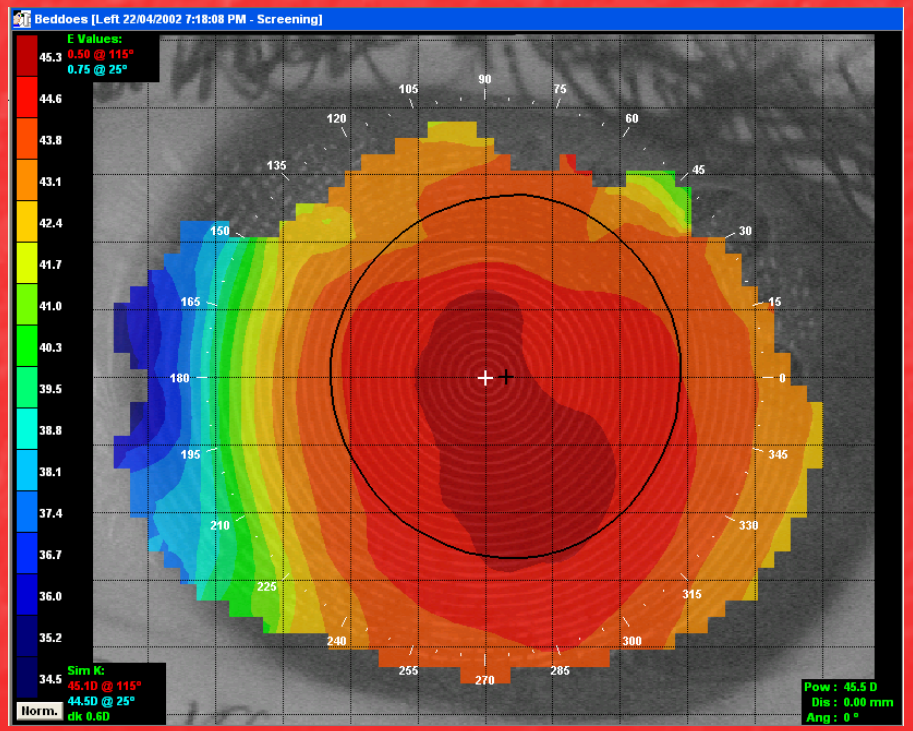
- Patient History
- Visual Acuity
  - Unaided: each eye & binocular
  - Current Best Aided: each eye & binocular
- Biomicroscopy
  - Evidence of Ocular Surface Disease
  - Rule out prior scarring, vascularization, surface staining, endothelial changes
  - Pupil Diameter: Light & Dark

# *BE Retainer:*
# Work up: Patient (Guardian) Consultation

- Motivation:
  - Realistic goals?
  - Positive attitude?
  - Reliable for appointments?
- Fees:
  - Total Fees and Payment options
  - Refund Policy/Guarantee Policy
- Review Forms:
  - Treatment Agreement
  - Informed Consent

# *BE Retainer:*
# The Key: Accurate Topography

- Critical to BE Retainer success
- Determines:
  - Patient potential
  - Trial parameters
  - Initial trial success



# The Best Topographer for BE Retainer Therapy?

## Medmont E300

# Why Medmont?

- Most accurate Topographer
  (Apical Curvature & Sagittal Height)
- Auto capture System
- Subtractive map functions
  - Axial
  - Tangential
  - Refractive
- Excellent Data display
  - Apical Curvature (Ro)
  - Sagittal Height (E,P,Q)
  - Standard Deviation
  - Average Ro
  - Average Sag
  - HVID
  - Pupil Size

# Topographer Elevation Error:
## Standard Deviation on human eyes

| | |
|---|---|
| Orbscan | N/A |
| PAR | N/A |
| TMS | +/- 17um |
| Dicon | +/- 16um |
| Eyesys | +/- 14um |
| Keratron | +/- 9.7um |
| Humphrey | +/- 8um |
| Medmont | +/- 2um |

HK Poly - Cho, Lam, Mountford (2002)

# Topographer Elevation Error on eyes:

Number of repeated readings to achieve a 2um Standard Deviation error

| | |
|---|---|
| PAR | N/A |
| Orbscan | 397 |
| TMS | 64 |
| Eyesys | 49 |
| Dicon | 36 |
| Humphrey | 16 |
| Keratron | 12 |
| Medmont | 3 |

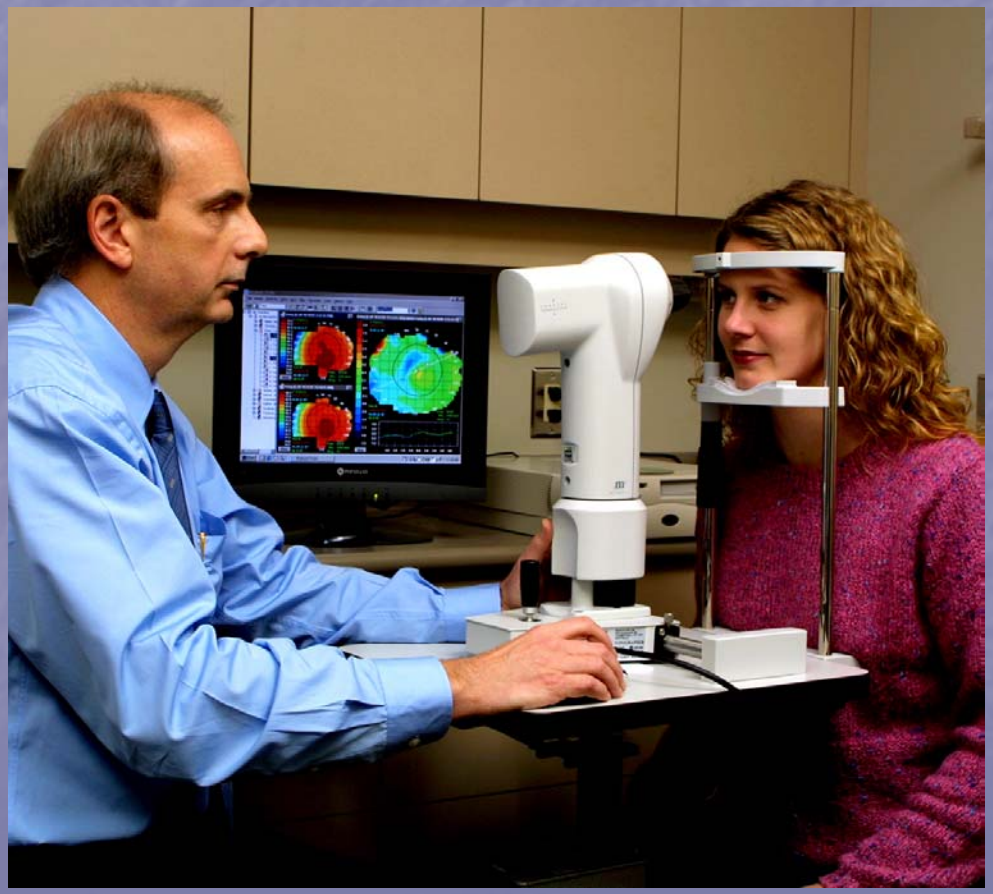
HK Poly (2002)

- Cho, P; Lam, A; Mountford, J. (2002) The performance of four different corneal topographers on normal human corneas and its impact on orthokeratology lens fitting. Opt. Vis. Sc. 79:3, 175-183.

The Medmont E300 is the preferred topographer of the BE Retainer system. The best results and easiest access to information, will be obtained from the Medmont.

Other topographers can be used with the BE Retainer. However, data access is more time consuming, additional trial fittings may be required (due to topographer inaccuracy) and analysis of effect may be less distinct.

The following Section on "Capturing" is designed for Medmont topographer users. However, many of the rules apply to all computerized corneal topographers

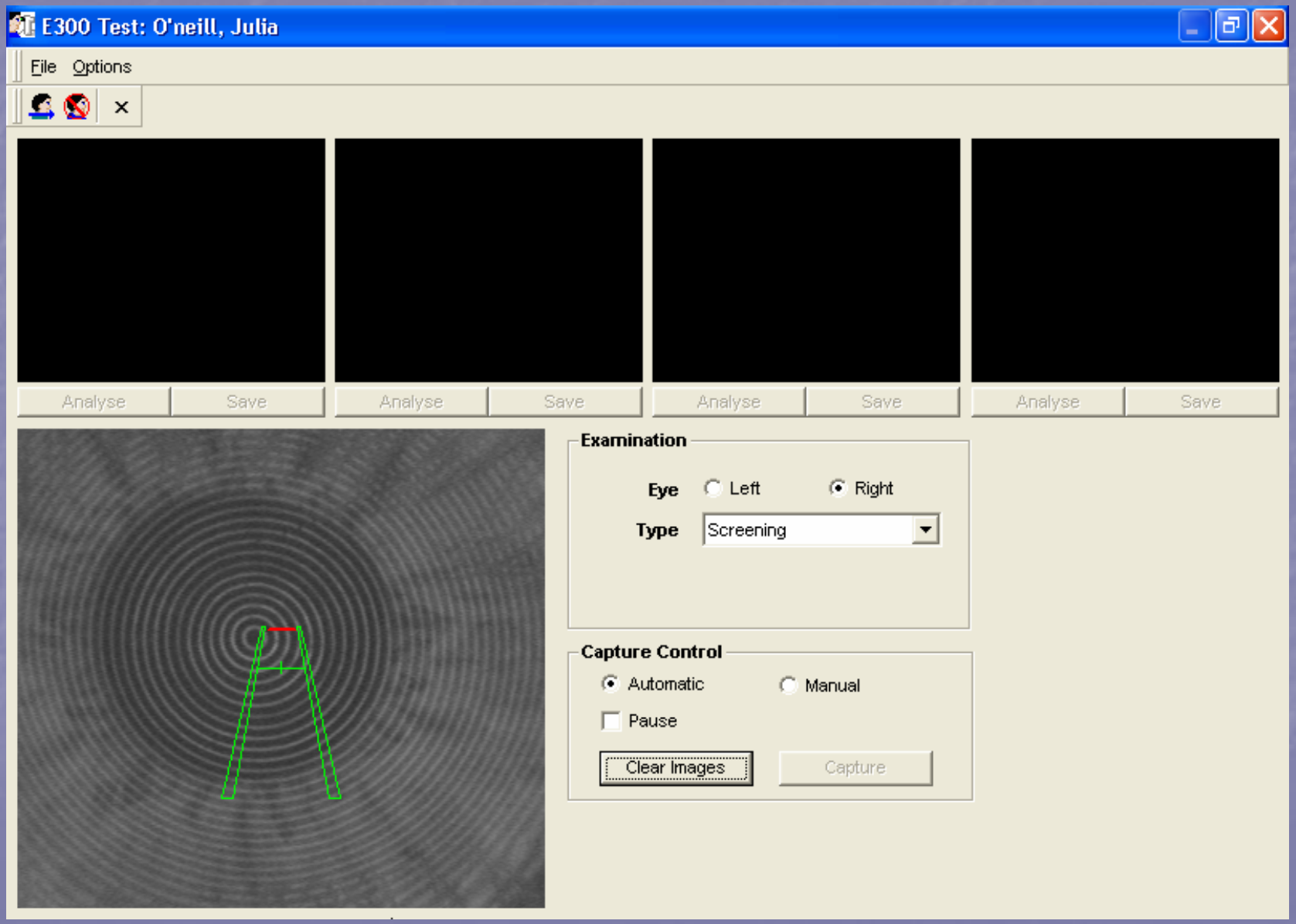


# The Capture Process

- Accuracy is imperative!!!
- Calibrated topographer
- Steady patient
- Proficient operator

- Seat patient comfortably
- Forehead firmly against head rest
- For deep set eyes or narrow PD's:
  - Move chin in the opposite direction of the desired eye to be captured
- Avoid pressure on the orb

# Capture Screen

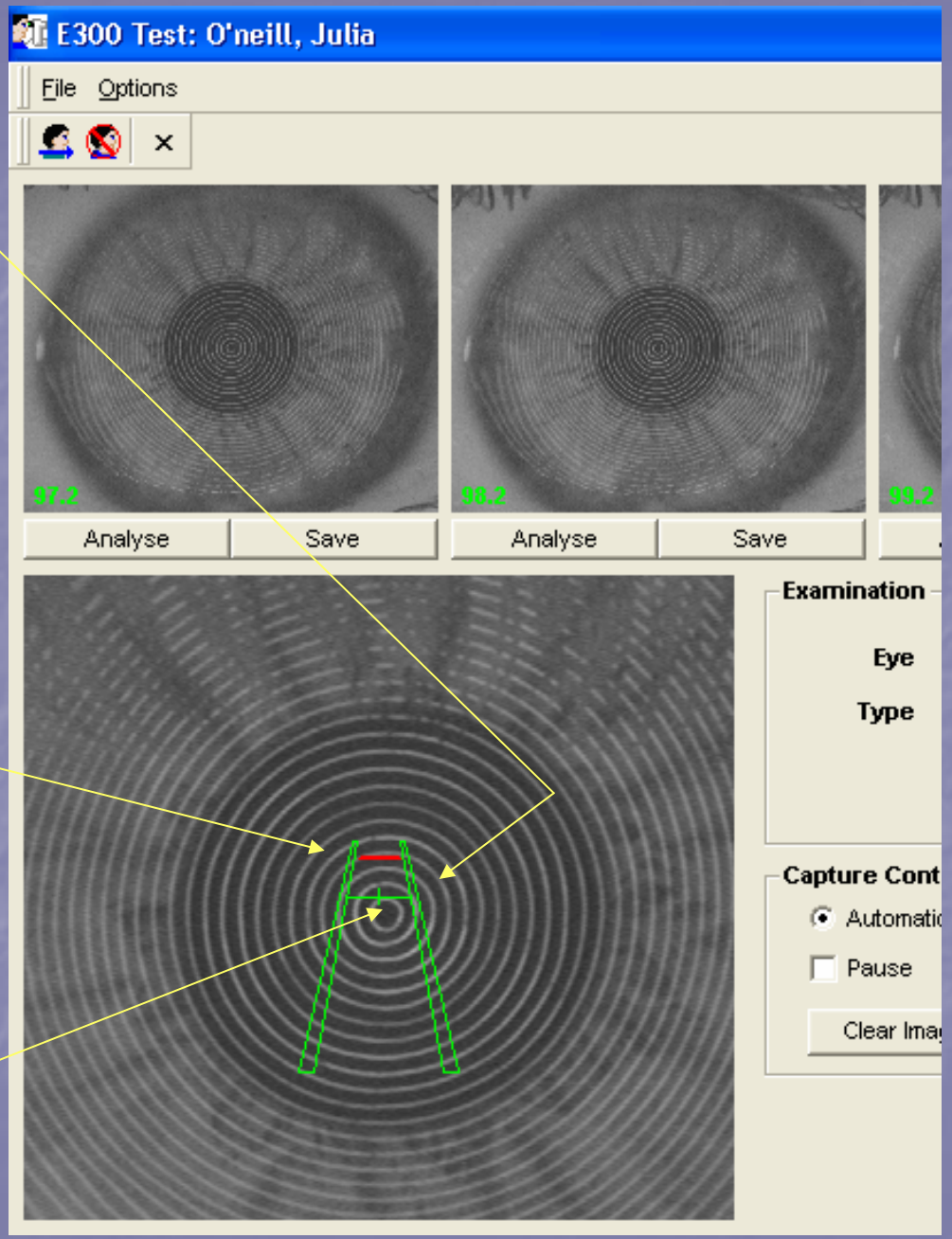


First, center the green cross-hair to the apex ring of the cornea.

Second, move the topographer the correct distance away from the cornea to capture.

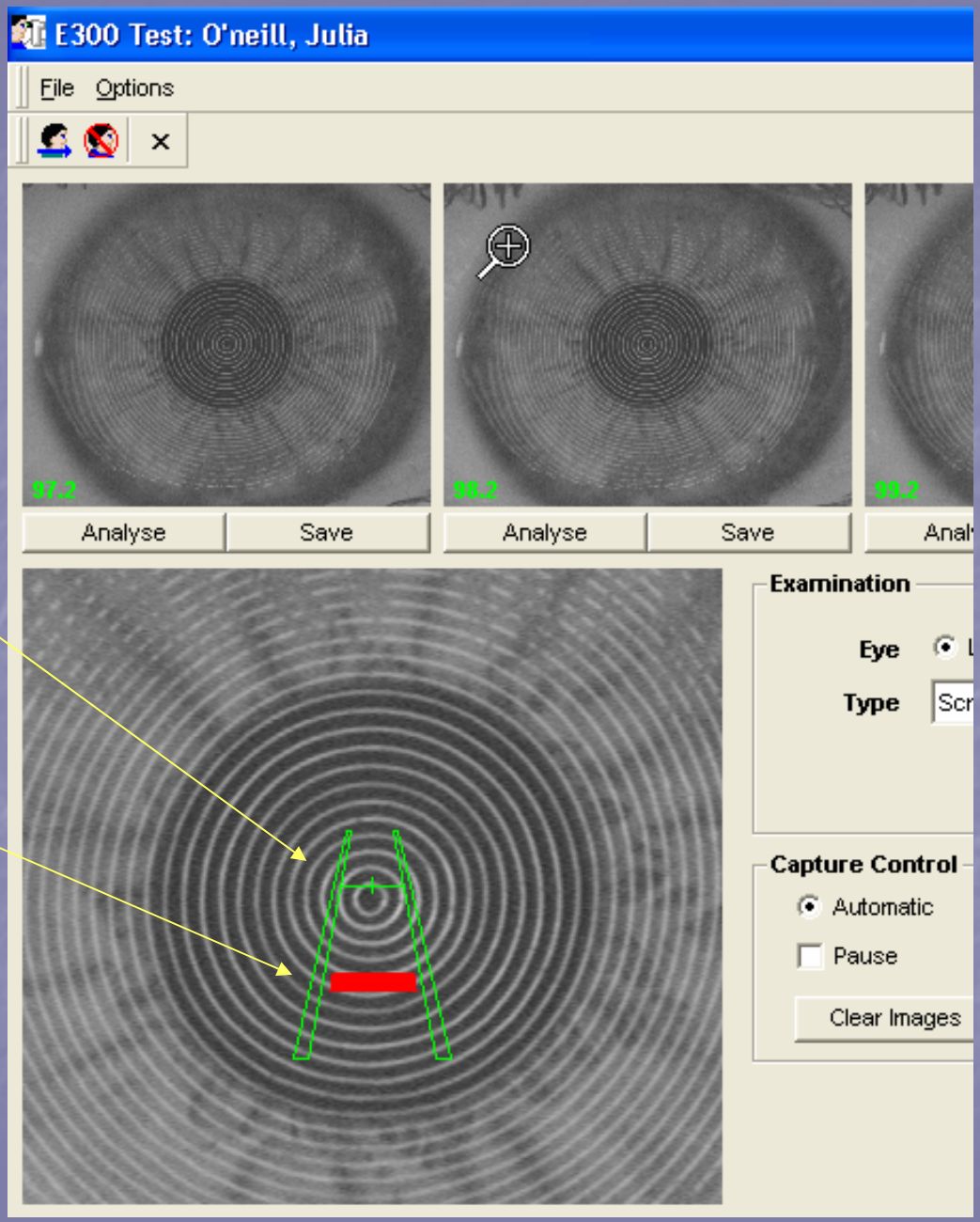
Note: when the red bar is above the green cross-hair, the topographer is too far away (see graphic at right). When the red bar is below the cross-hair, the topographer is too close to the cornea.

Line up the green crosshair and red distance indicator at the apex ring.



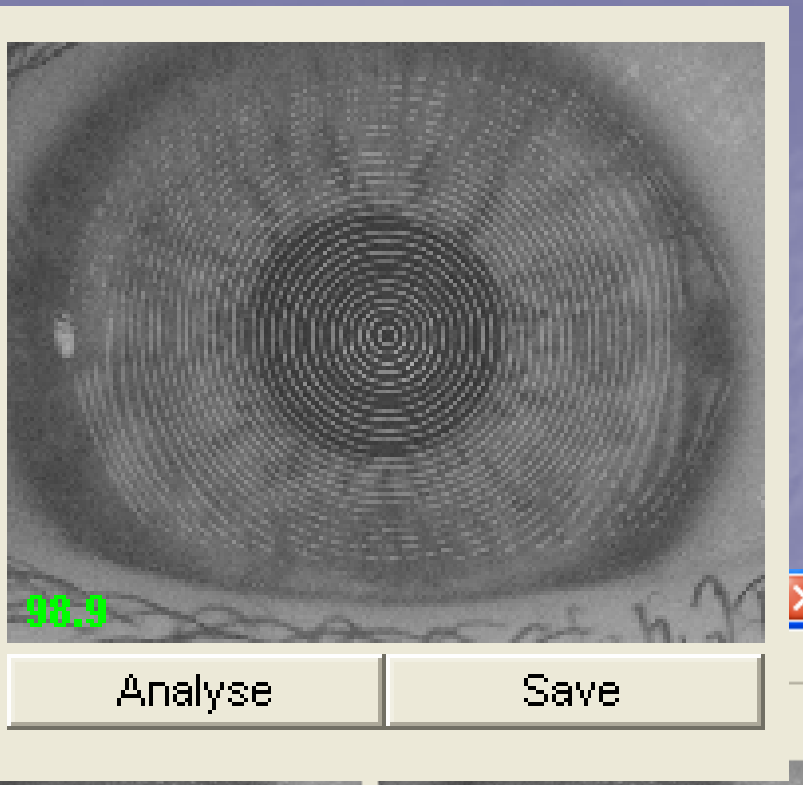
Note the position of the green crosshair slightly high in relation to the apex ring.

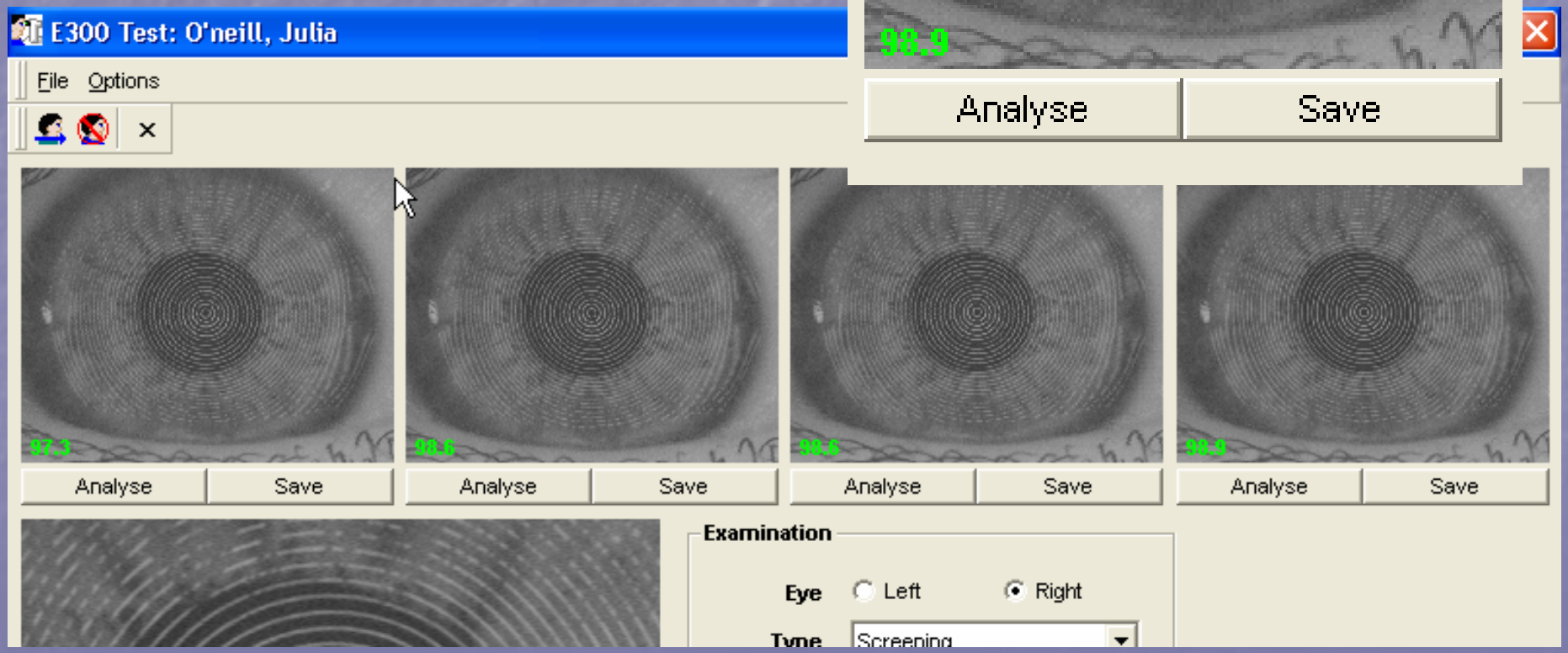
In this example, the topographer is TOO CLOSE to the cornea as indicated by the position of the red distance indicator bar below the green cross-hair.

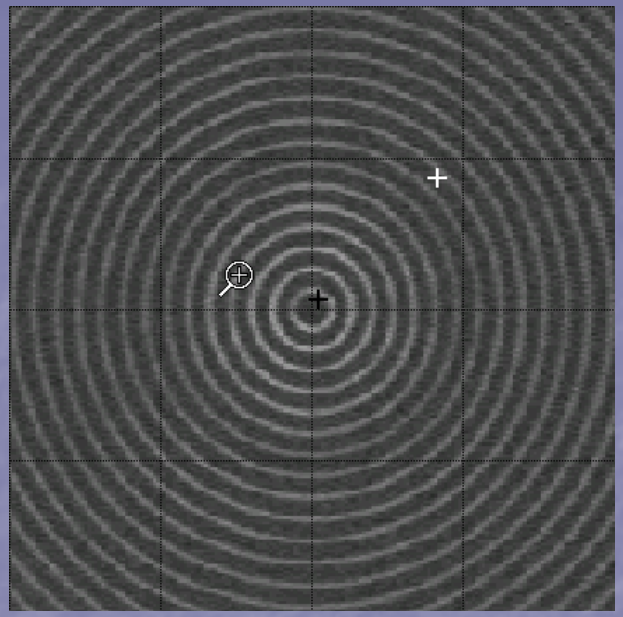


The Medmont automatically captures four topographies and displays the images with a percentage confidence. This percentage is the topographer's measurement (estimate) of capture quality.

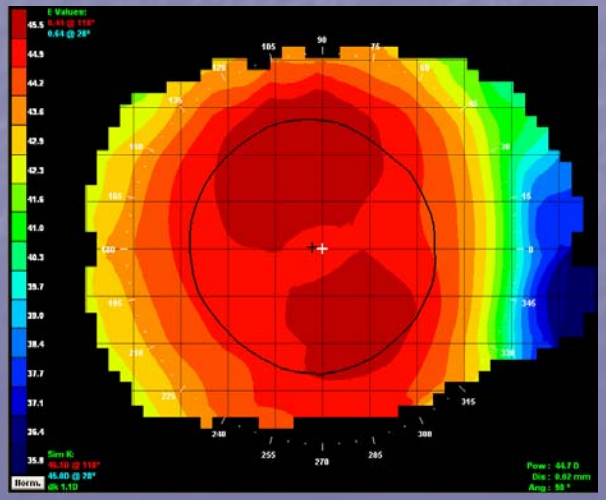
The readings are displayed with the highest percentage towards the right, down to lowest on the left.





1) Zoom in to analyze the ring quality (right click with the mouse on the image and select zoom)



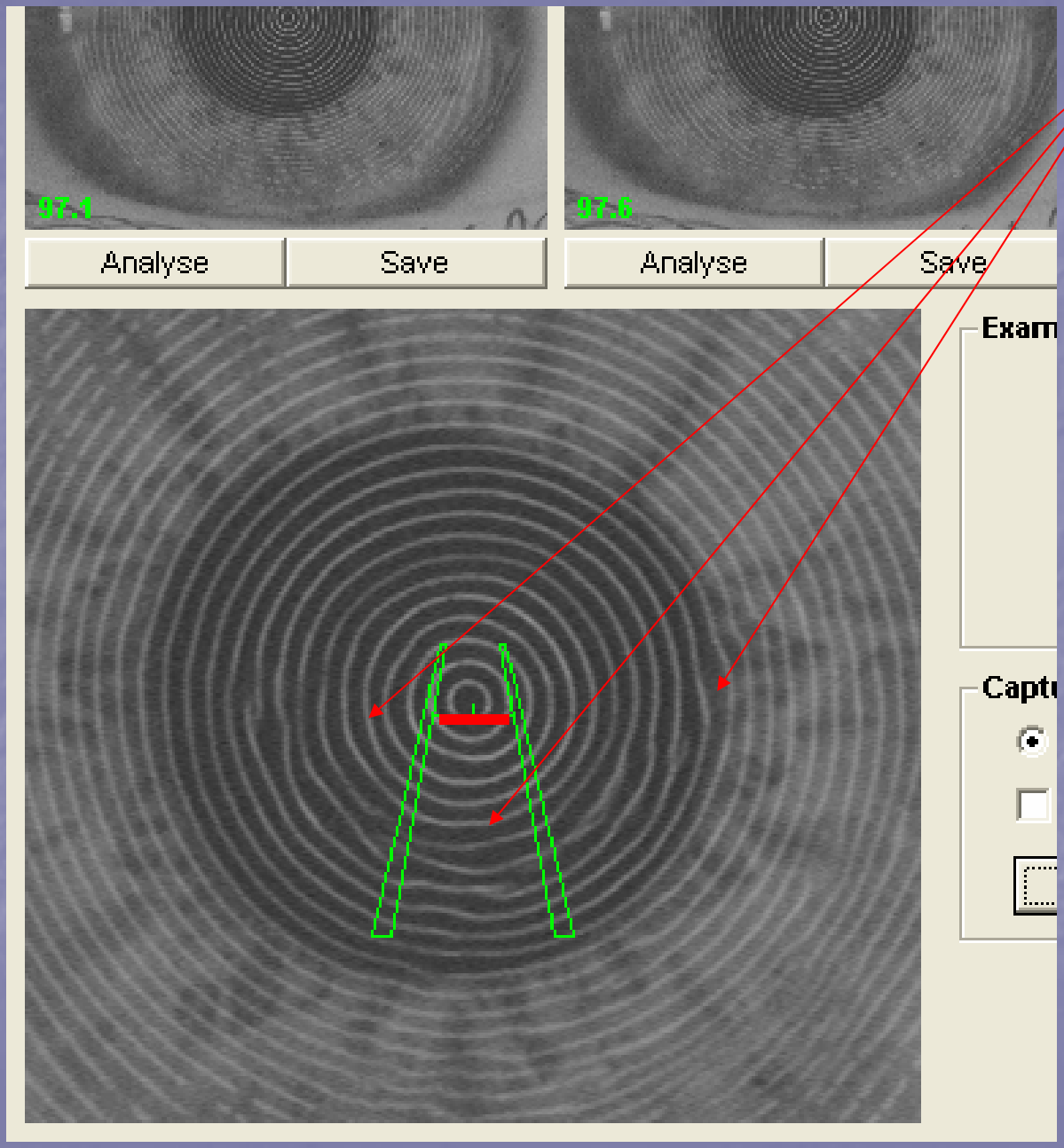
2) Select “Analyze” to view the capture

OR

“Save” to store the map to the patient file (if acceptable).

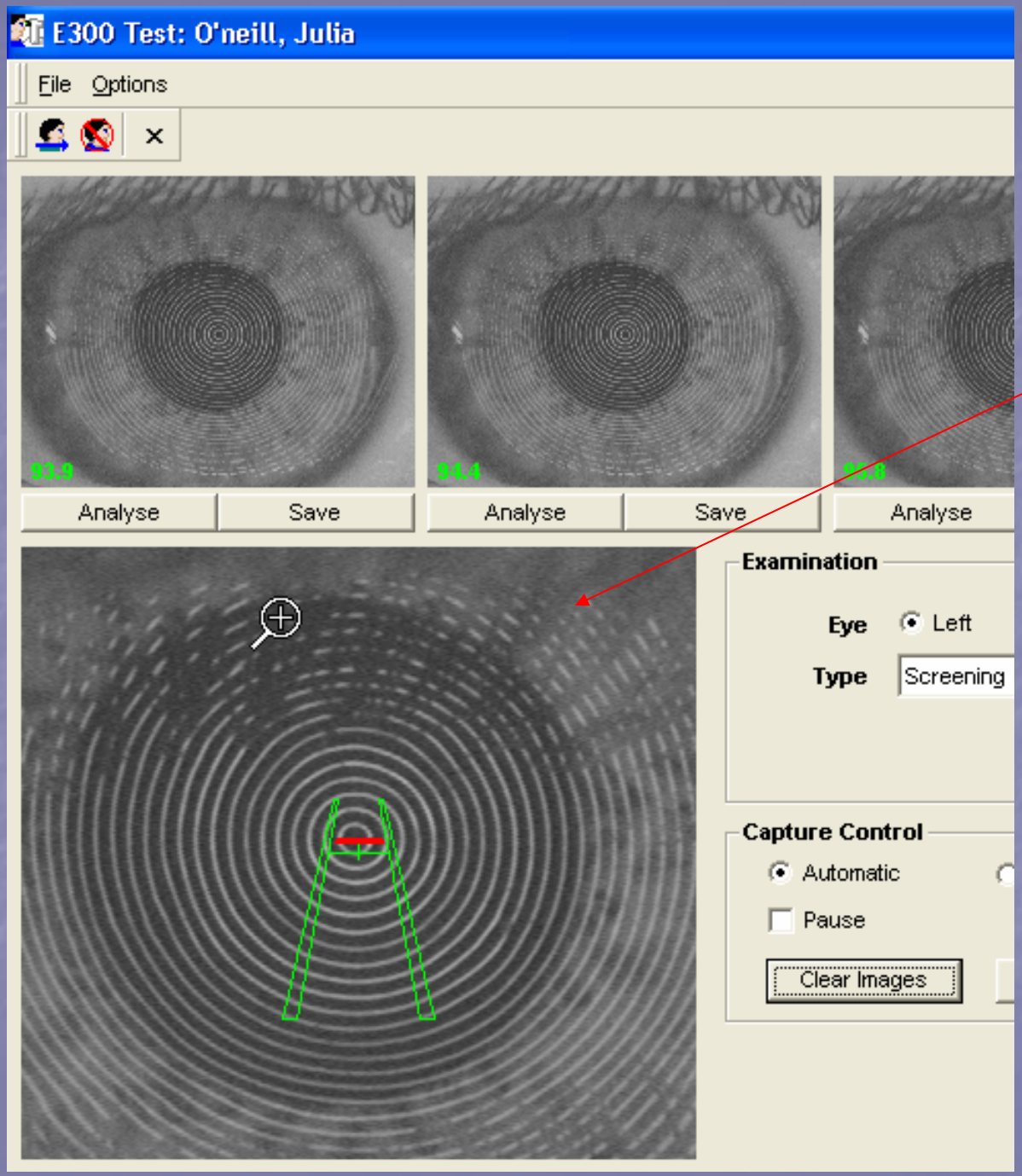
Continue aligning the topographer to achieve percentages above 95. The topographer continues to capture and display maps if higher percentage confidences are achieved. Capture and save the highest percentage possible for each individual cornea (ie. Don't stop at 95). After saving the best capture, select "Clear Images" and perform the capture process until 4 independent maps have been taken on each eye.

Lowest confidence up to Highest confidence




Do not capture during “ring-jam” (especially near the apex and within the pupil). Move the topographer out of position and ask the patient to blink. If serious dryness exists, instill artificial tears.

Ring-jam is the result of inconsistent tear film, dryness or a distorted epithelium. Distorted rings cause topographer error. Select “Clear Images” if the topographer has captured maps while ring-jam existed OR capture “over” lower percentage ring-jam maps.




Avoid capturing while the fissure is small or eye lash shadows exist.

Ask the patient to open up wide just before you are in position to auto-capture.

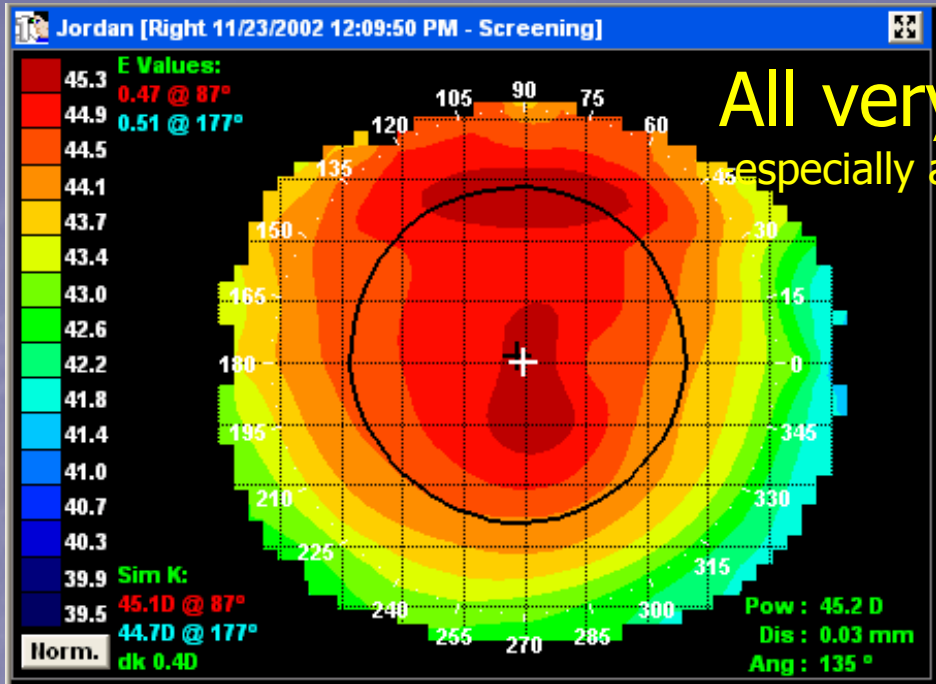
The larger the fissure and capture area, the more data can be collected with the least extrapolation error.

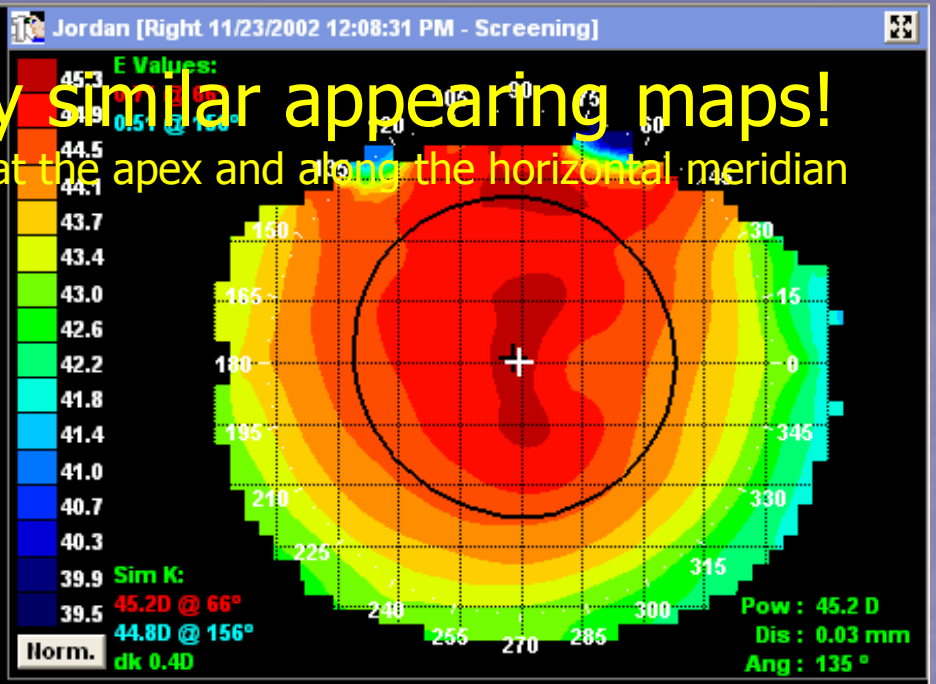
# Capture Process: Review

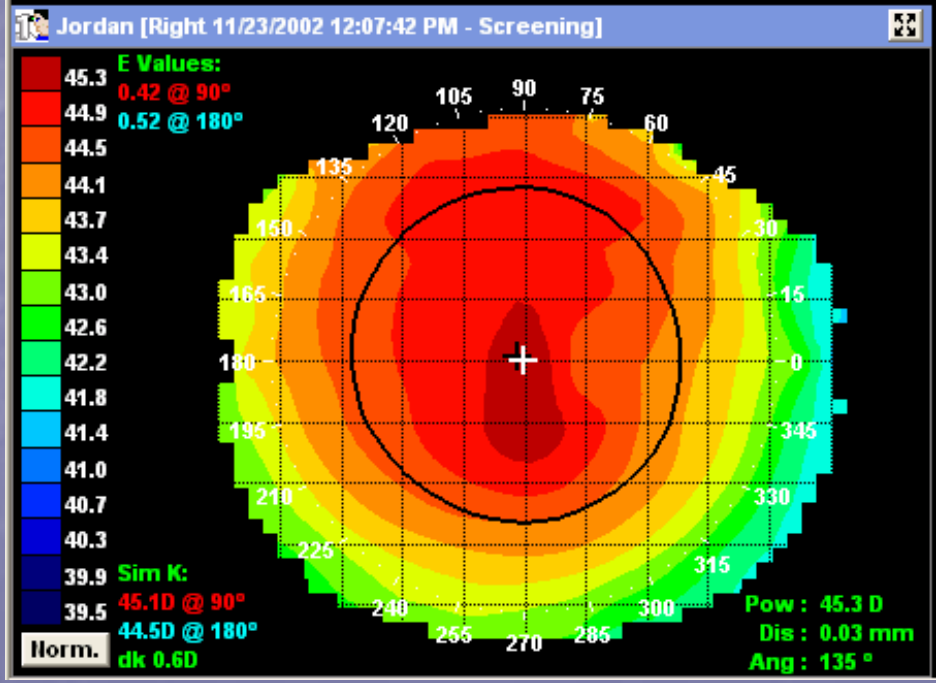
- Accuracy is imperative!
- Steady patient, steady user
- Avoid Ring Jam
- Large fissure (patient must open up as wide as possible)
- Analyze rings before saving
- Save 4 quality captures (on each eye)

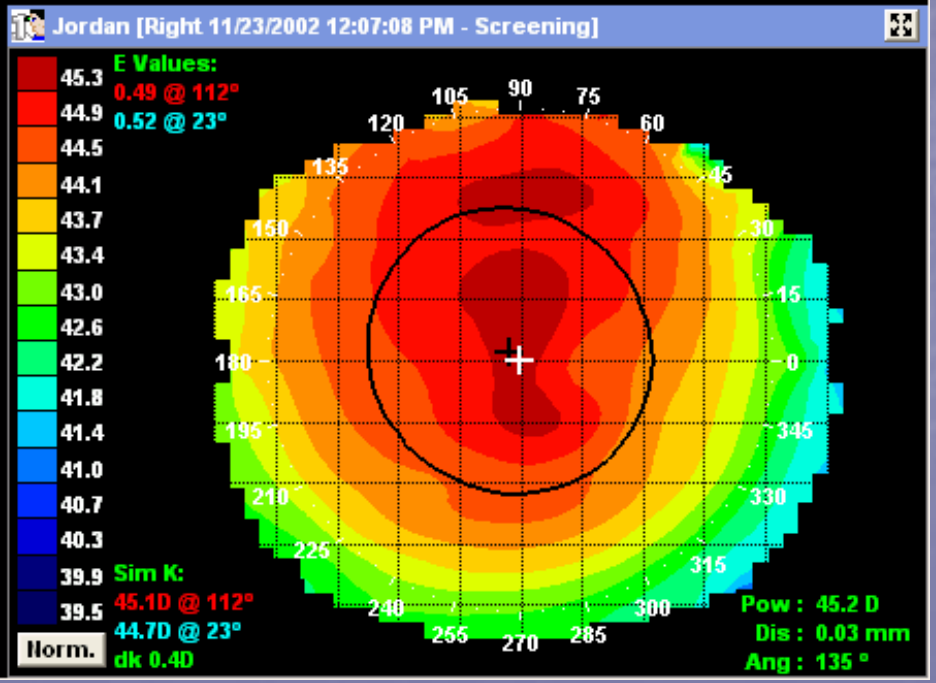
# Analyzing Topography & Recording Data

- Review symmetry of 4 maps on each eye (throw out maps with unusual shapes or those not similar to the others)
- Review corneal data
- Throw out "rogue" maps with significantly different Apical Curvatures or Sagittal Heights than the others
- Retake additional captures if necessary
- Employ BE Retainer Worksheet
- Record
  - Apical Curvature (Ro)
  - Sagittal Height or Eccentricity
  - HVID



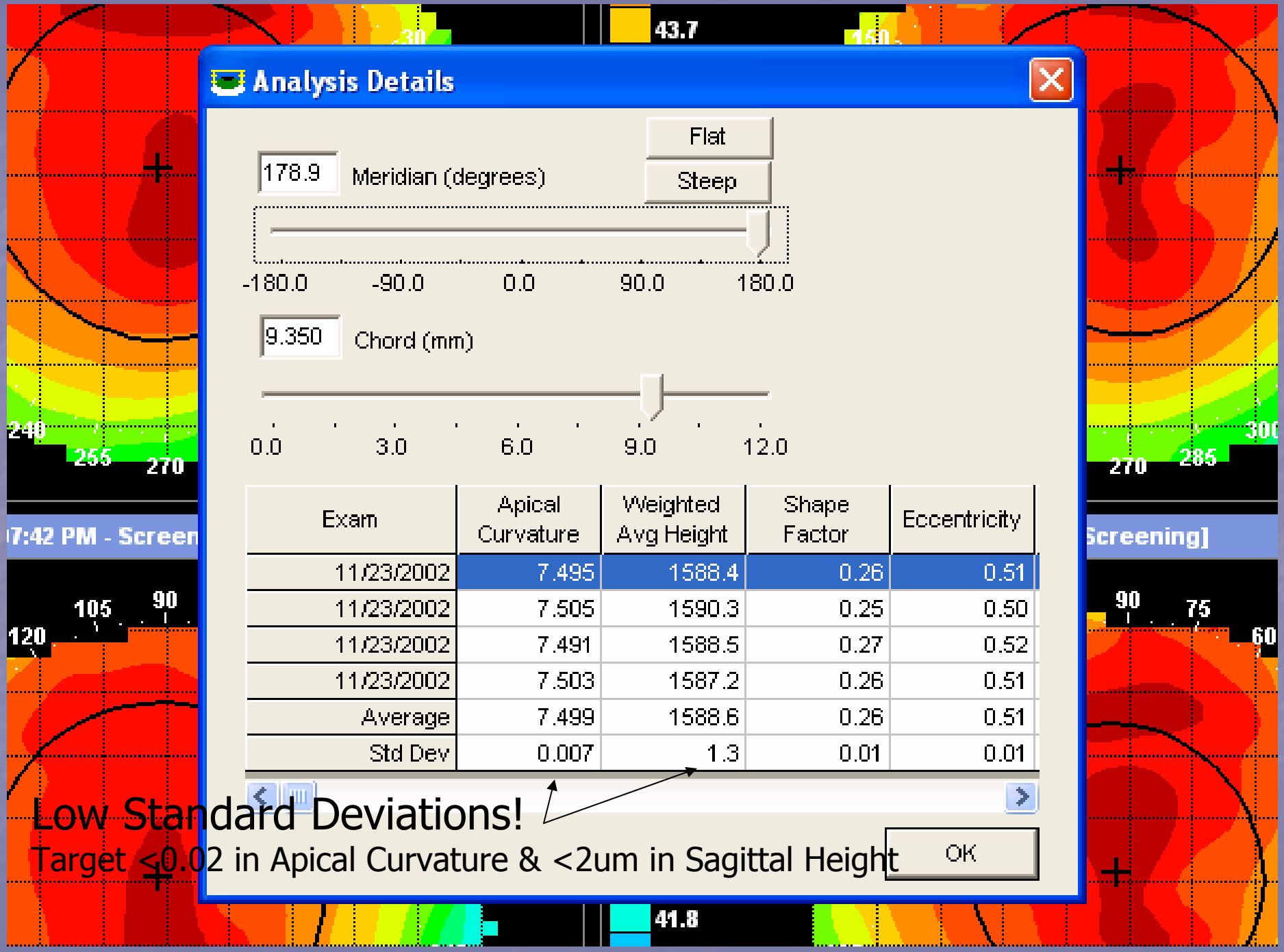




# All very similar appearing maps!

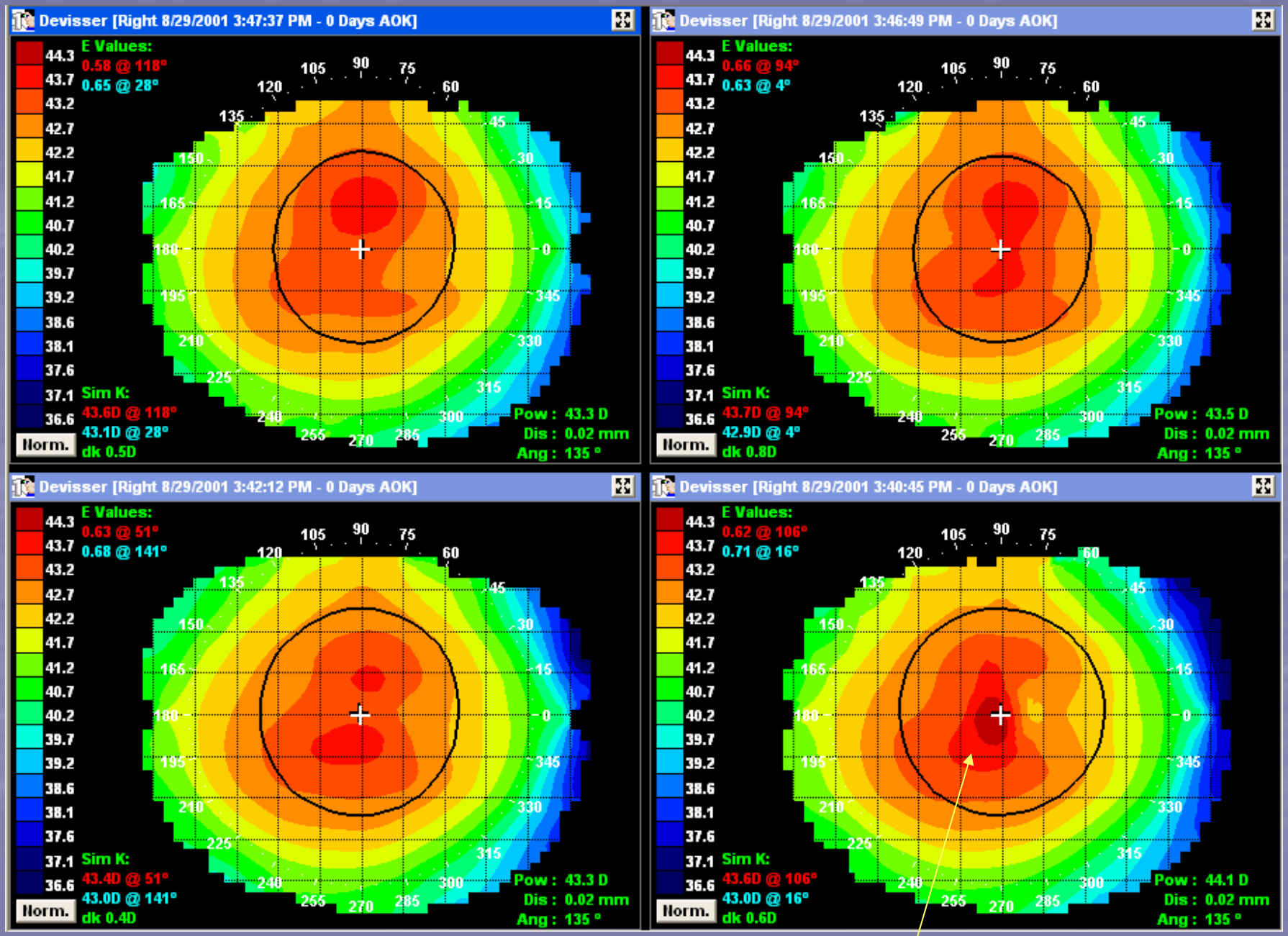
especially at the apex and along the horizontal meridian



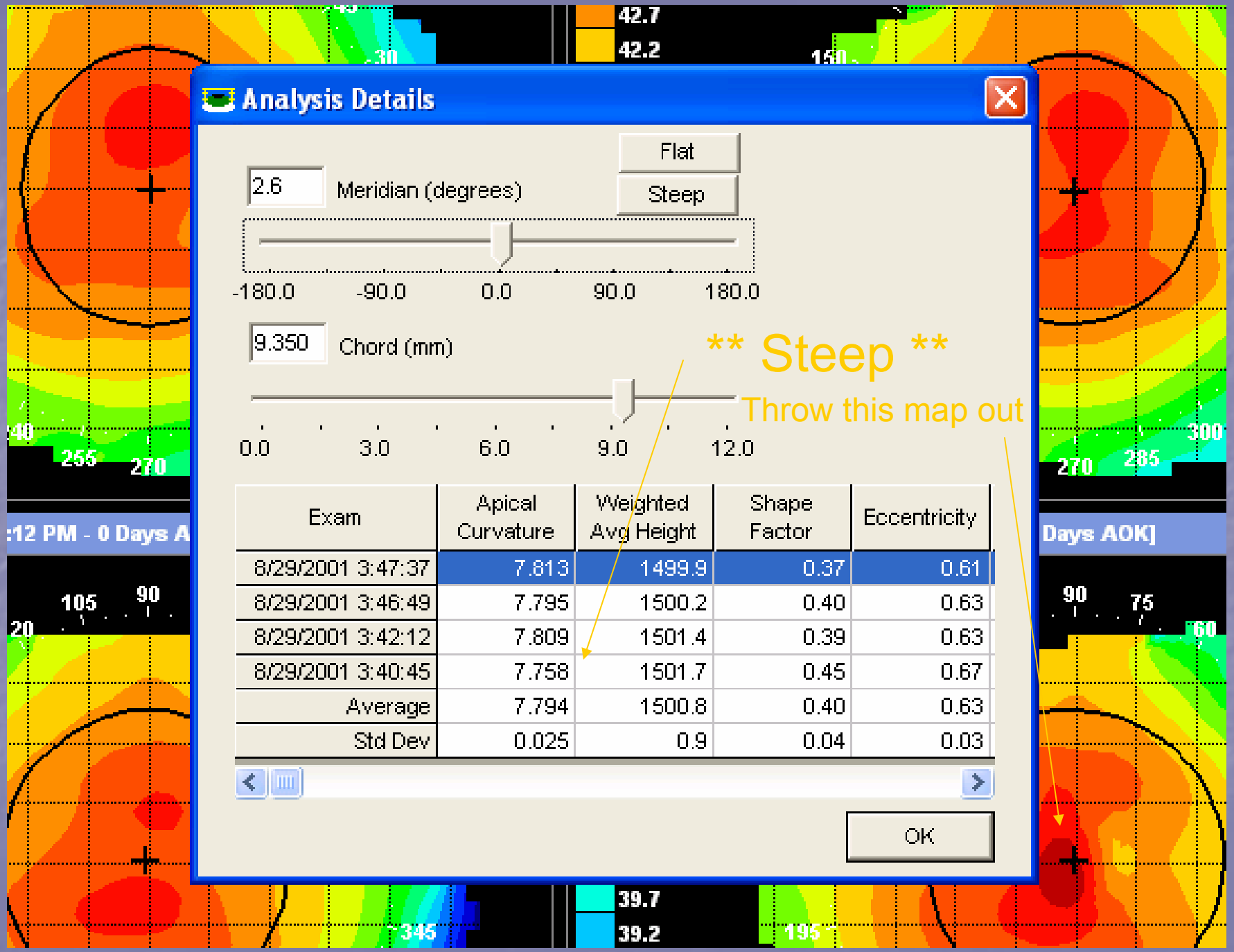

| Exam | Apical Curvature | Weighted Avg Height | Shape Factor | Eccentricity |
|---|---|---|---|---|
| 11/23/2002 | 7.495 | 1588.4 | 0.26 | 0.51 |
| 11/23/2002 | 7.505 | 1590.3 | 0.25 | 0.50 |
| 11/23/2002 | 7.491 | 1588.5 | 0.27 | 0.52 |
| 11/23/2002 | 7.503 | 1587.2 | 0.26 | 0.51 |
| Average | 7.499 | 1588.6 | 0.26 | 0.51 |
| Std Dev | 0.007 | 1.3 | 0.01 | 0.01 |

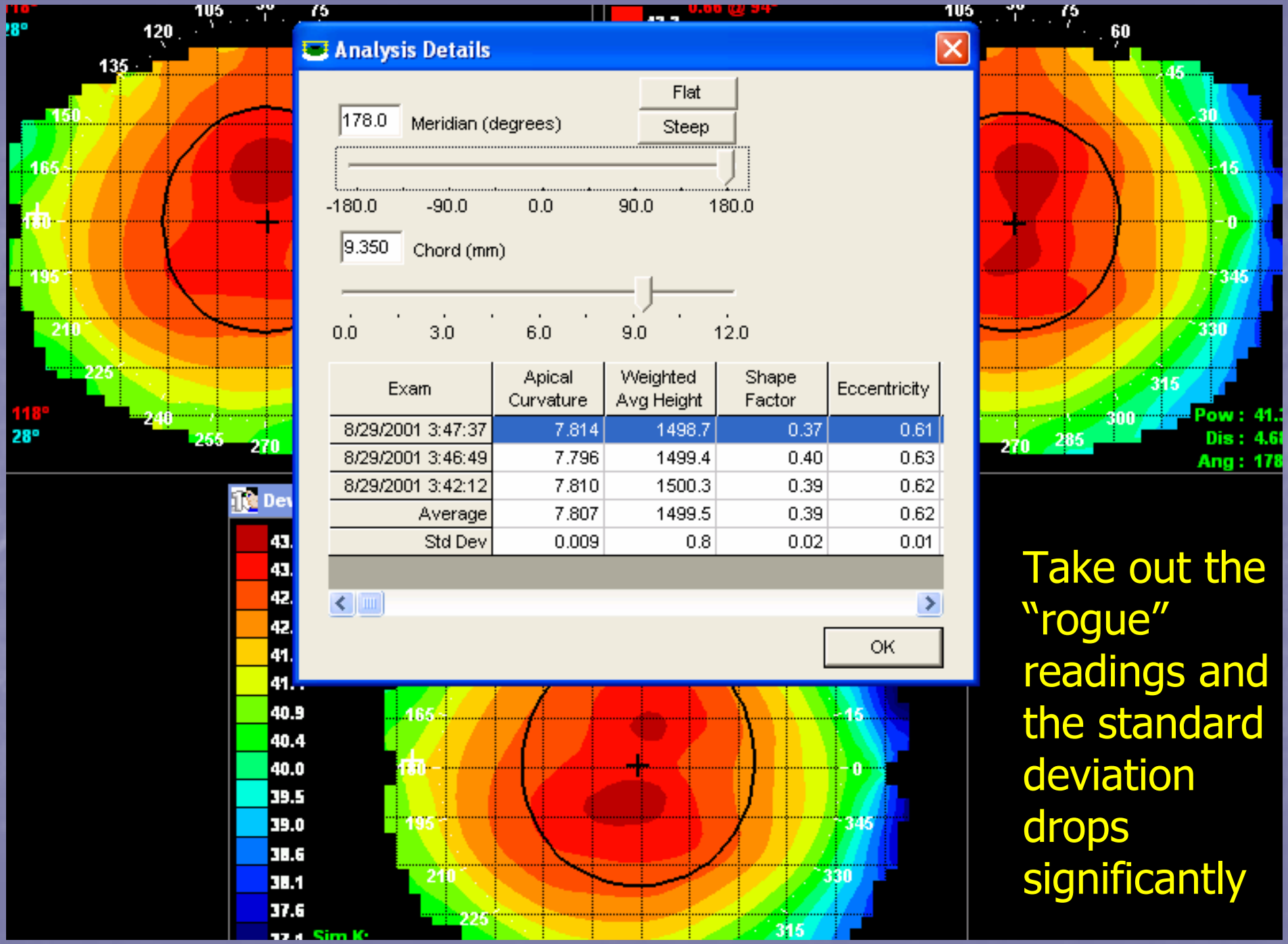
Low Standard Deviations!

Target ≤0.02 in Apical Curvature & <2um in Sagittal Height

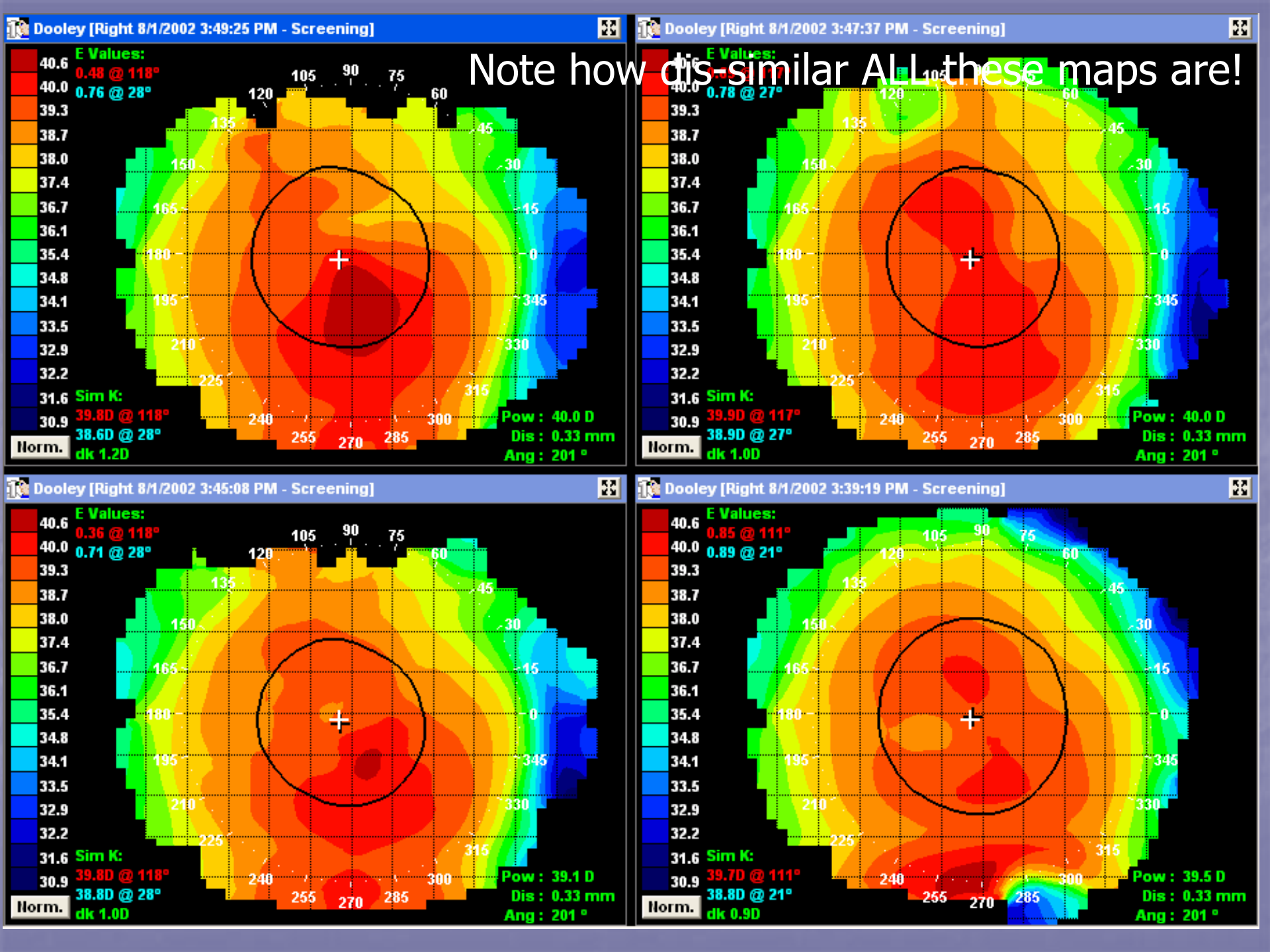


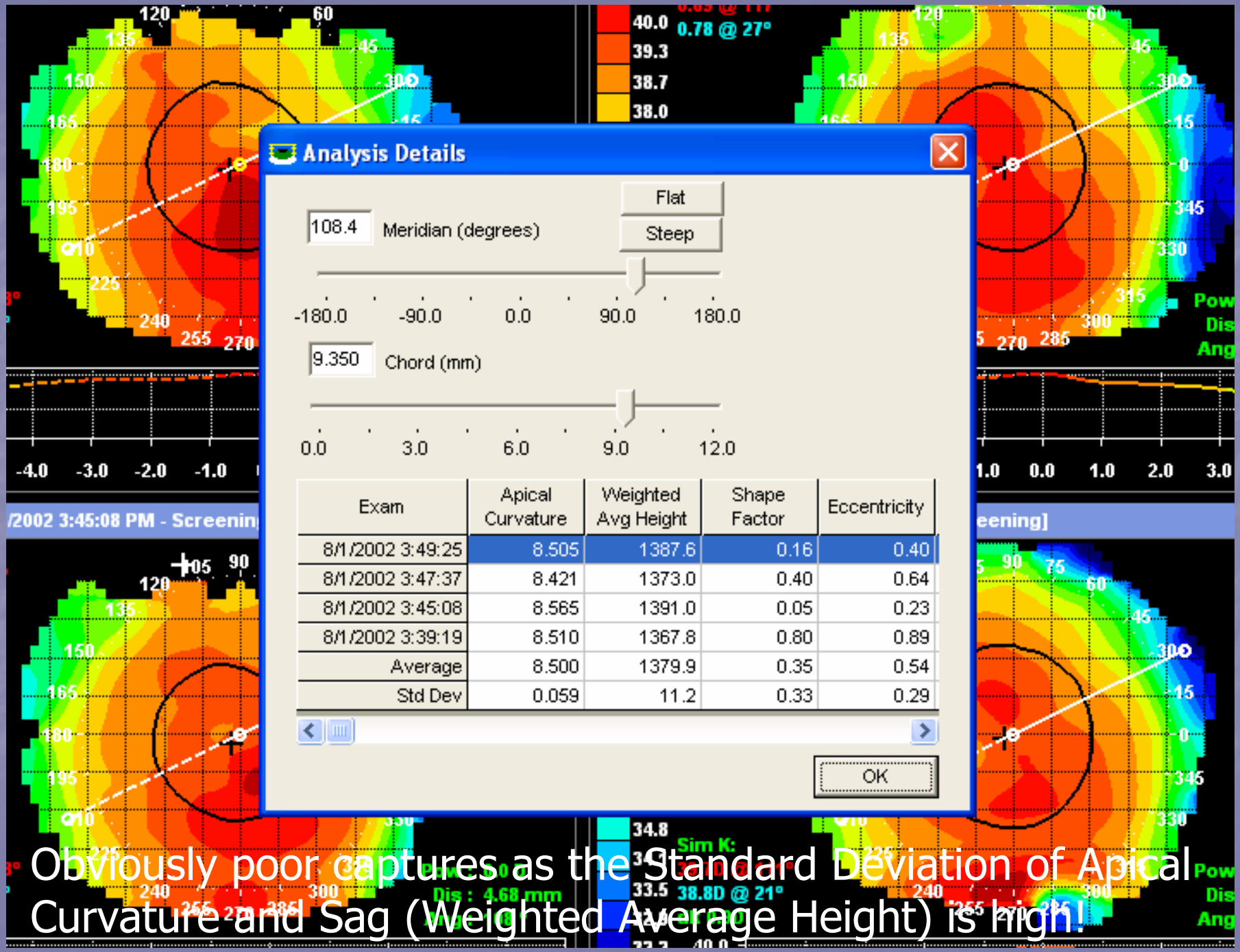

Throw out maps out of symmetry with other captures


42.7
42.2
39.7
39.2
Analysis Details
Flat
Steep
2.6
Meridian (degrees)
-180.0
-90.0
0.0
90.0
180.0
9.350
Chord (mm)
0.0
3.0
6.0
9.0
12.0
** Steep **
Throw this map out
Exam
Apical Curvature
Weighted Avg Height
Shape Factor
Eccentricity
8/29/2001 3:47:37
7.813
1499.9
0.37
0.61
8/29/2001 3:46:49
7.795
1500.2
0.40
0.63
8/29/2001 3:42:12
7.809
1501.4
0.39
0.63
8/29/2001 3:40:45
7.758
1501.7
0.45
0.67
Average
7.794
1500.8
0.40
0.63
Std Dev
0.025
0.9
0.04
0.03
OK




Take out the "rogue" readings and the standard deviation drops significantly


Note how dis-similar ALL these maps are!
Dooley [Right 8/1/2002 3:49:25 PM - Screening]
E Values:
0.48 @ 118°
0.76 @ 28°
Sim K:
39.8D @ 118°
38.6D @ 28°
dk 1.2D
Pow : 40.0 D
Dis : 0.33 mm
Ang : 201 °
Norm.
Dooley [Right 8/1/2002 3:47:37 PM - Screening]
E Values:
0.78 @ 27°
Sim K:
39.9D @ 117°
38.9D @ 27°
dk 1.0D
Pow : 40.0 D
Dis : 0.33 mm
Ang : 201 °
Norm.
Dooley [Right 8/1/2002 3:45:08 PM - Screening]
E Values:
0.36 @ 118°
0.71 @ 28°
Sim K:
39.8D @ 118°
38.8D @ 28°
dk 1.0D
Pow : 39.1 D
Dis : 0.33 mm
Ang : 201 °
Norm.
Dooley [Right 8/1/2002 3:39:19 PM - Screening]
E Values:
0.85 @ 111°
0.89 @ 21°
Sim K:
39.7D @ 111°
38.8D @ 21°
dk 0.9D
Pow : 39.5 D
Dis : 0.33 mm
Ang : 201 °
Norm.




Obviously poor captures as the Standard Deviation of Apical Curvature and Sag (Weighted Average Height) is high!

Be
TOTALLY
critical of your Capture process and Topography data analysis!

# Collecting the topography data and calculating the trial

# Analyzing Standard Deviation

- Standard Deviation indicates reproducibility
- Used as a gauge of ease of capturing on a particular eye and therefore its accuracy

| Exam | Apical Curvature | Weighted Avg Height |
|---|---|---|
| 11/23/2002 | 7.495 | 1588.4 |
| 11/23/2002 | 7.505 | 1590.3 |
| 11/23/2002 | 7.491 | 1588.5 |
| 11/23/2002 | 7.503 | 1587.2 |
| Average | 7.499 | 1588.6 |
| Std Dev | 0.007 | 1.3 |

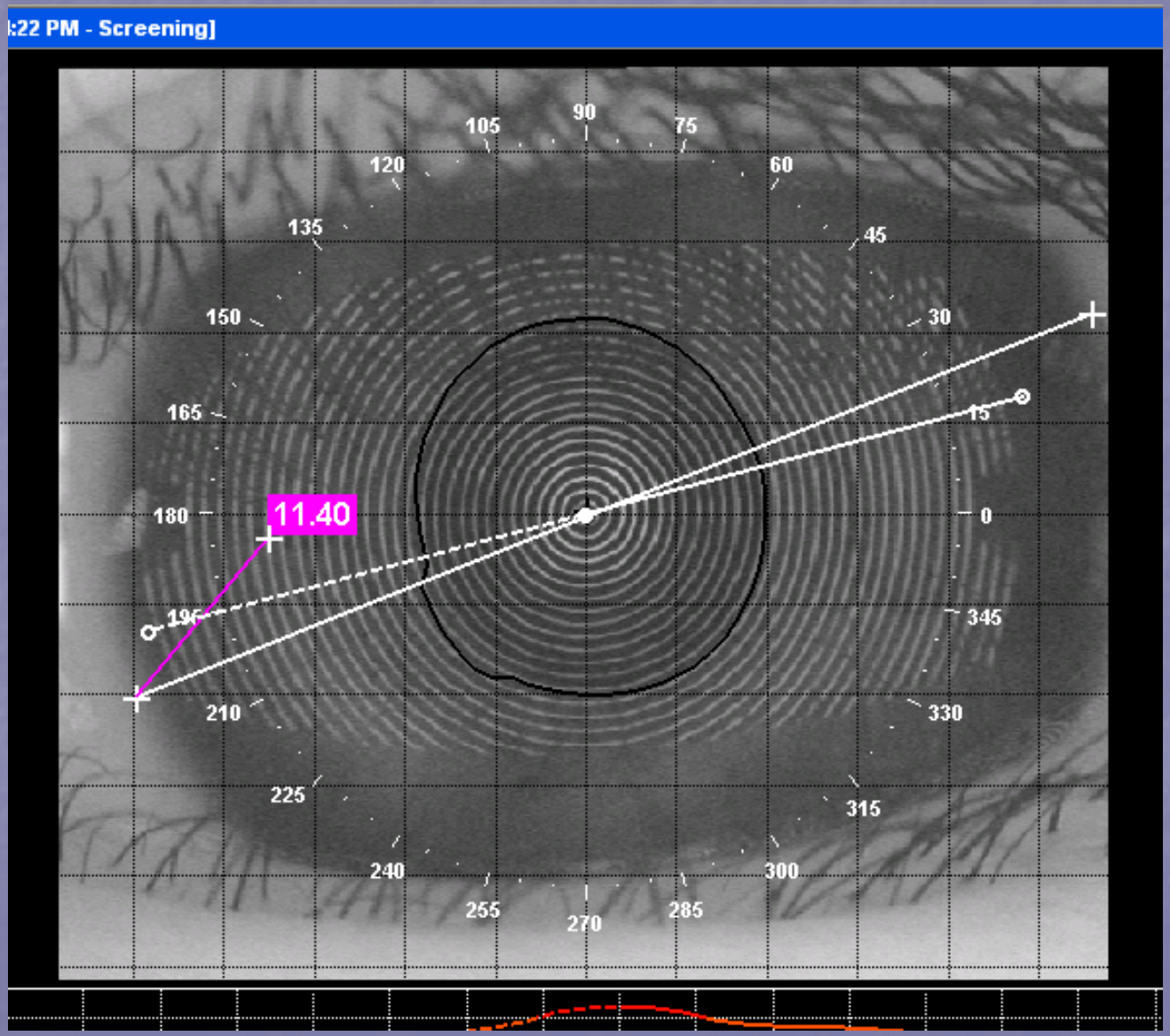
Target Standard Deviation Errors of:

Apical Curvature (Ro): <0.02mm (ideally 0.01mm)

Sagittal Height (Weighted average height):

<2 microns (ideally 1um)

# Measure Iris Diameter (HVID)



# *BE Retainer:*
# Calculating Rx Therapy Target

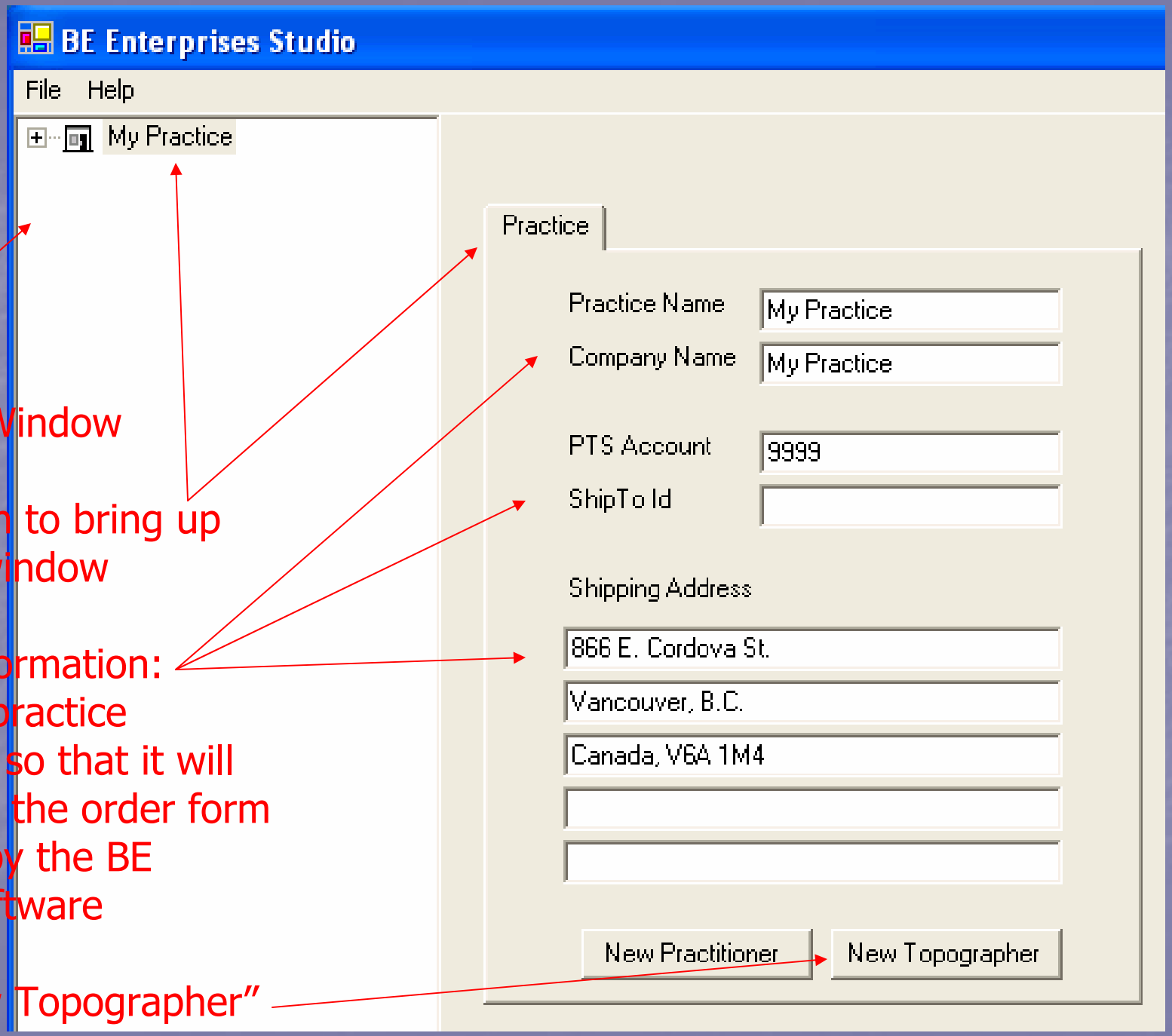
- 1st Week (1-4 days): Regression Factor: 0.50Dp (Alhabri)
- Work to achieve a reduced wear schedule for your patients by over-correcting the Rx requirement
- DO NOT compensate for spherical equivalent
- Vertex high Rx ≥4.00
- Adolescents/pre presbyopes: Add -0.50 to sphere OU
- Presbyopes:
  - Dominant Eye: Add -0.50 to sphere
  - Non-Dominant Eye: Rx target or monovision

# Required BE Retainer Data

- Apical Curvature (Ro) – radius of curvature at the apex of the cornea
- Sagittal Height (over a chord diameter of 9.35mm) or Eccentricity (Shape Factor or Asphericity can be used when converted to "e-value")
- Horizontal Visible Iris Diameter (HVID)
- Target Rx (therapy refractive change requirement)

# *BE Retainer:* Software

- Determines the patient potential for OOK therapy
- Determines the initial trial
- Problem solves
- Calculates custom order Retainers

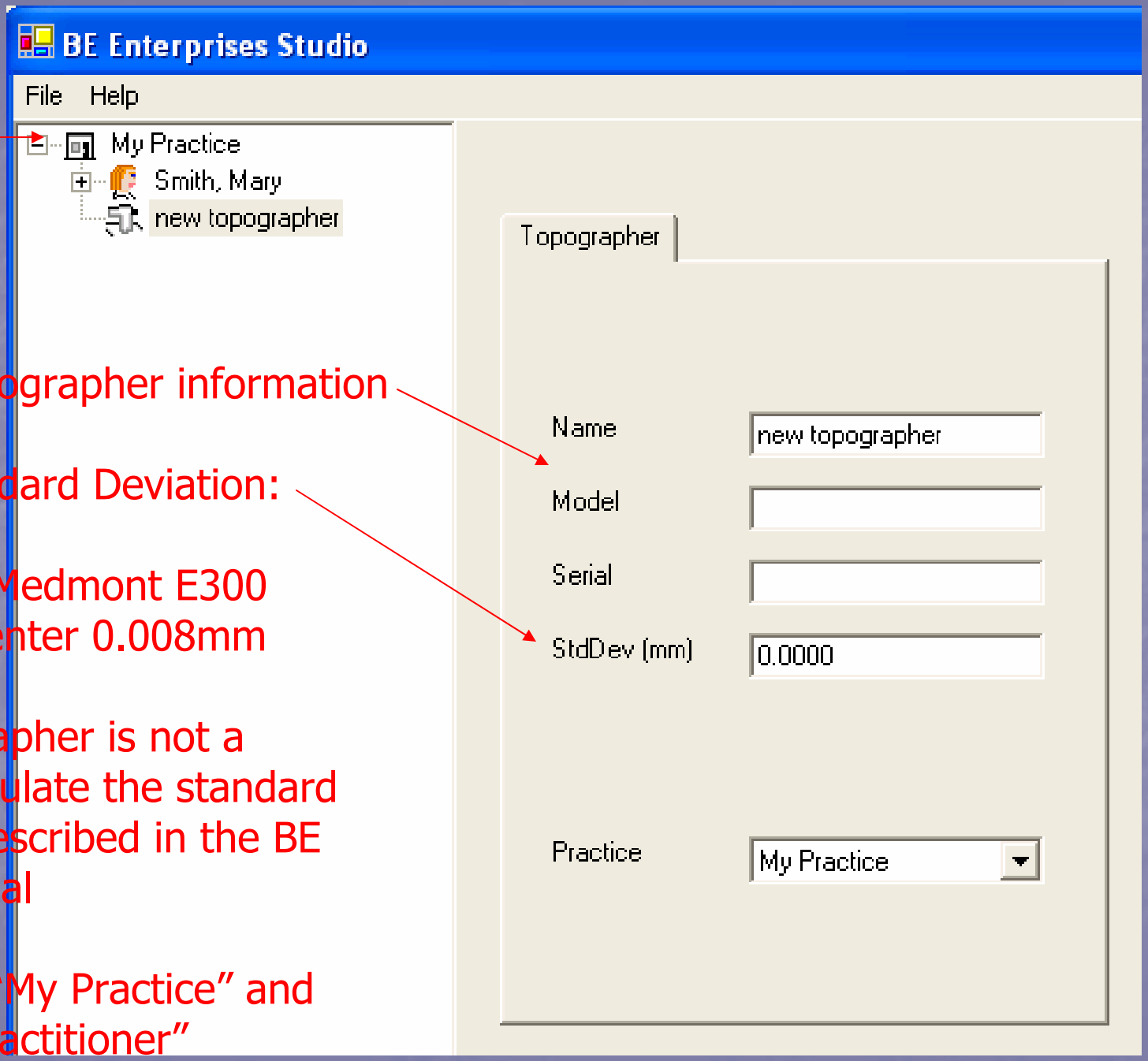



Data base Window

Click on icon to bring up "Practice" window

Practice Information: Enter your practice information so that it will print out on the order form generated by the BE Retainer software

Select "New Topographer"



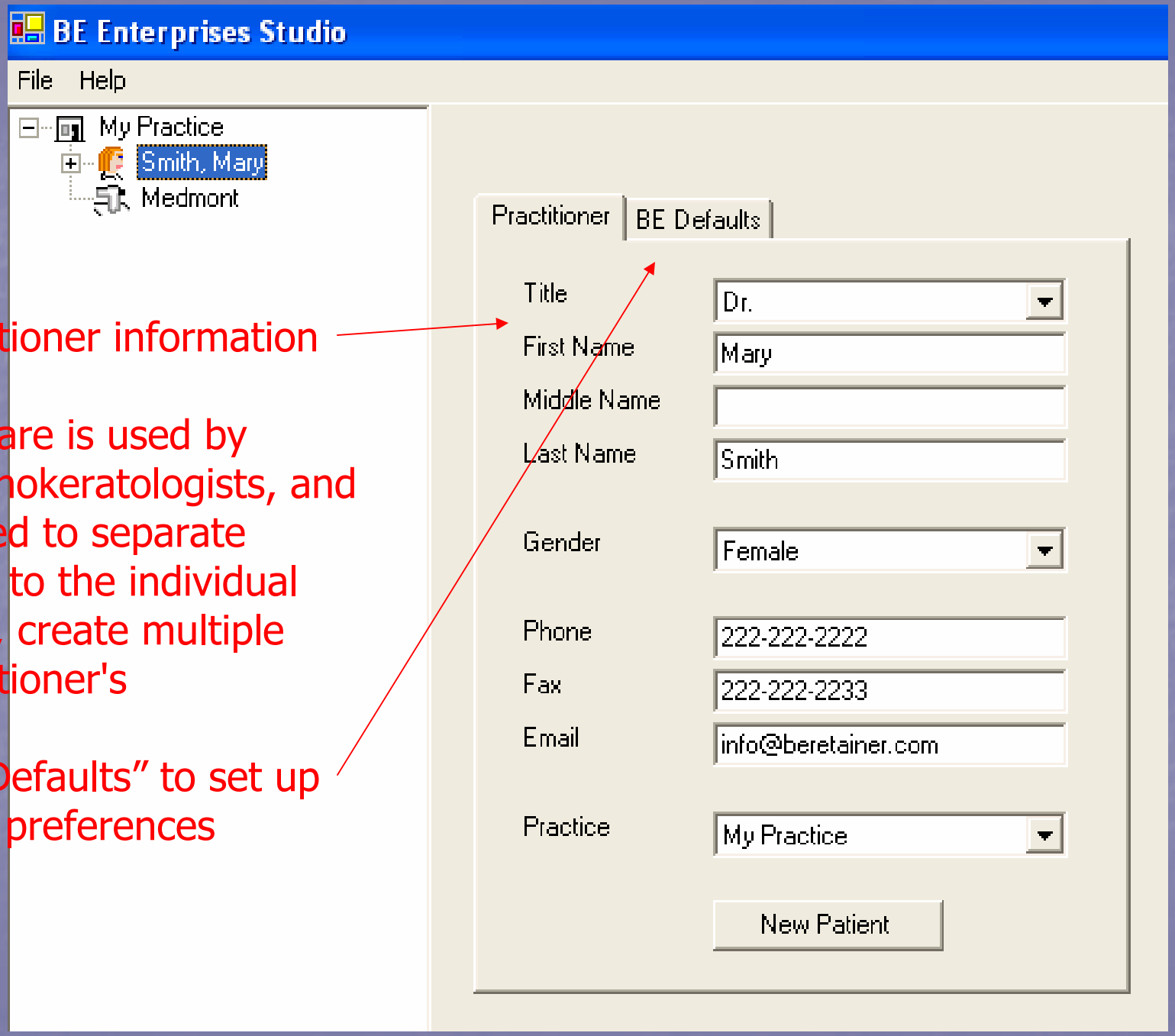

Enter your topographer information

Enter the Standard Deviation:

If you have a Medmont E300 topographer, enter 0.008mm

If your topographer is not a Medmont, calculate the standard deviation as described in the BE Retainer manual

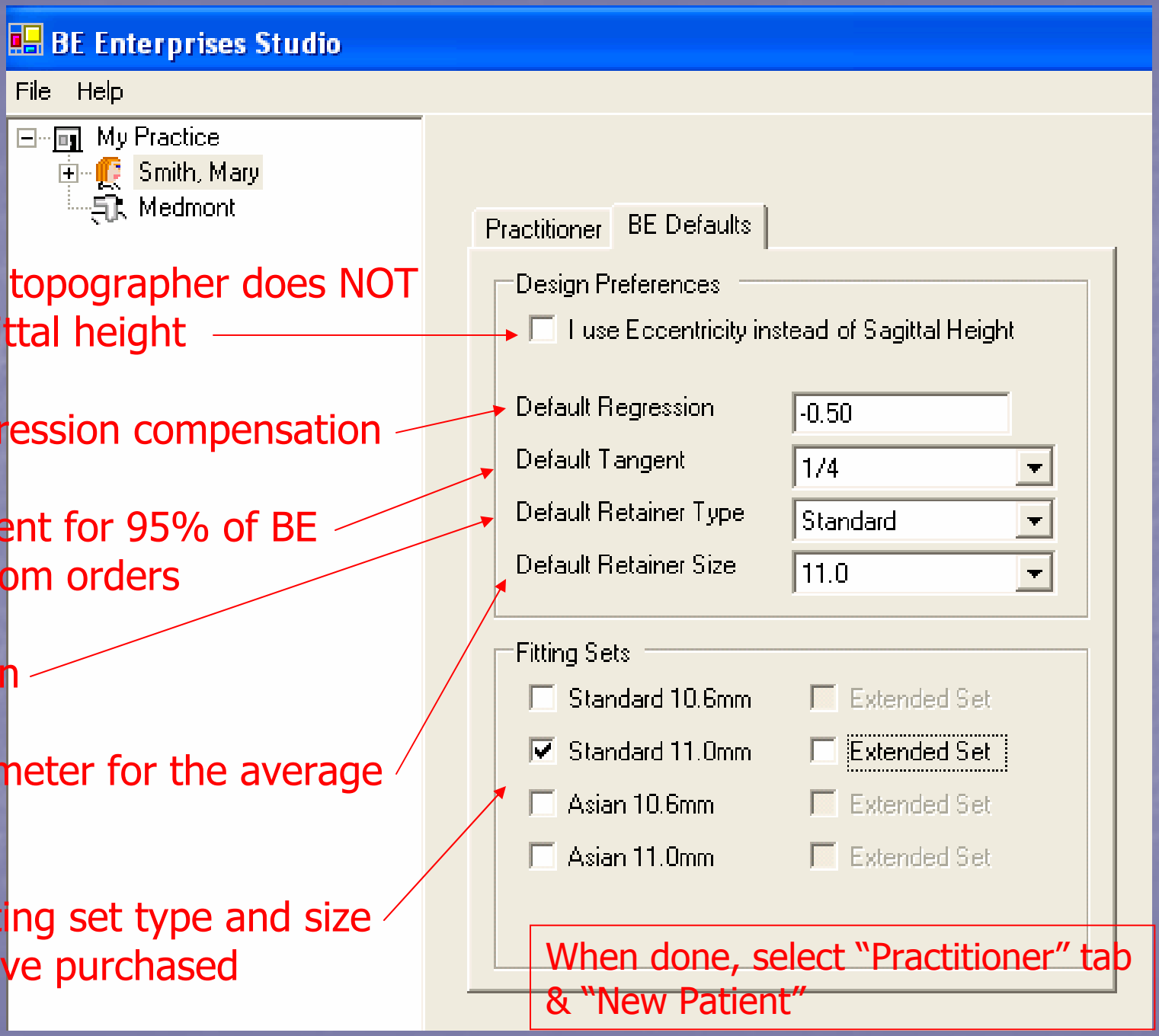
Then click on "My Practice" and select "New Practitioner"




Enter Practitioner information

If the software is used by multiple orthokeratologists, and it is preferred to separate patient files to the individual practitioner, create multiple "New Practitioner's

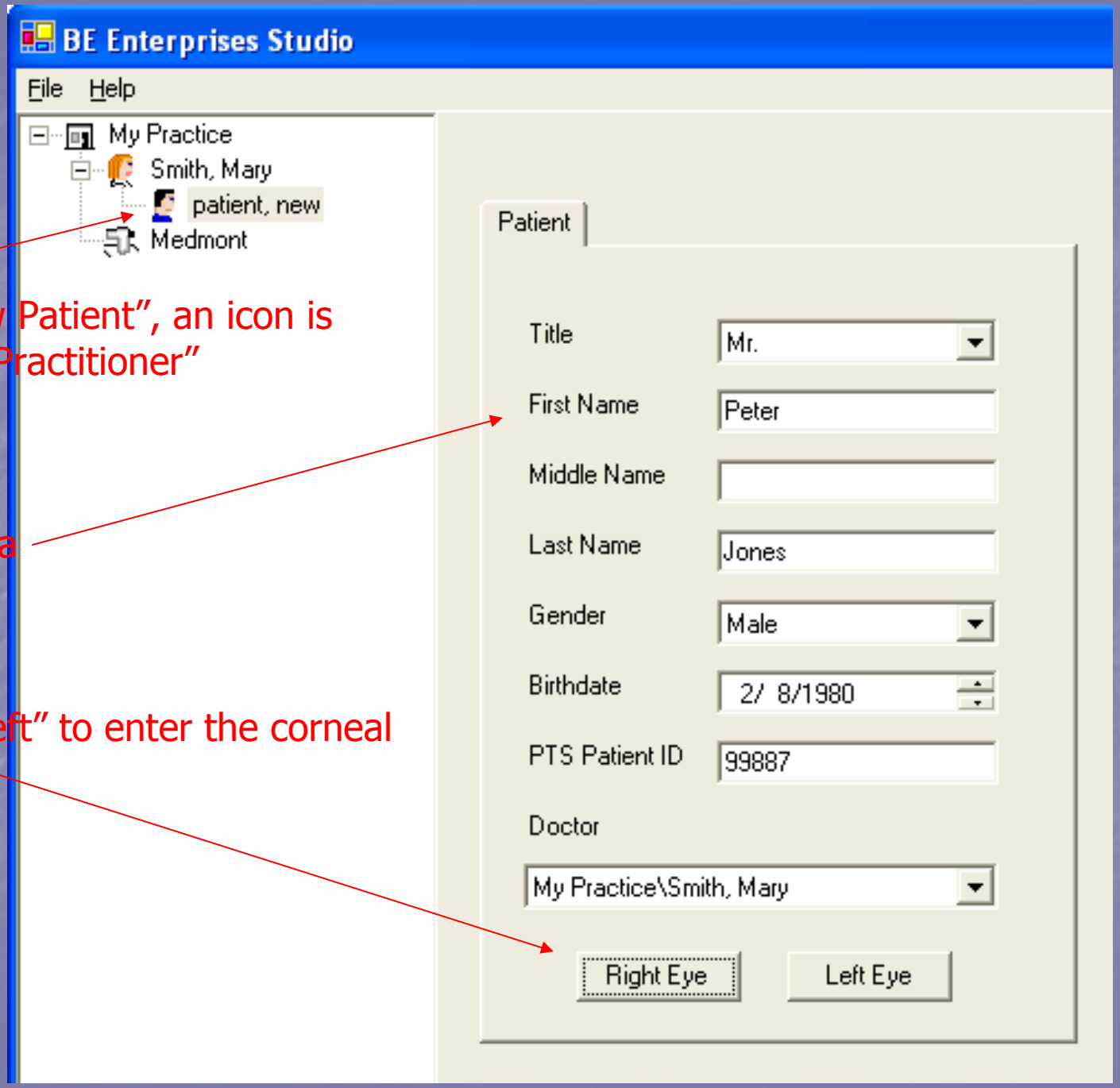
Select "BE Defaults" to set up practitioner preferences

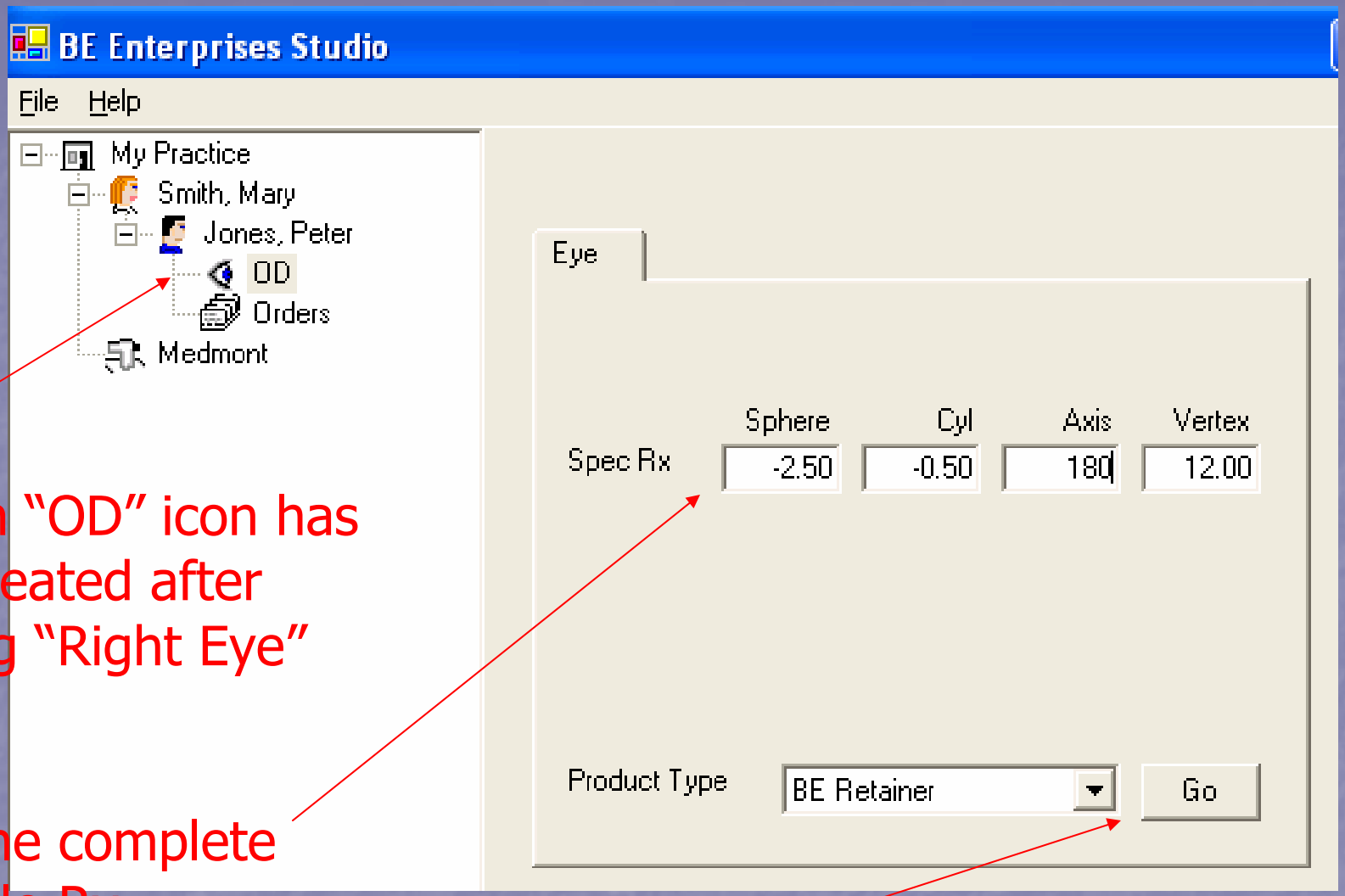

BE Enterprises Studio
File
Help
My Practice
Smith, Mary
Medmont
Practitioner
BE Defaults
Design Preferences
I use Eccentricity instead of Sagittal Height
Default Regression
-0.50
Default Tangent
1/4
Default Retainer Type
Standard
Default Retainer Size
11.0
Fitting Sets
Standard 10.6mm
Extended Set
Standard 11.0mm
Extended Set
Asian 10.6mm
Extended Set
Asian 11.0mm
Extended Set
Select if your topographer does NOT calculate sagittal height
Standard regression compensation
Normal Tangent for 95% of BE Retainer custom orders
Default design
Standard diameter for the average corneal size
Select the fitting set type and size which you have purchased
When done, select "Practitioner" tab & "New Patient"

After selecting "New Patient", an icon is created under the "Practitioner"

Enter all patient data

Select "Right" or "Left" to enter the corneal data for either eye

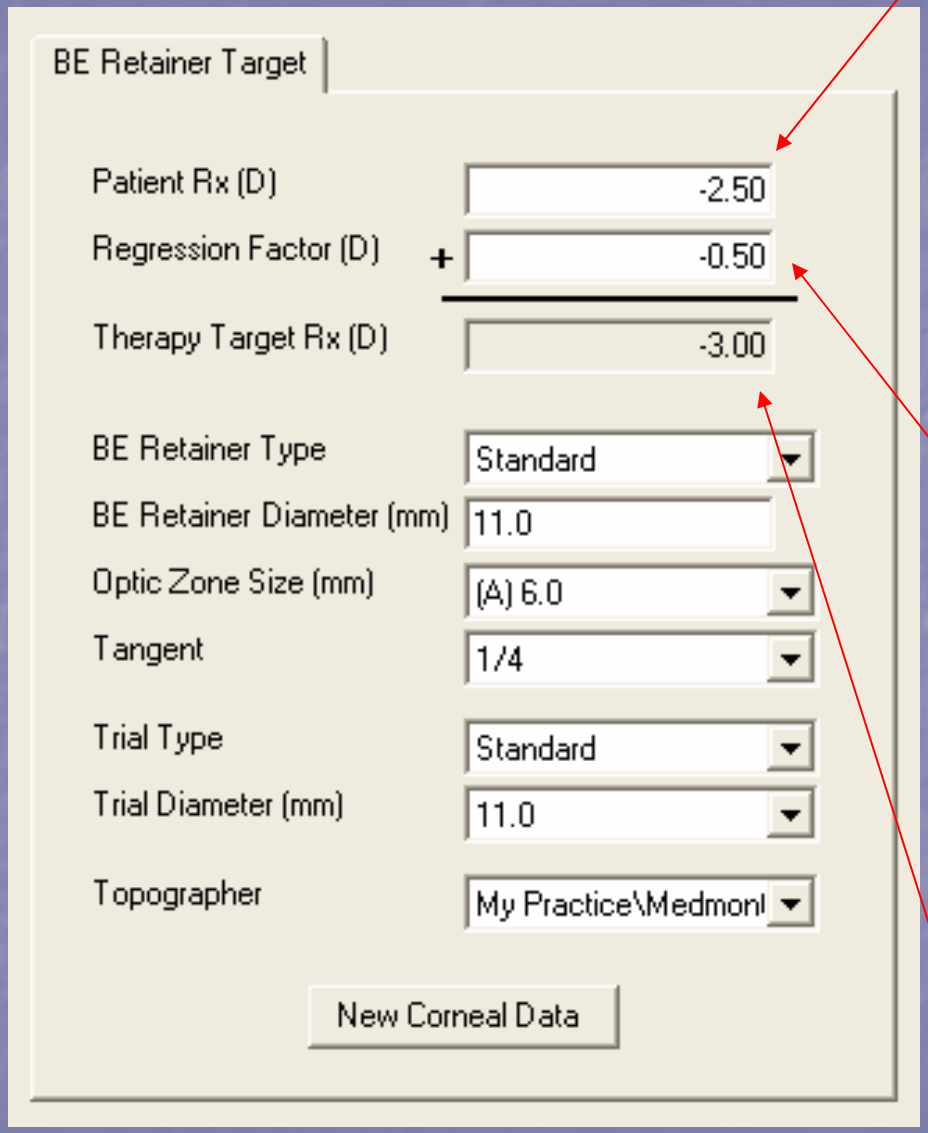





Note an "OD" icon has been created after entering "Right Eye"

Enter the complete spectacle Rx

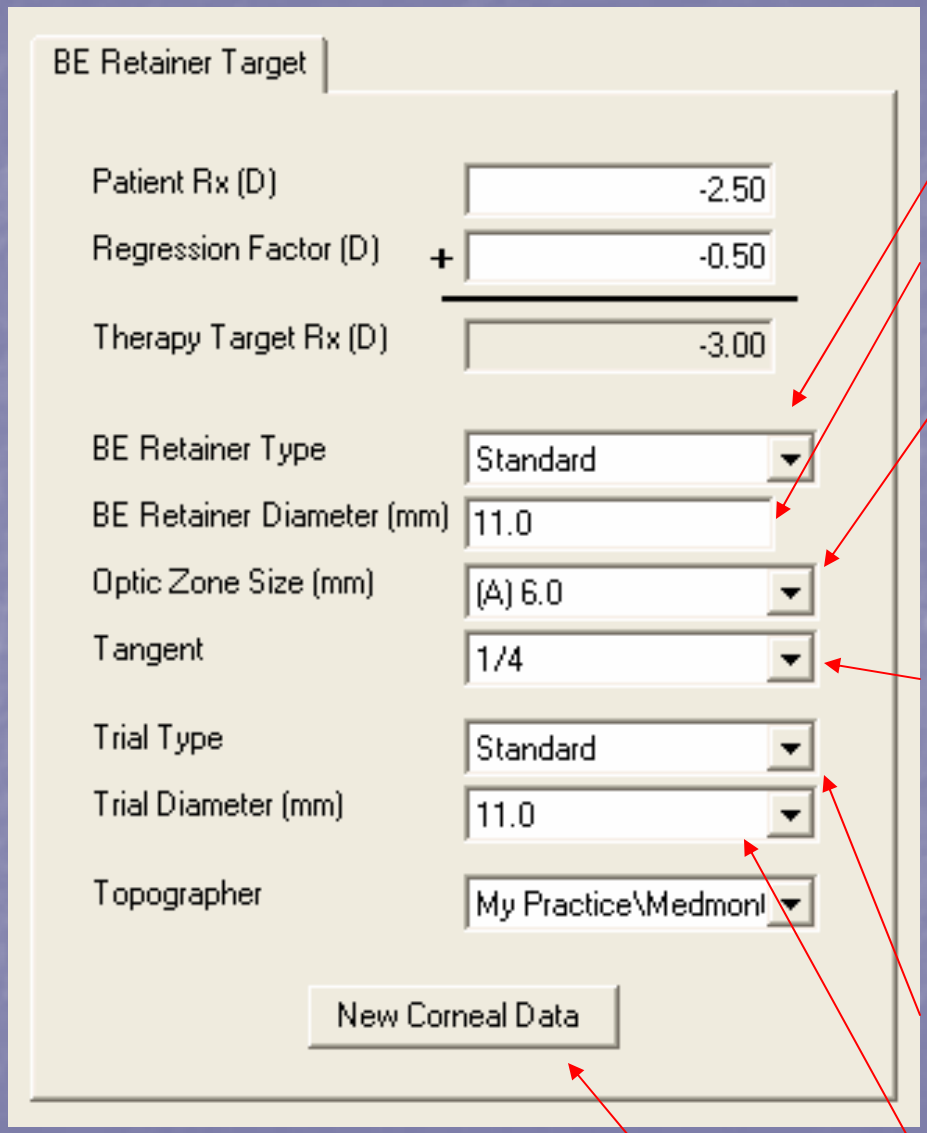
Then select "Go"




Rx: Software displays the entered spectacle Rx from the previous screen (Vertexed). The software will not compensate for spherical equivalent as Optimal Orthokeratology typically reduces the refractive cylinder by at least half.

Regression factor selected in the "Practitioner", "BE Defaults". This additional adjustment provides for quality AM versus PM vision and makes it possible to reduce the wearing schedule (from every day to only a few days a week on some patients)

Optimal Orthokeratology target Rx (the desired change in Rx following BE Retainer therapy)




When done, select "New Corneal Data"

The following specs are "Defaults" set up in the "Practitioner" file and are only displayed for review. Adjust the selected parameters if fitting outside of the norm.

Select the "Standard" or "Asian" BE design

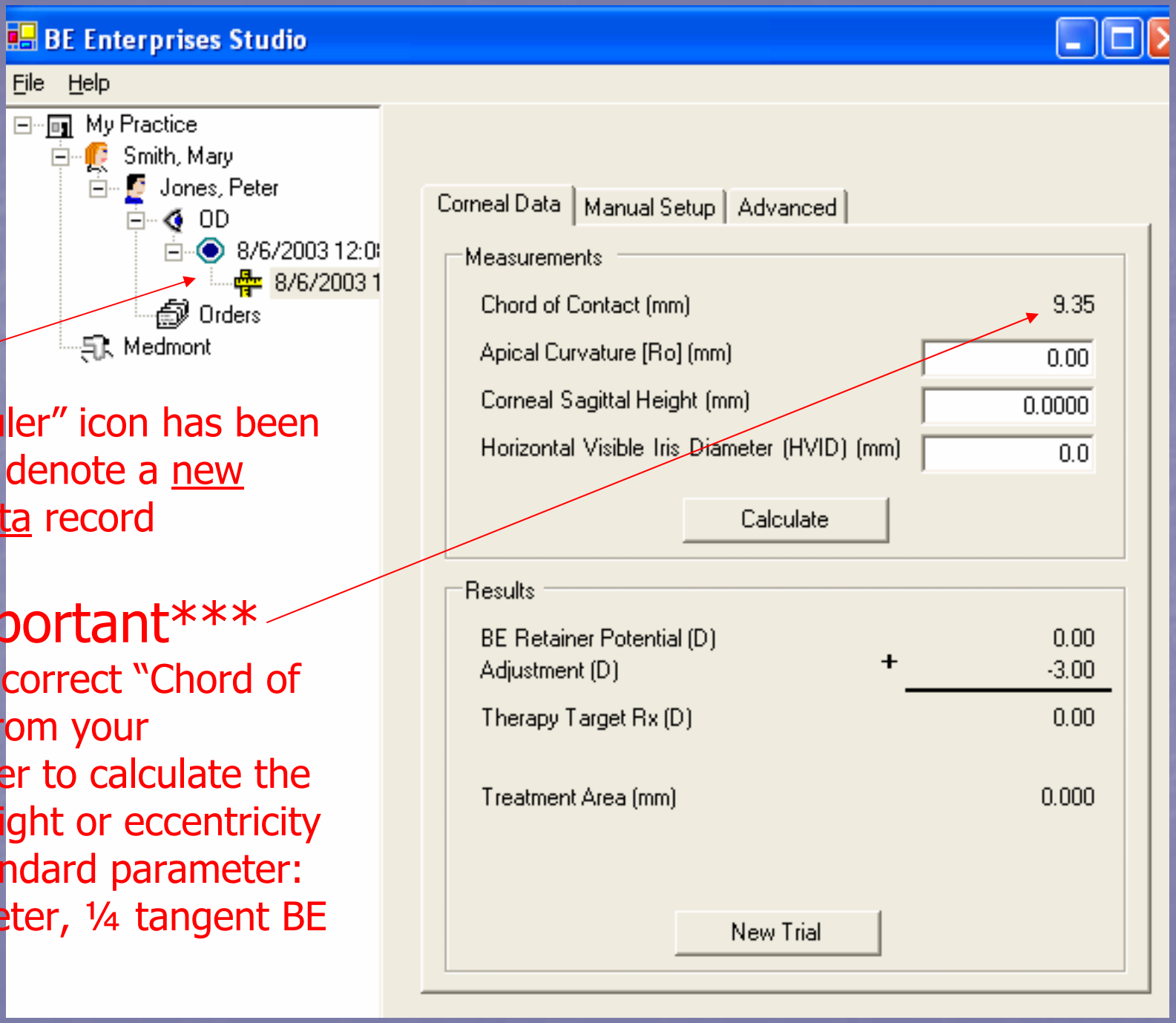
Select the desired diameter of the custom BE Retainer

Select "A" zone on all initial custom orders. If flare and glare exists after 1 month, the "B" zone can be dispensed when full effect has been achieved with the "A" zone

Select "¼ Tangent" for most corneas. If lateral decentration results in the trial or custom order, calculate a "1/3 tangent". "½ Tangents" are used on small diameter BE Retainers (<10.6mm)

Select the diagnostic design that you intend to trial (Standard or Asian)

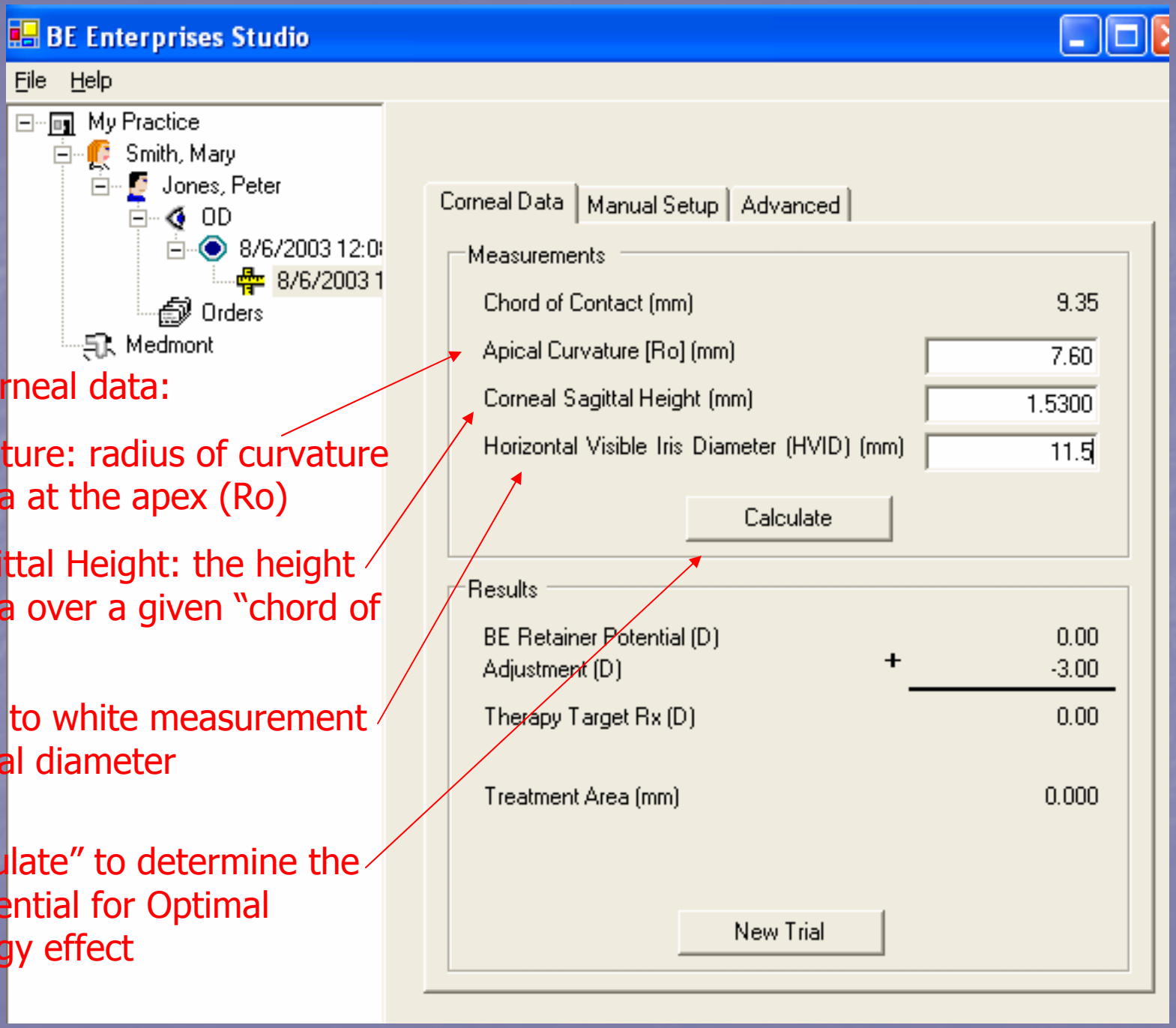
Select the diameter of diagnostic that you intend to trial (11.0 or 10.6mm)




Note a "Ruler" icon has been created to denote a <u>new corneal data</u> record

*** Important***

Select the correct "Chord of Contact" from your topographer to calculate the sagittal height or eccentricity for the standard parameter: 11.0 diameter, ¼ tangent BE Retainer



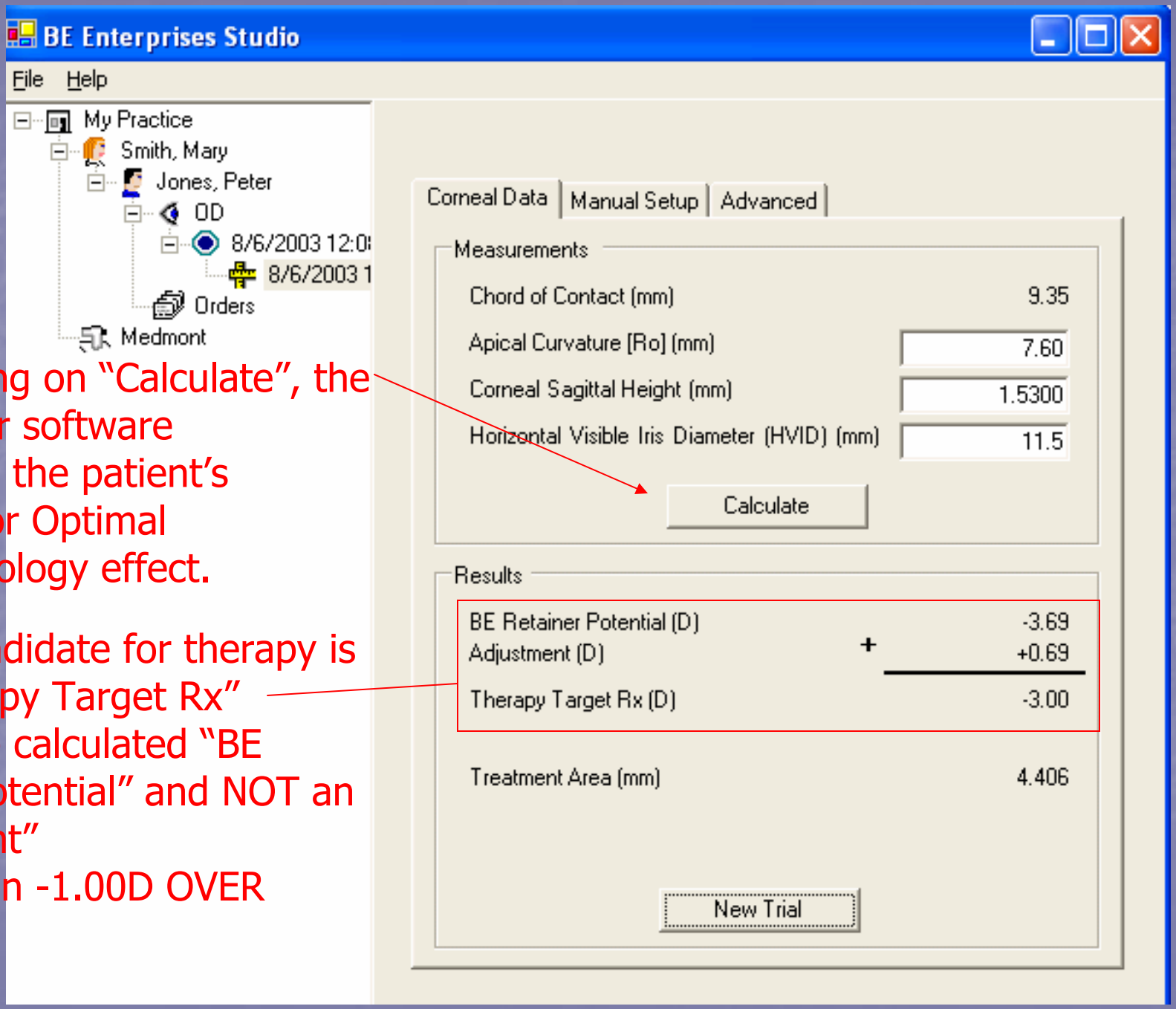

Enter the corneal data:

Apical Curvature: radius of curvature of the cornea at the apex (Ro)

Corneal Sagittal Height: the height of the cornea over a given "chord of contact"

HVID: white to white measurement of the corneal diameter

Select "Calculate" to determine the patients potential for Optimal Orthokeratogy effect



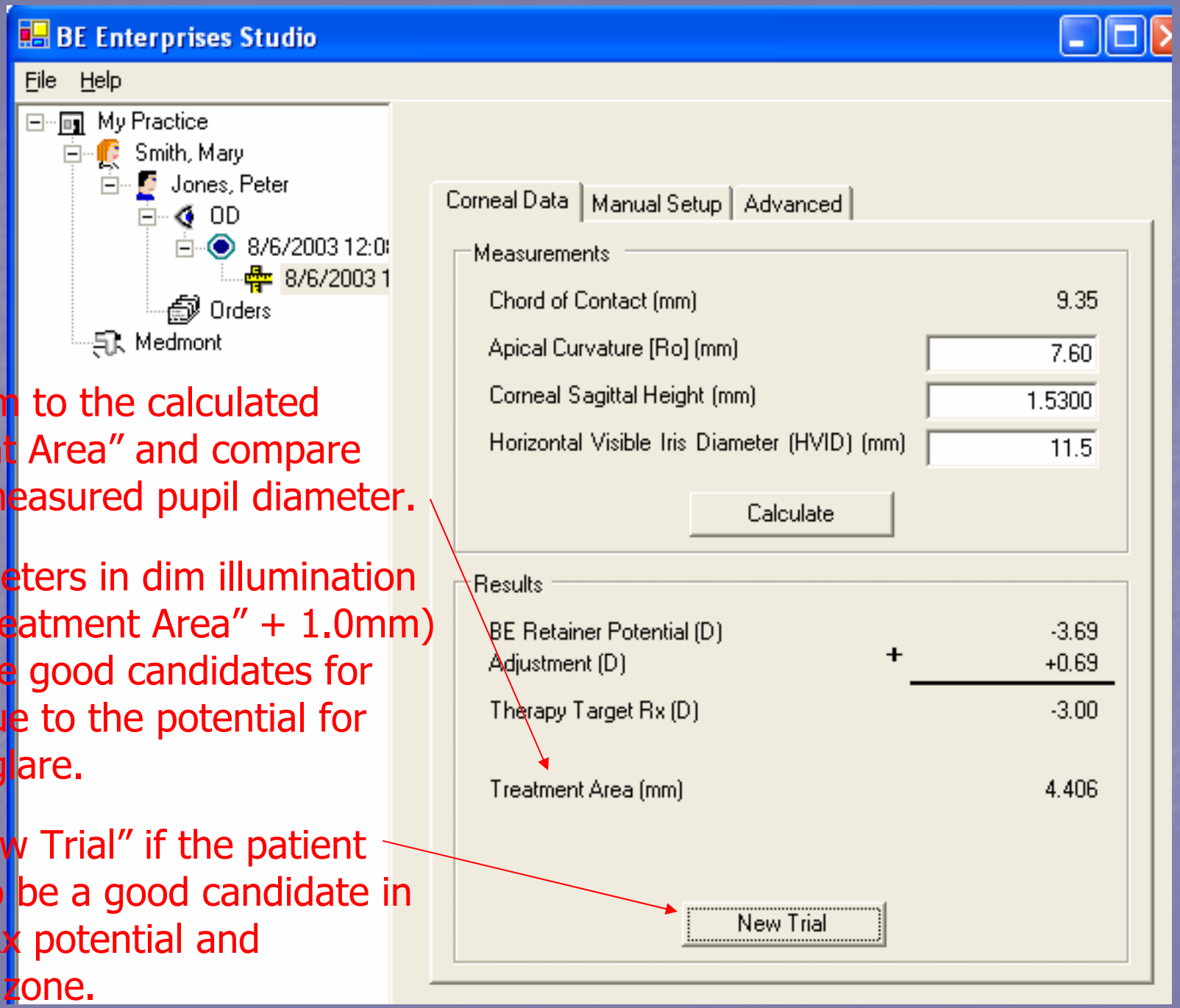

After clicking on "Calculate", the BE Retainer software determines the patient's potential for Optimal Orthokeratology effect.

A good candidate for therapy is any "Therapy Target Rx" UNDER the calculated "BE Retainer Potential" and NOT an "Adjustment" greater than -1.00D OVER potential

| | | |
|---|---|---|
| BE Retainer Potential (D) | | -3.69 |
| Adjustment (D) | + | +0.69 |
| Therapy Target Rx (D) | | -3.00 |
| Treatment Area (mm) | | 4.406 |

Patients requiring a "Therapy Target Rx" -1.00 OVER the "BE Retainer Potential" should be considered poor candidates for therapy. Achieving the refractive target may be difficult on patients lacking the ideal shape for the required therapy Rx goal. Avoid patients with "Adjustments" of > -1.00Dp. Patients with (+) "Adjustments" are EXCELLENT candidates for Optimal Orthokeratology therapy.

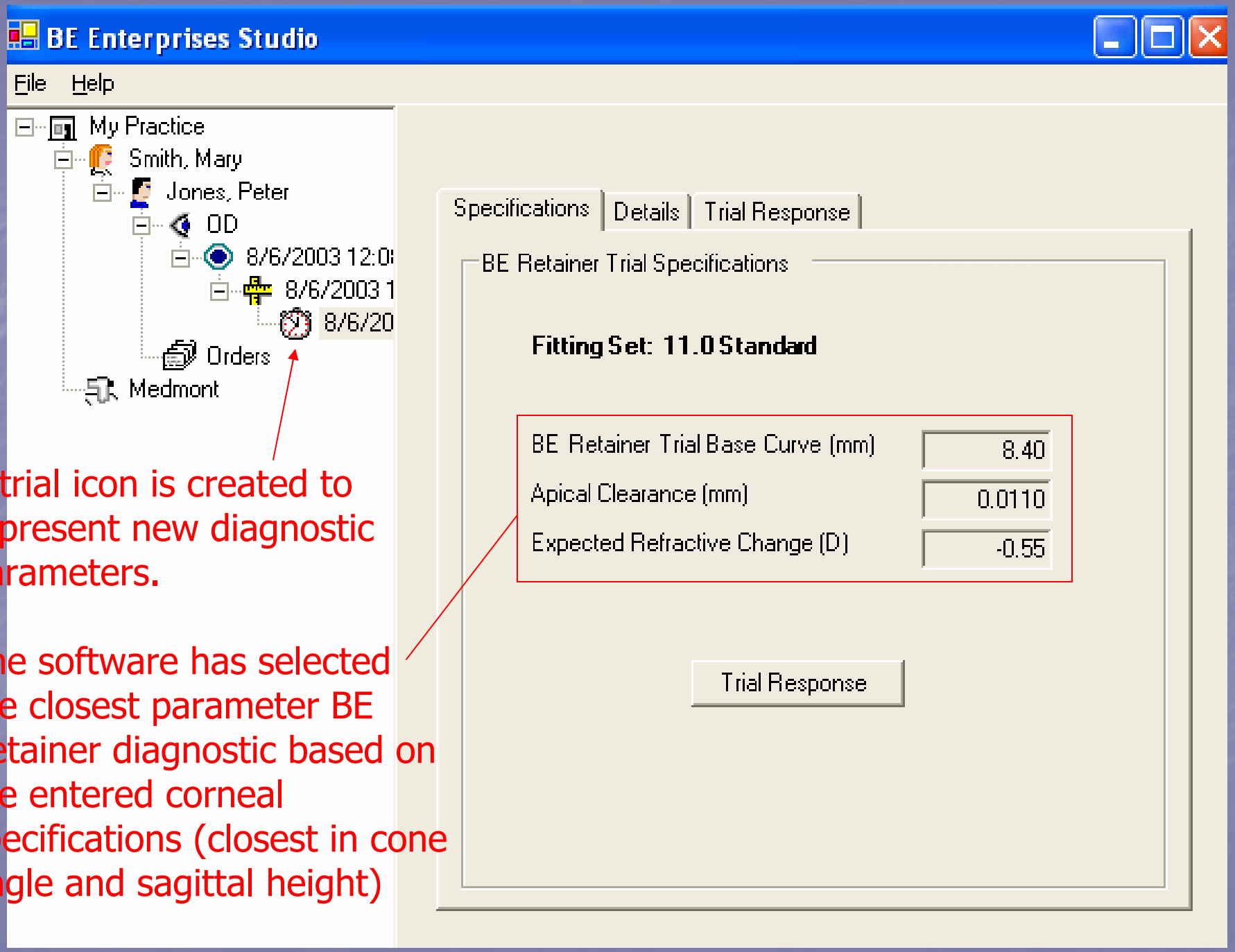
The "Treatment Area" is a mathematical prediction. The clinical treatment zone is typically 1.0mm larger than the predicted "Treatment area". Compare the calculated "Treatment Area" + 1.0mm to the pupil size in dim illumination. Attempting therapy on patients with larger pupils than treatment areas may be problematic.




Add 1.0mm to the calculated "Treatment Area" and compare with the measured pupil diameter.

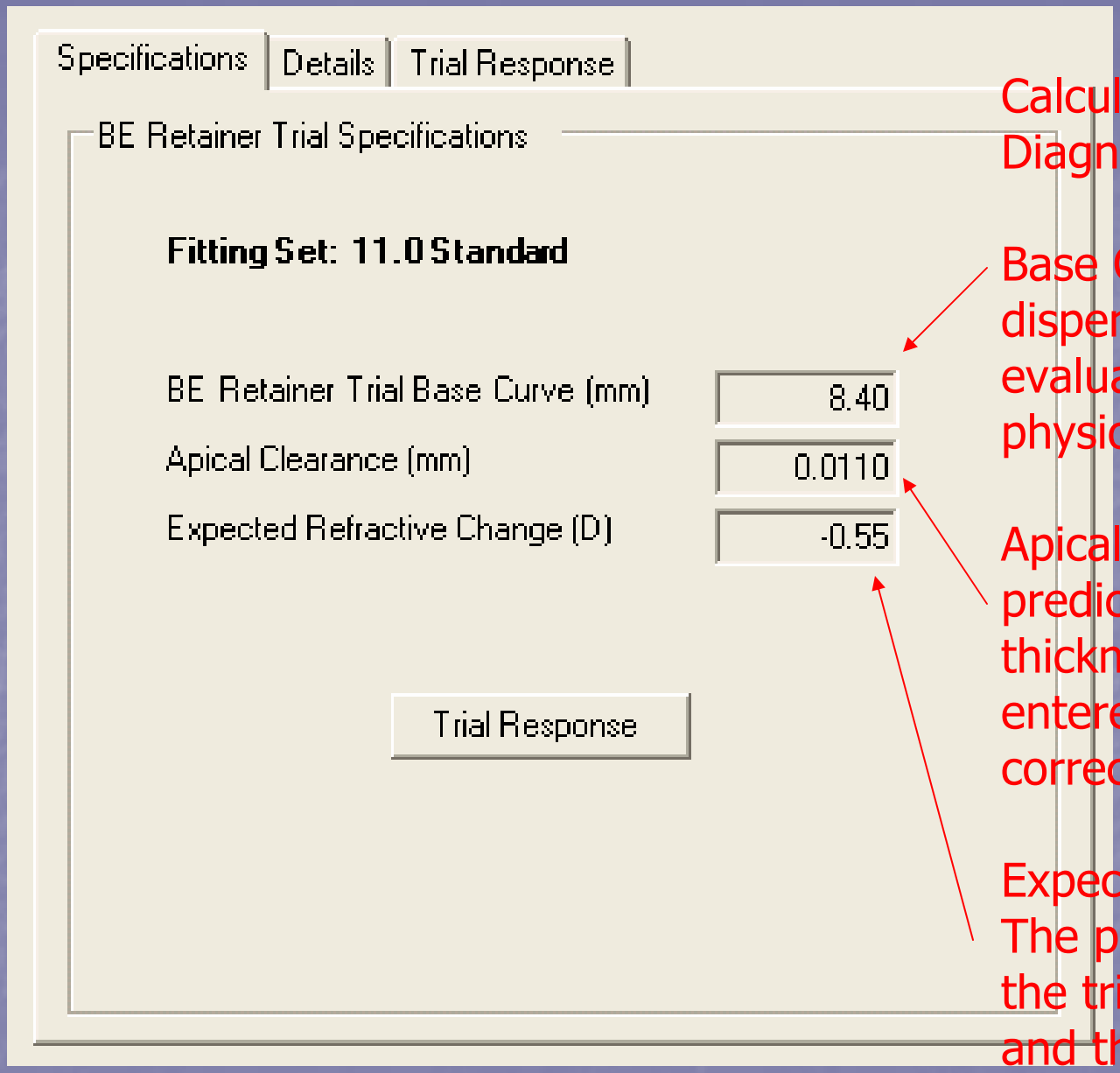
Pupil diameters in dim illumination > the ("Treatment Area" + 1.0mm) may not be good candidates for therapy due to the potential for flare and glare.

Select "New Trial" if the patient appears to be a good candidate in terms of Rx potential and treatment zone.




A trial icon is created to represent new diagnostic parameters.

The software has selected the closest parameter BE Retainer diagnostic based on the entered corneal specifications (closest in cone angle and sagittal height)




Calculated BE Retainer Diagnostic parameters:

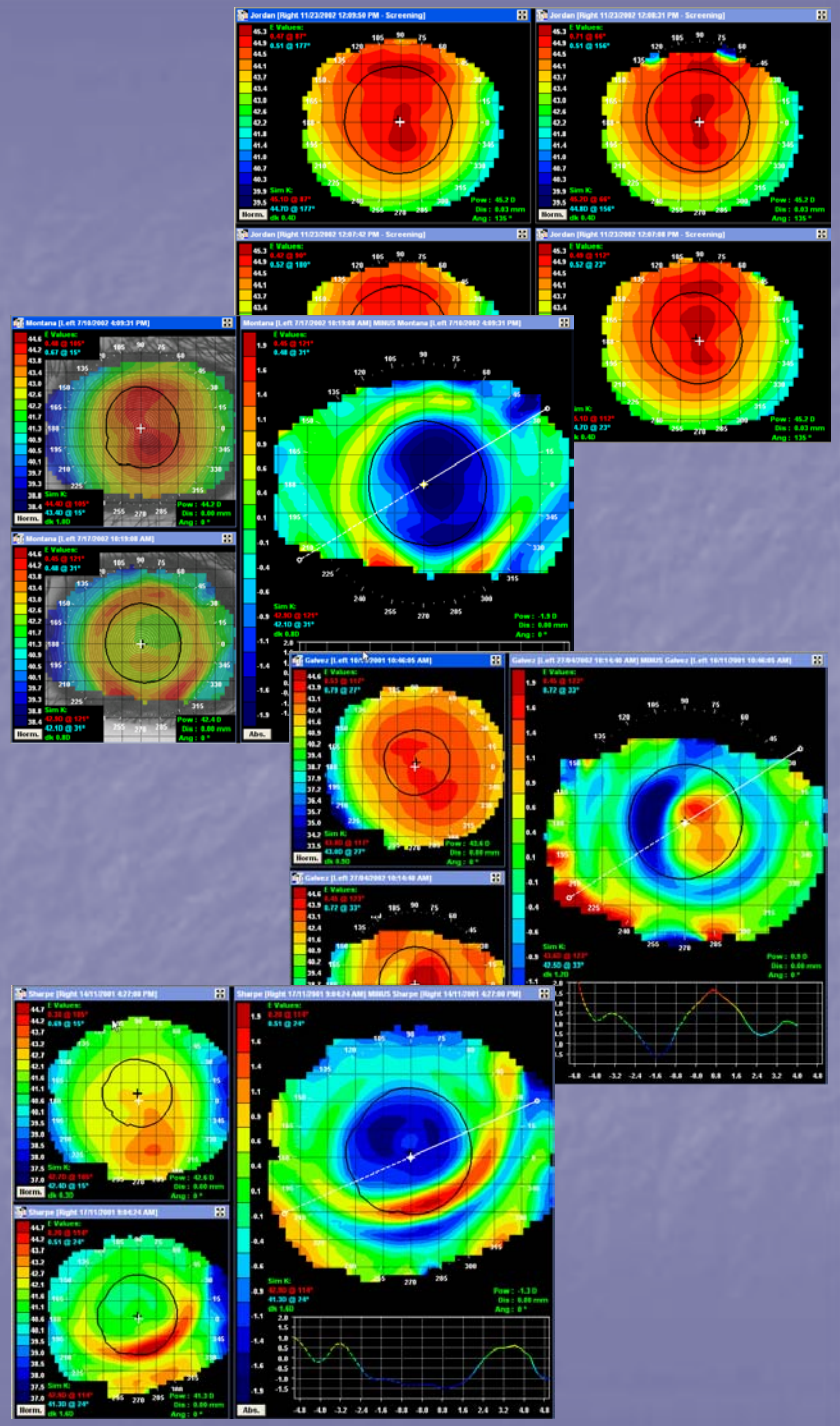
Base Curve: Select this trial to dispense to the patient for evaluation of topographical & physiological effect

Apical Clearance: The prediction of tear layer thickness at the apex if the entered corneal data is 100% correct.

Expected Refractive Change: The predicted Rx change with the trial if the apical clearance and therefore corneal data is 100% correct

# Why Perform Diagnostic Trials?

- Unknown: Topography Data (Sag & Ro)
- Known: Sag & Cone Angle of BE Retainer diagnostic
- Unknown: Corneal response
- Known: Topographical response (post treatment)



# Practitioner Benefit of the Trial

- Proves out the topography data
  - Bulls-eye
  - Smiley face
  - Central Island

  Only 3 things can happen
- Provides the practitioner an Rx response to calculate the final custom BE Retainer parameters (if a Bulls-eye results)
- Reduces Costs (increases the 1st fit success)

# Opportunity of the Trial:

- Wonderful opportunity with OOK, to have patient experience improved vision after **just one day!**
- Patients are excited about this chance with no/limited fees attached or risk involved
- Their interested is piqued…they have nothing to lose.

# How the Trial helps you:

- Rules out those who may find the awareness of the Retainer objectionable
- Observe physiological response
- Evaluate the topographical response:
  - Difference/subtractive maps
- Build patient's excitement!

The BE Retainer diagnostic is NOT designed to achieve the Rx target required by the patient.

The trial is designed to provide you with a TOPOGRAPHICAL response and therefore an idea whether or not the topography data is accurate/near accurate

Custom Order BE Retainers are designed to achieve the Rx target

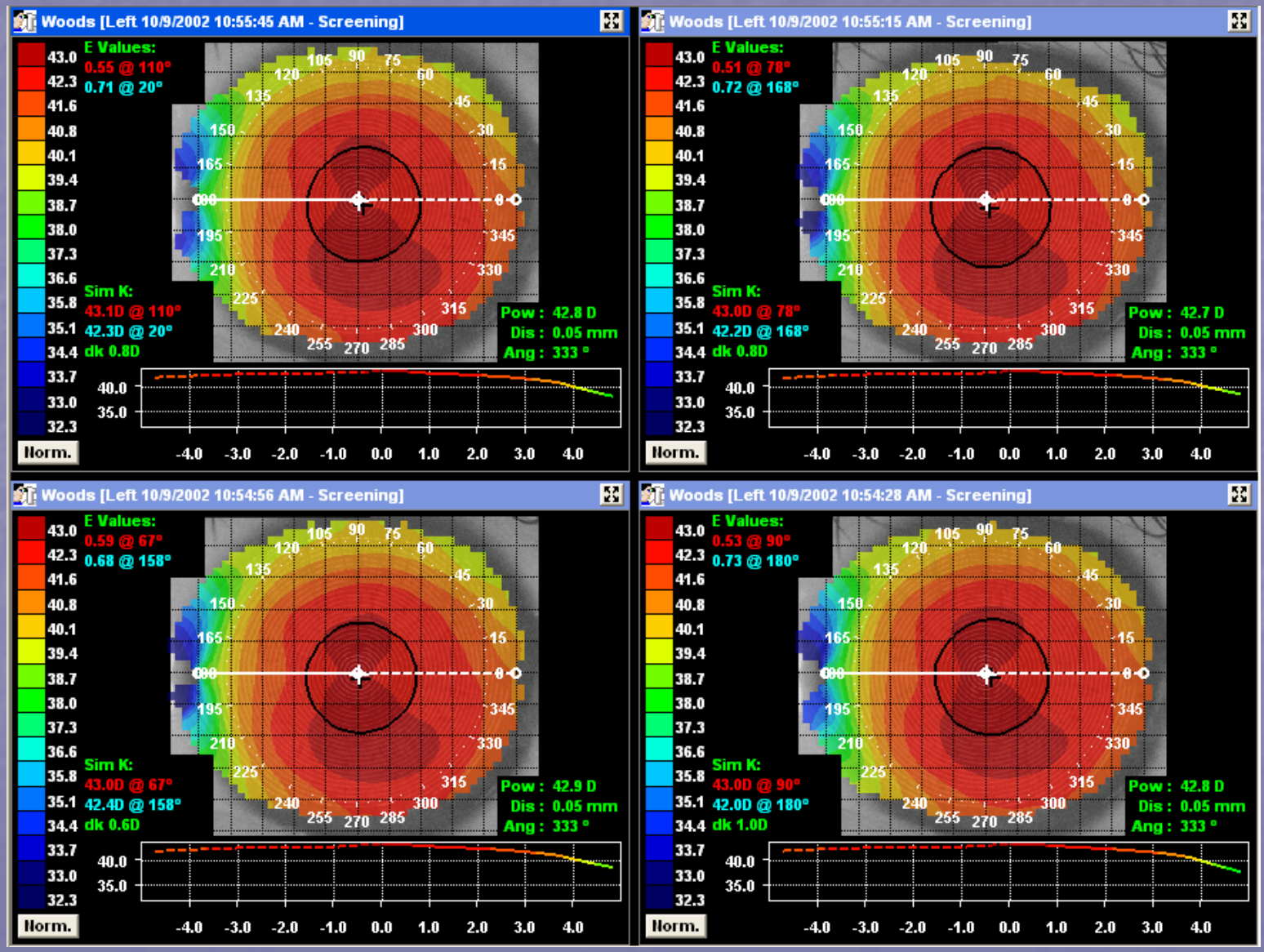
# BE Retainer: Optimal Orthokeratology

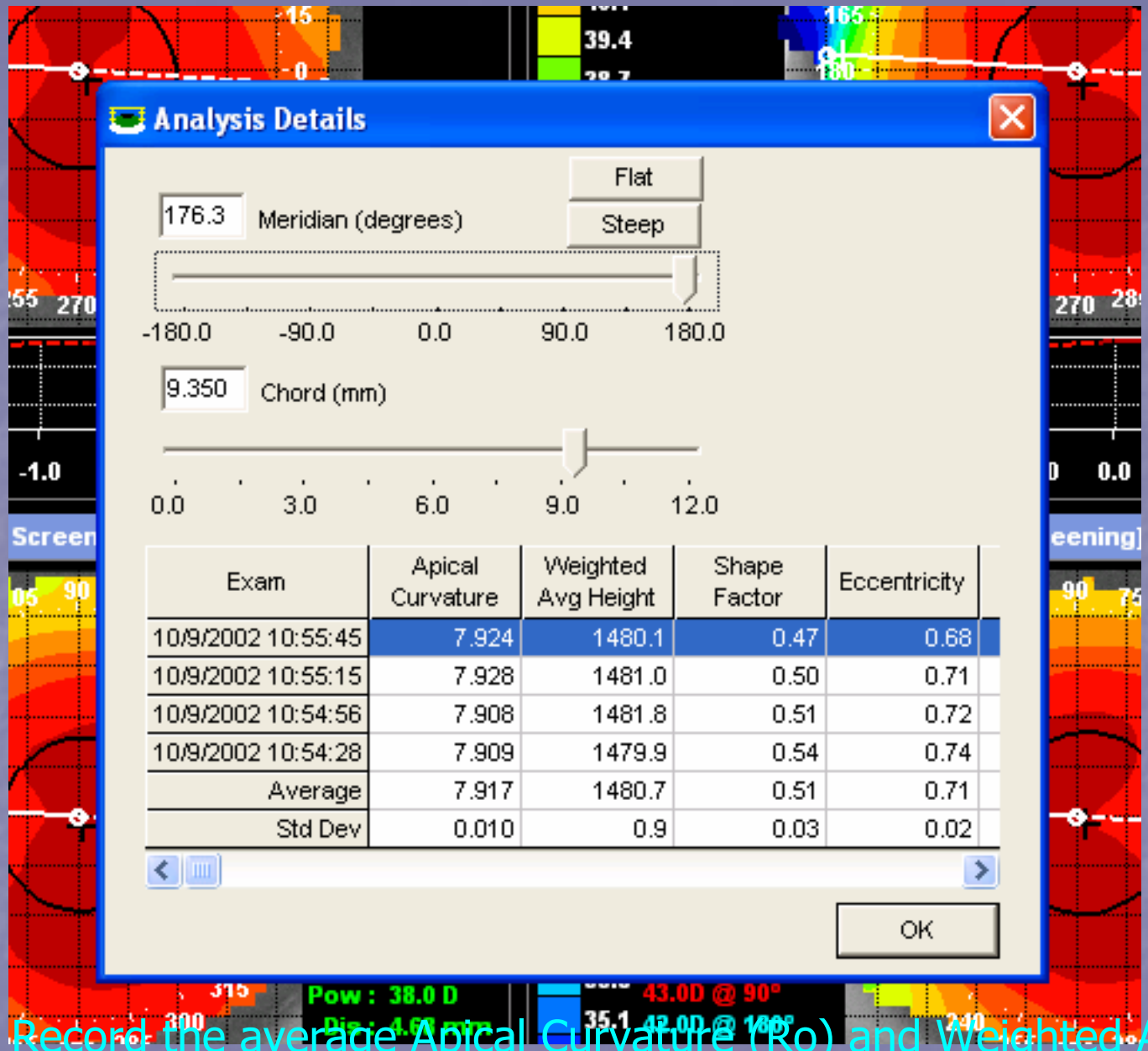
## Case Studies

# Case 1

Patient: Woods

# Take 4 Independent Captures OU



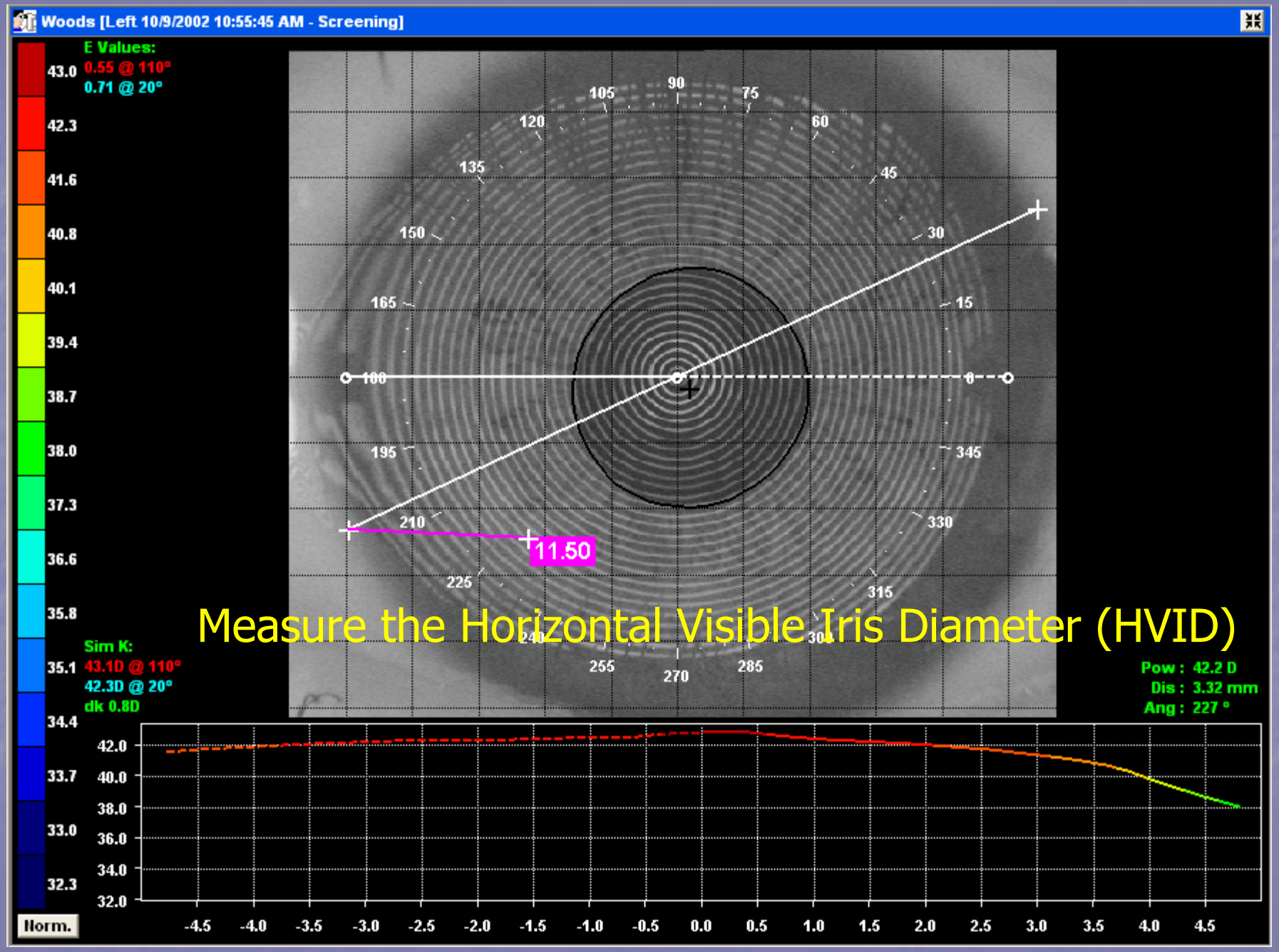



# Record:

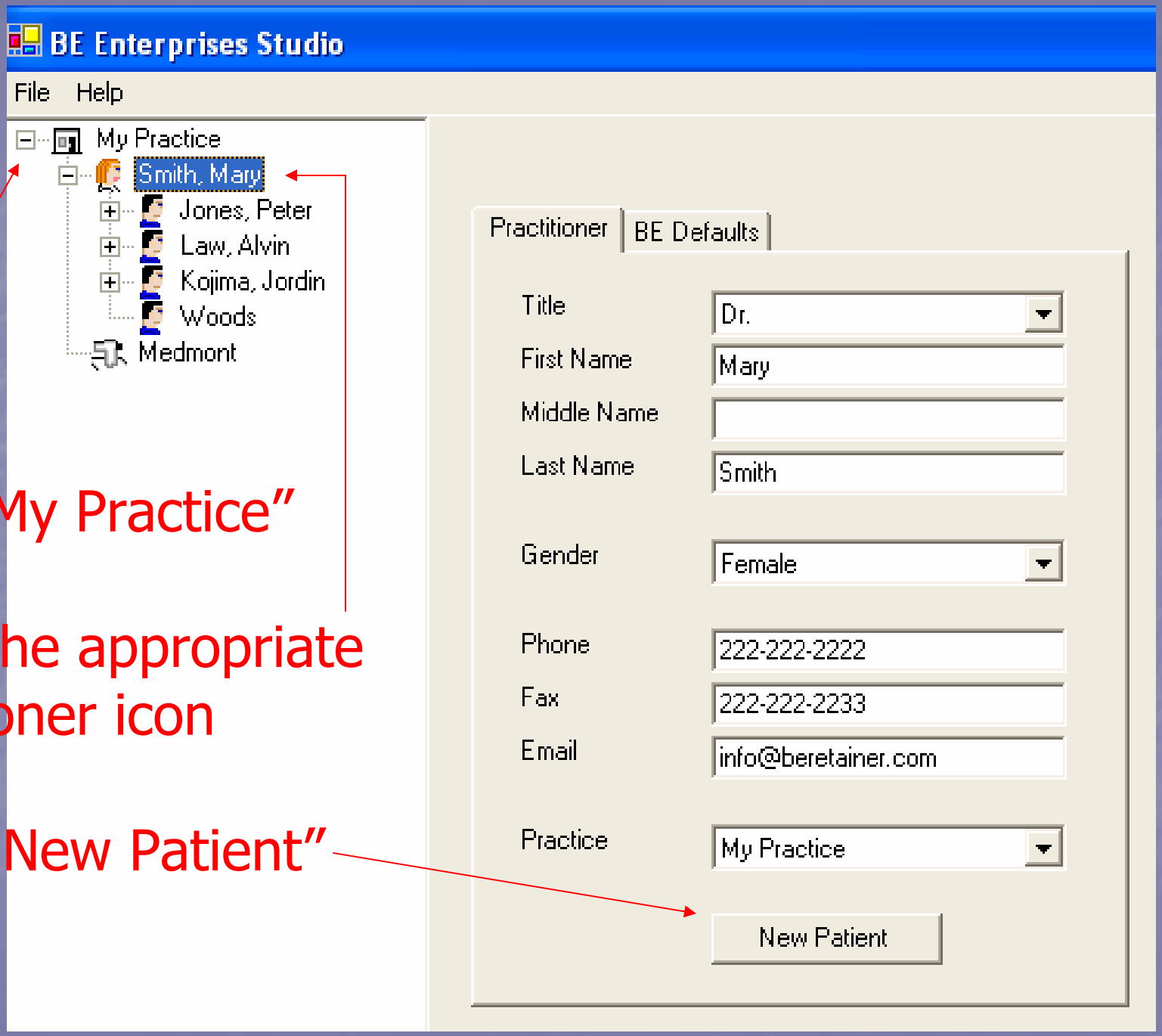
Apical Curvature (Ro)
7.917

Weighted Average Height (Sag)
1480.7
convert to mm:
1.4807

Record the average Apical Curvature (Ro) and Weighted Average Height (Sag) OR Eccentricity. Be sure the standard deviation error is low. Otherwise throw out maps that are obviously in error and retake any additional maps required.



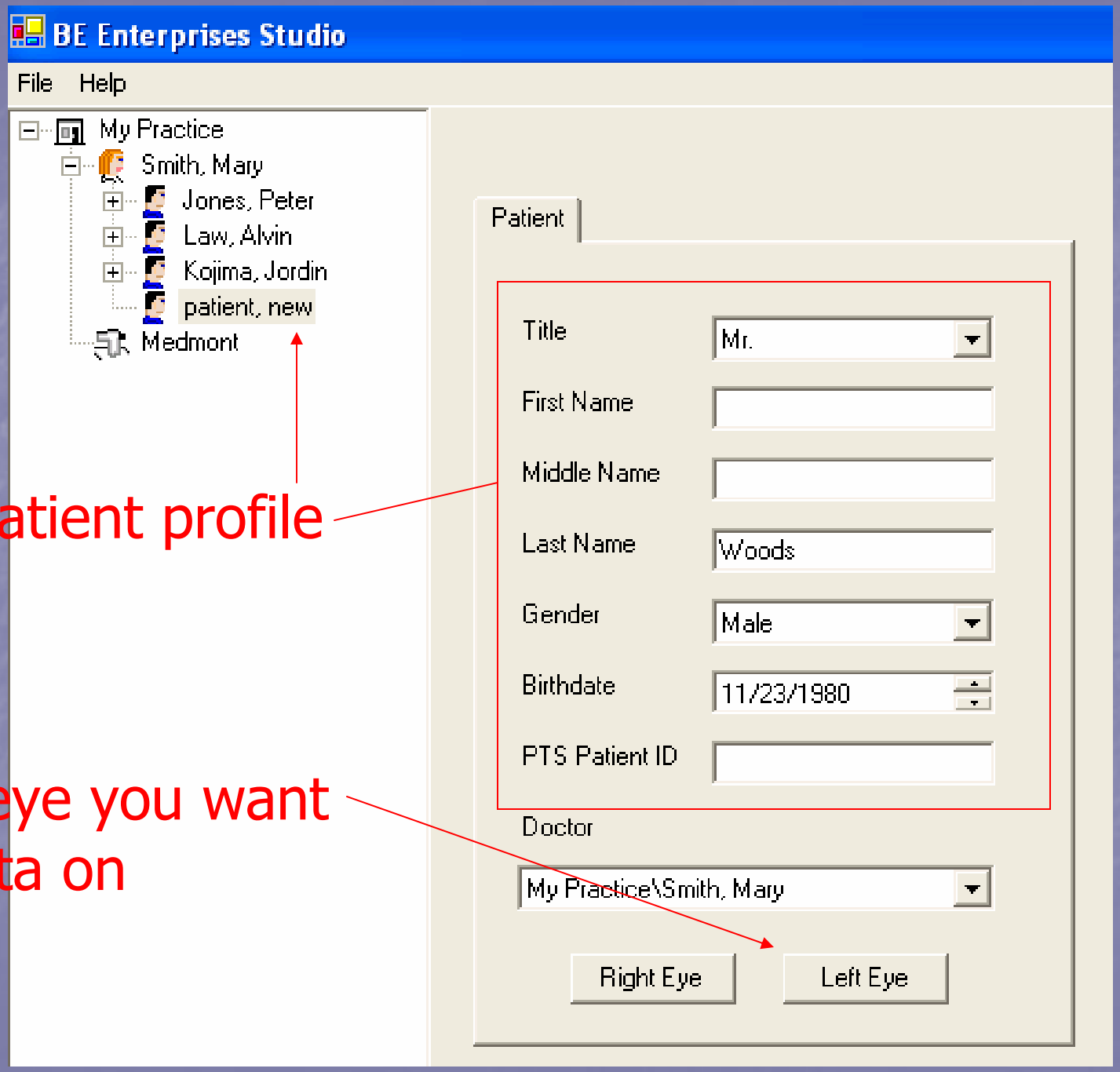

Measure the Horizontal Visible Iris Diameter (HVID)




Open "My Practice"

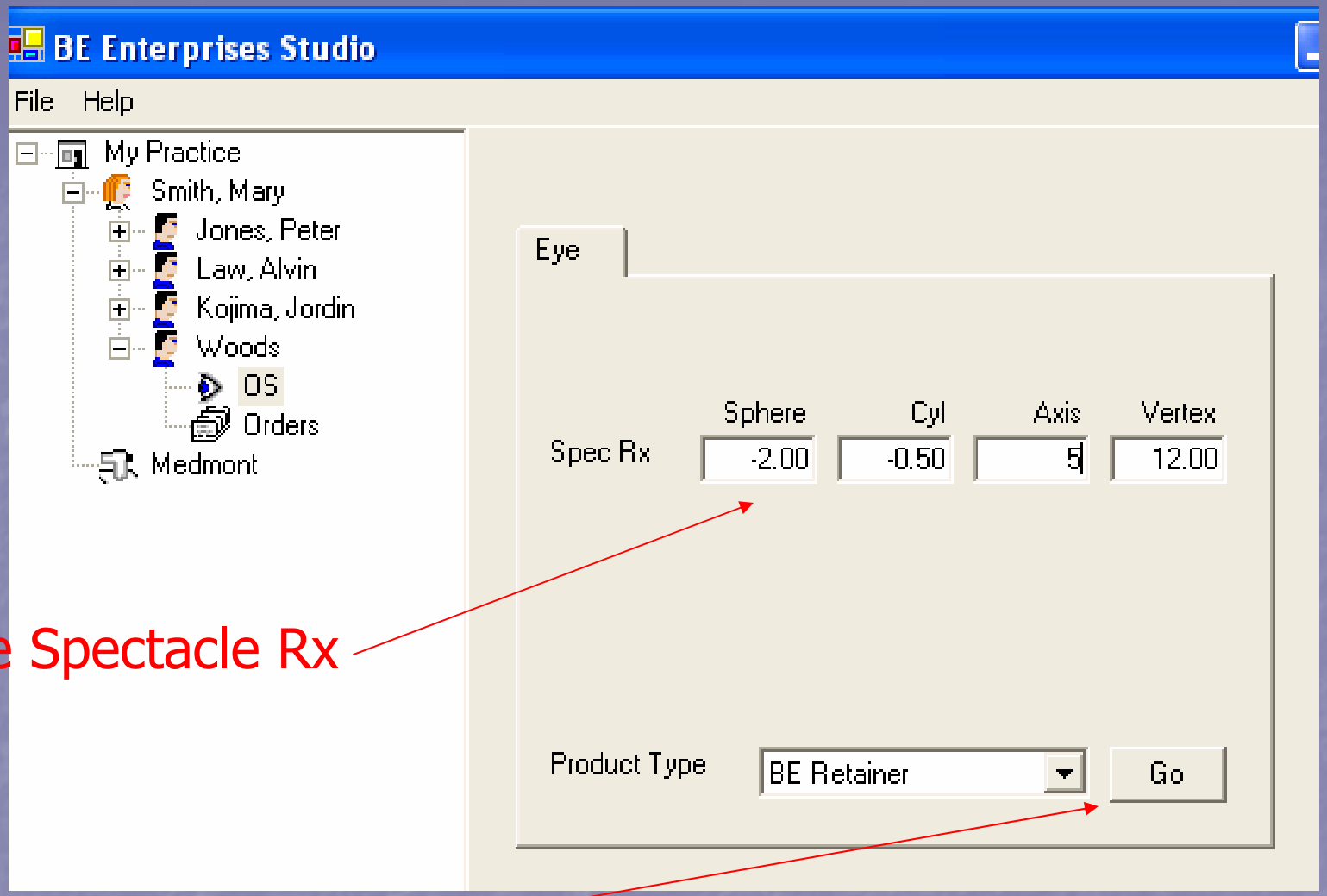
Select the appropriate practitioner icon

Select "New Patient"



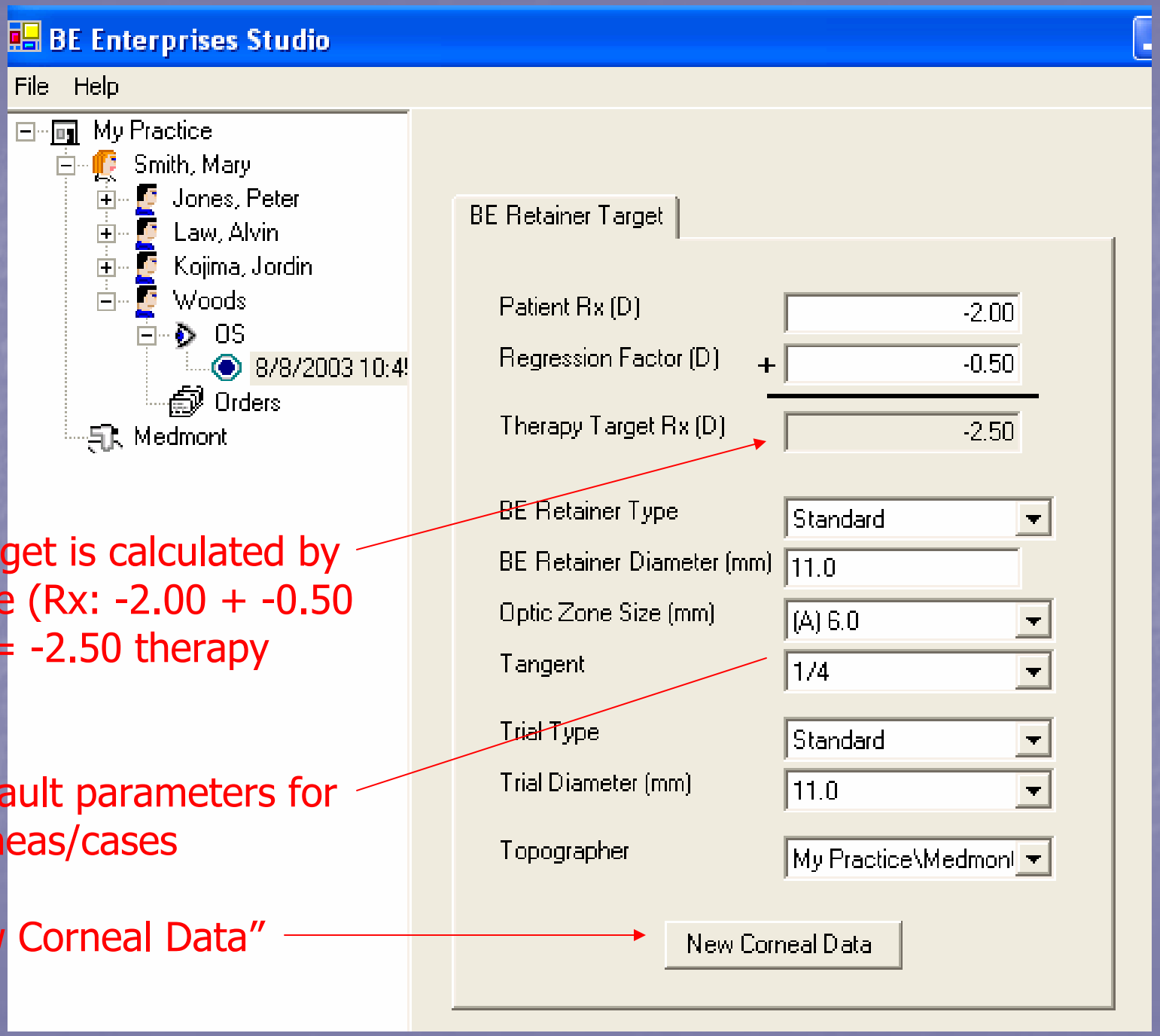

Enter the patient profile information

Select the eye you want to enter data on




Enter the Spectacle Rx

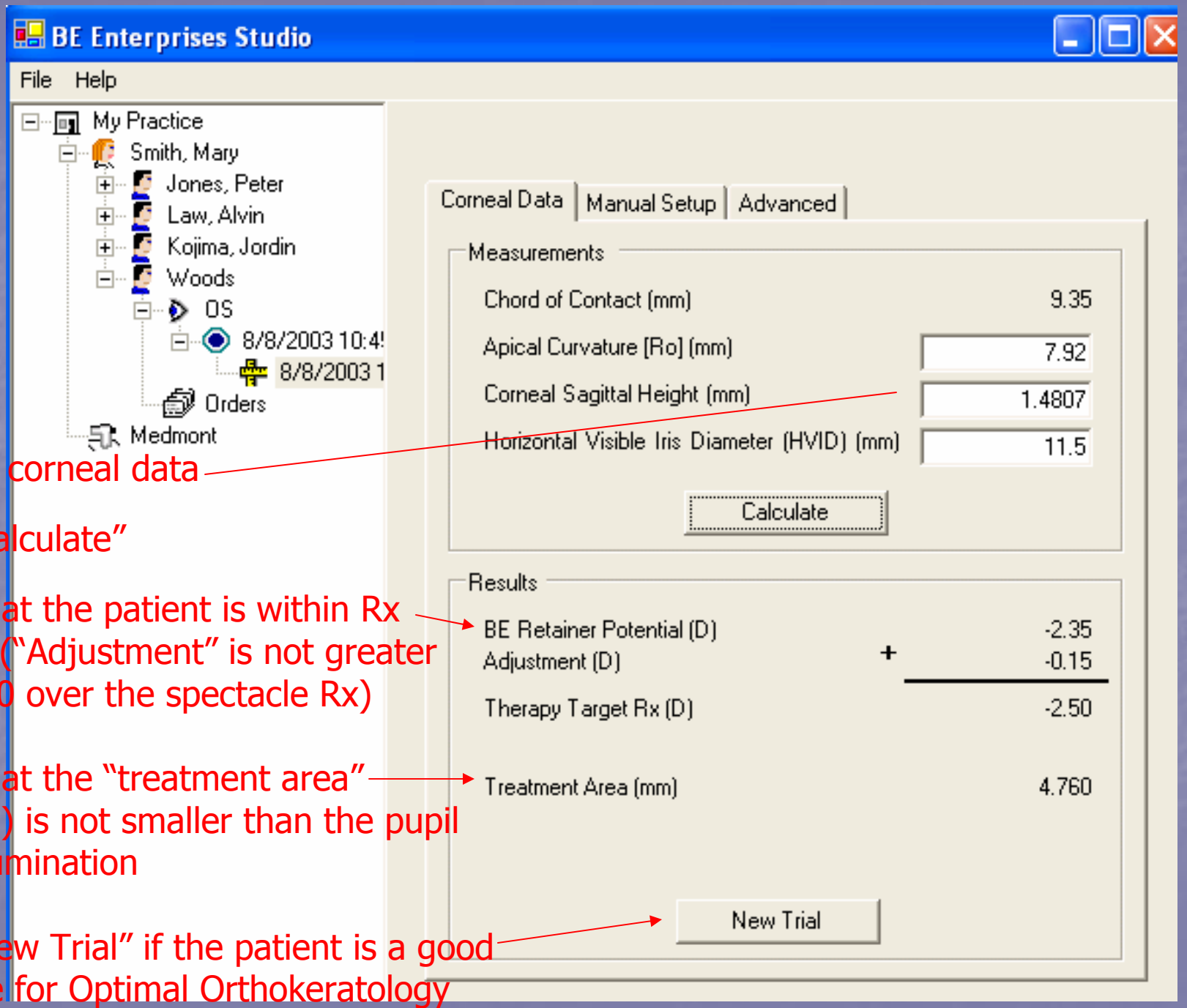
Select "Go"




Therapy target is calculated by the software (Rx: -2.00 + -0.50 regression = -2.50 therapy target Rx)

Use the default parameters for normal corneas/cases

Select "New Corneal Data"



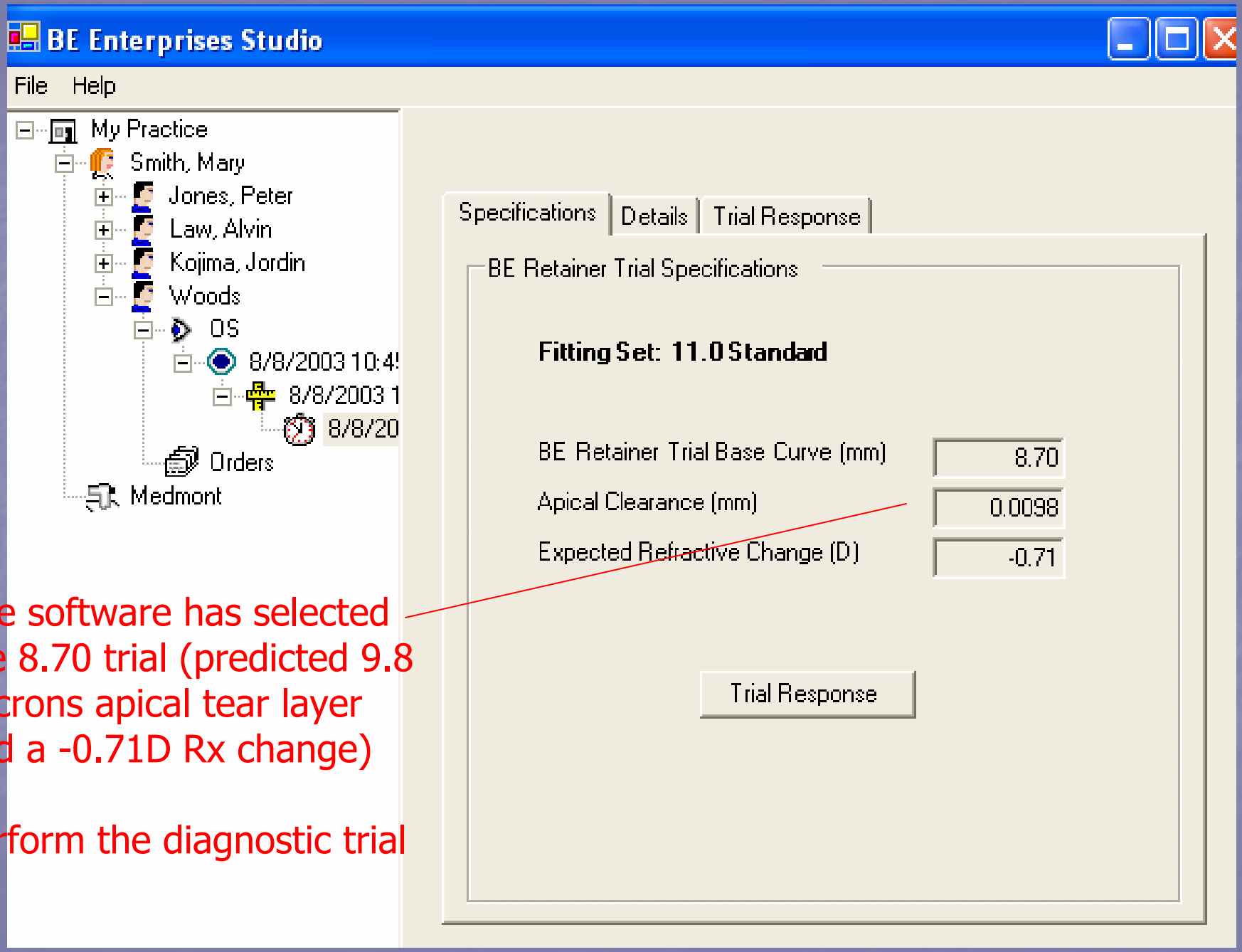

Enter the corneal data

Select "Calculate"

Ensure that the patient is within Rx potential ("Adjustment" is not greater than -1.00 over the spectacle Rx)

Ensure that the "treatment area" (+1.0mm) is not smaller than the pupil in dim illumination

Select "New Trial" if the patient is a good candidate for Optimal Orthokeratology


BE Enterprises Studio
File
Help
My Practice
Smith, Mary
Jones, Peter
Law, Alvin
Kojima, Jordin
Woods
OS
8/8/2003 10:4
8/8/2003 1
8/8/20
Orders
Medmont
Specifications
Details
Trial Response
BE Retainer Trial Specifications
Fitting Set: 11.0 Standard
BE Retainer Trial Base Curve (mm)
8.70
Apical Clearance (mm)
0.0098
Expected Refractive Change (D)
-0.71
Trial Response
The software has selected the 8.70 trial (predicted 9.8 microns apical tear layer and a -0.71D Rx change)
Perform the diagnostic trial

# Perform a Diagnostic Trial

- Dispense the calculated BE Retainer diagnostic (check letter engravement)
- Instruct the patient on the proper insertion and removal techniques
- Patient inserts the BE Retainer at the end of the day
- Schedule the patient for a return to the office early in the AM

# Post-trial Evaluation

- Slit Lamp Evaluation
  - Check that the trial is not bound (press with finger on the superior and inferior sclera 3x to free)
  - Check for the proper letter engravement on each eye (correct trial in the correct eye)
  - Remove trials
  - Check, record and grade staining if present (instill artificial tears if the staining appears to be bound mucus and re-evaluate)
- Acuity and Subjective Refraction
- Perform Topography (within 20 minutes of trial removal)
  - Capture 1 good quality topography on each eye (large capture area, minimize ring jam)

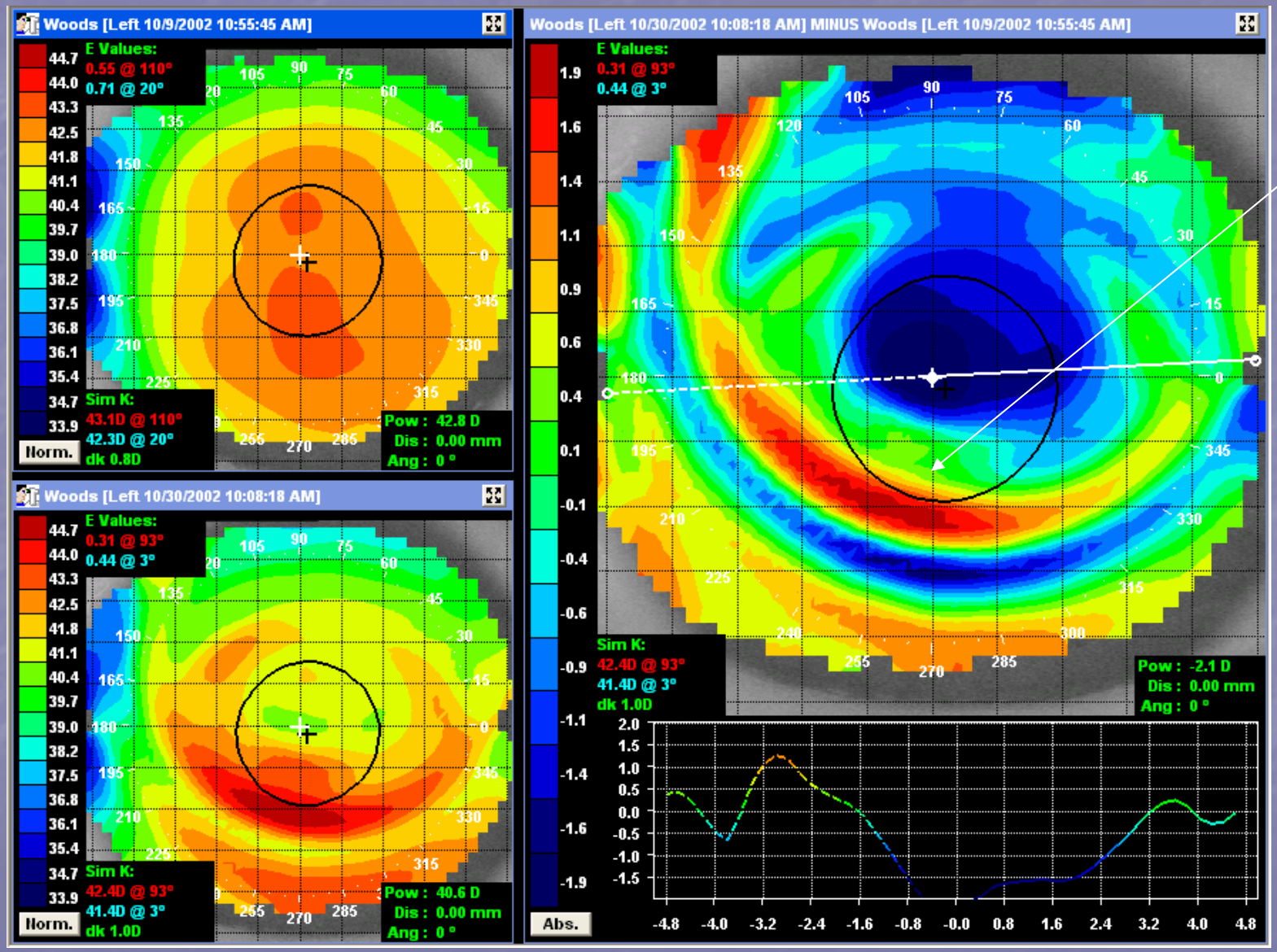
# Topographical Analysis

- For each eye:
  - Select the best pretreatment map
    - Large capture area, avoid maps with anomalies due to tear inconsistency or topography error
  - Select the best post-treatment map
    - Large capture area, avoid maps with anomalies due to tear inconsistency or topography error
  - Select the “Subtractive” or “Difference” map function (comparison map option that displays the difference between pre and post corneal shape)
- What was the result?

# Employing Subtractive/Difference Maps

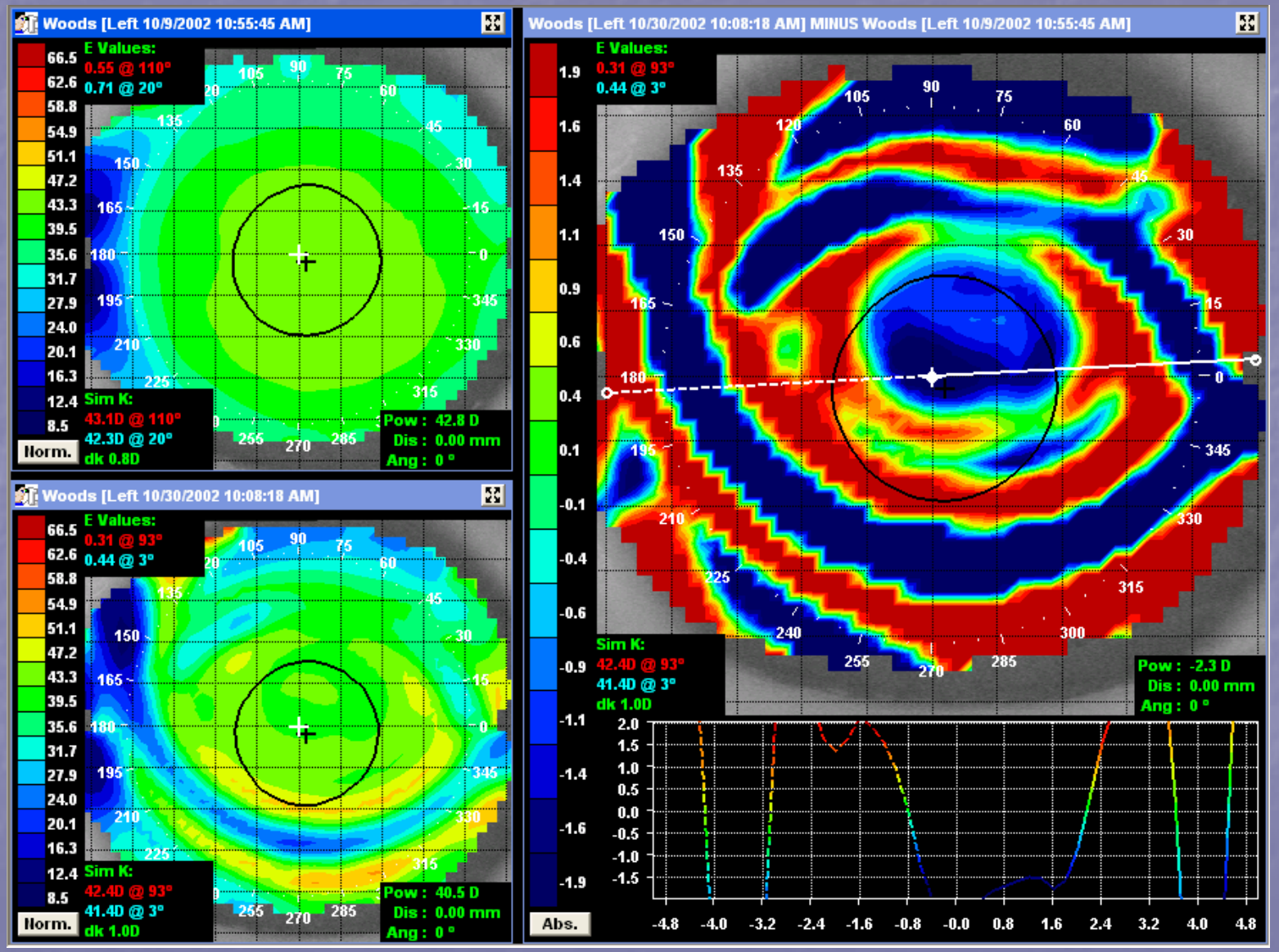
- The Key to evaluating the corneal response following Optimal Orthokeratology wear
- Axial Power Subtractive: measures the Rx change, defines treatment zone position
- Tangential Power Subtractive: defines the position of the BE Retainer
- Refractive Power Subtractive: Measures the treatment zone size and defines the position of the Rx change following Optimal Orthokeratology

# Axial Subtractive



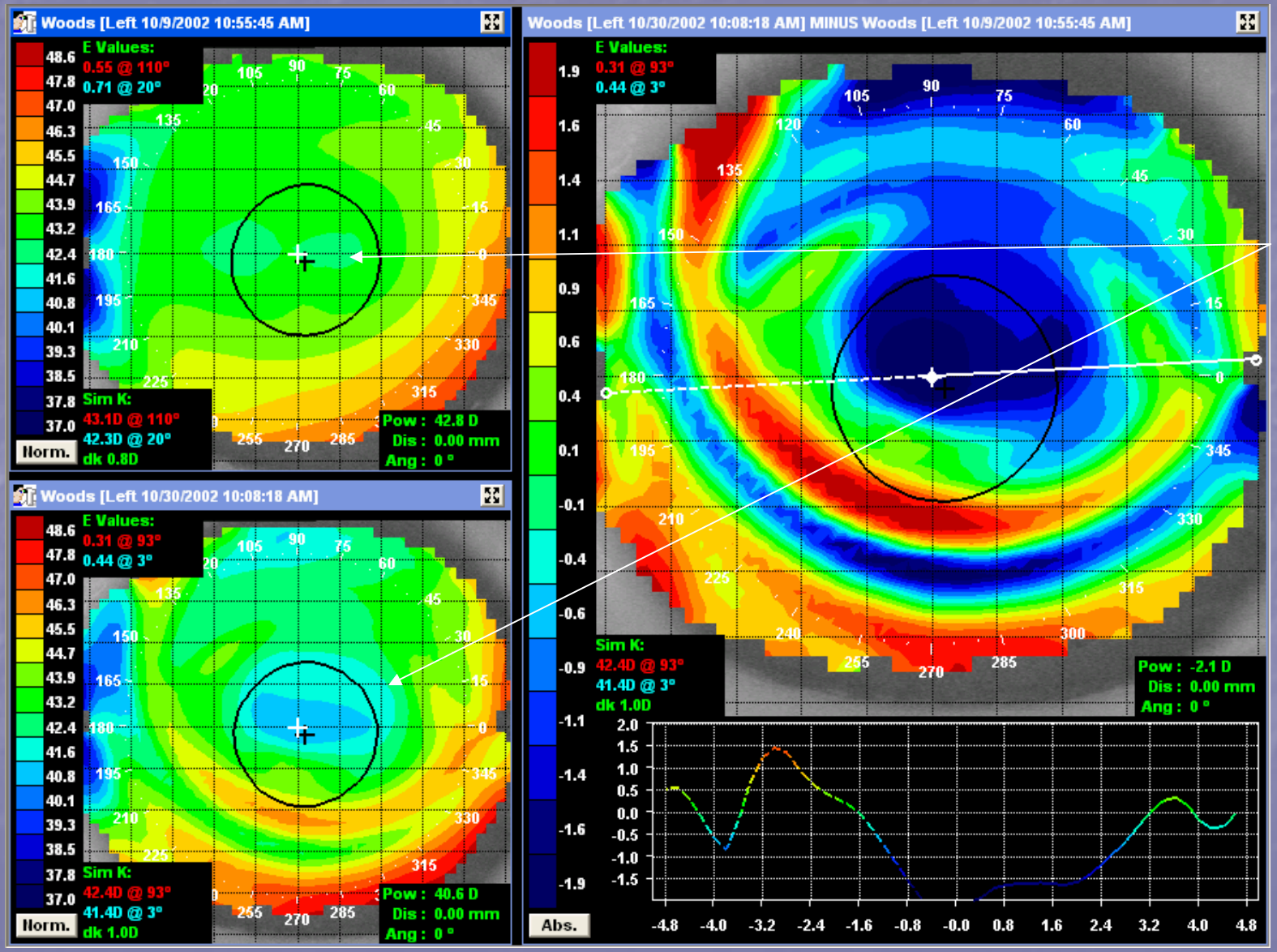

The superior displaced "smile" and treatment area (in relation to the pupil) indicate a cone angle too loose. The Axial power map indicates a "Smiley Face" response and requires re-trial.

# Tangential Subtractive




The superior displacement of the red and blue rings in relation to the pupil indicate a cone angle too loose following wear. The superior displacement requires a retrial in the next steeper diagnostic.

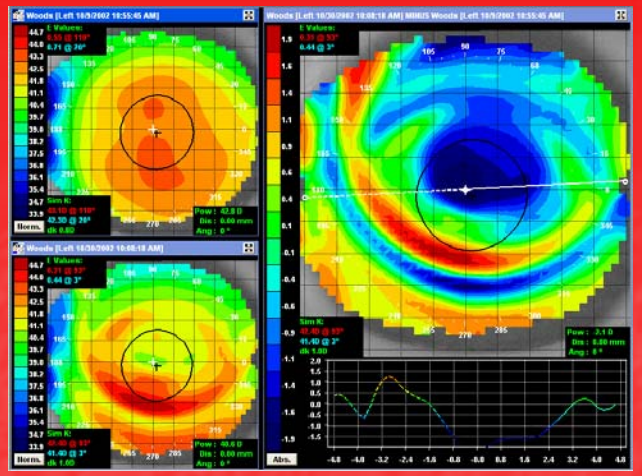
# Refractive Power

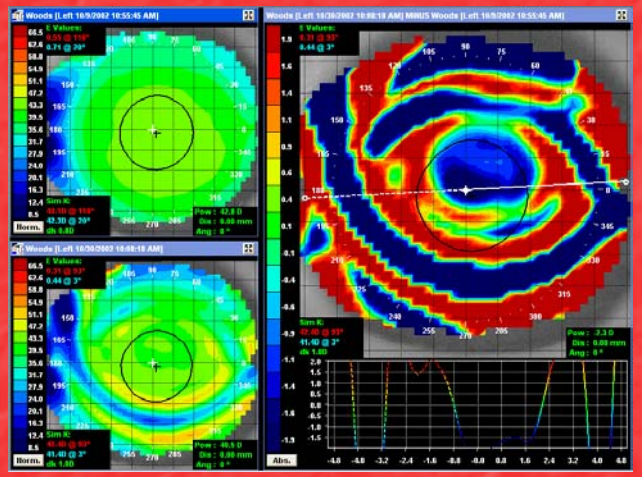


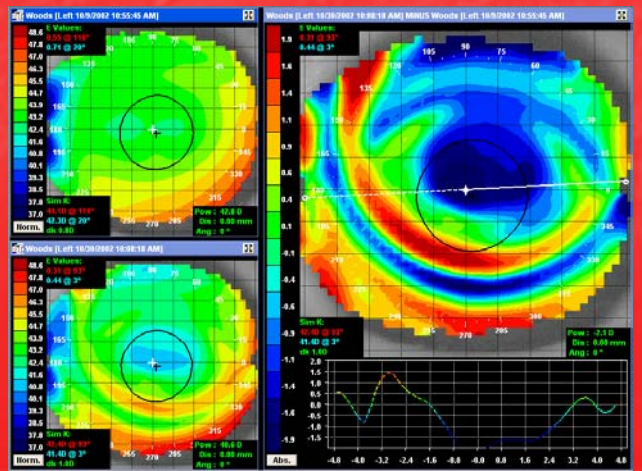

Note the superior displacement of the Rx effect to the cornea. Compare the pretreatment Rx power of the cornea versus the post-treatment power.

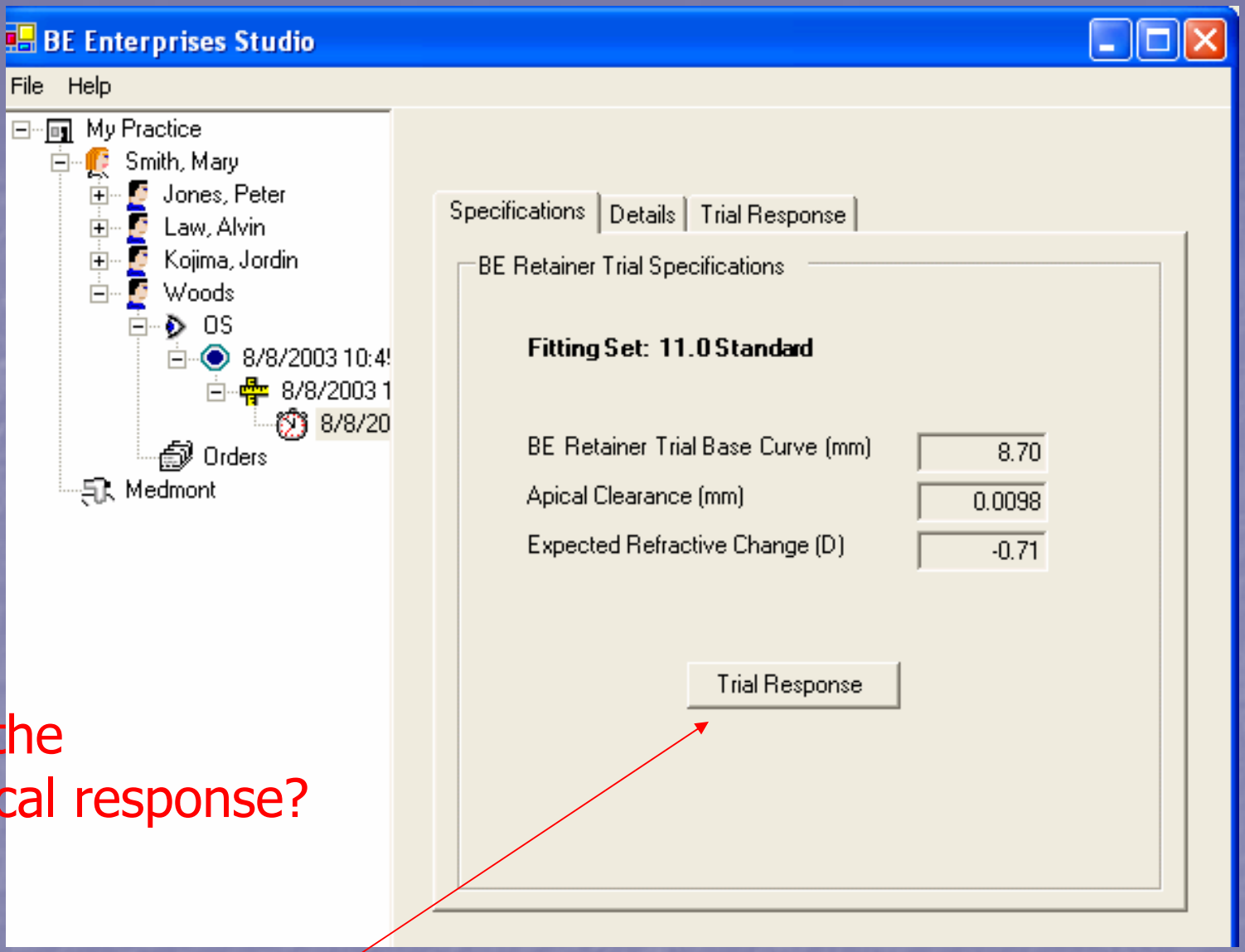
The key to analysis of Optimal Orthokeratology effect/results is the Subtractive/Difference Map

Learn to use these maps and understand them clearly for successful BE Retainer practice



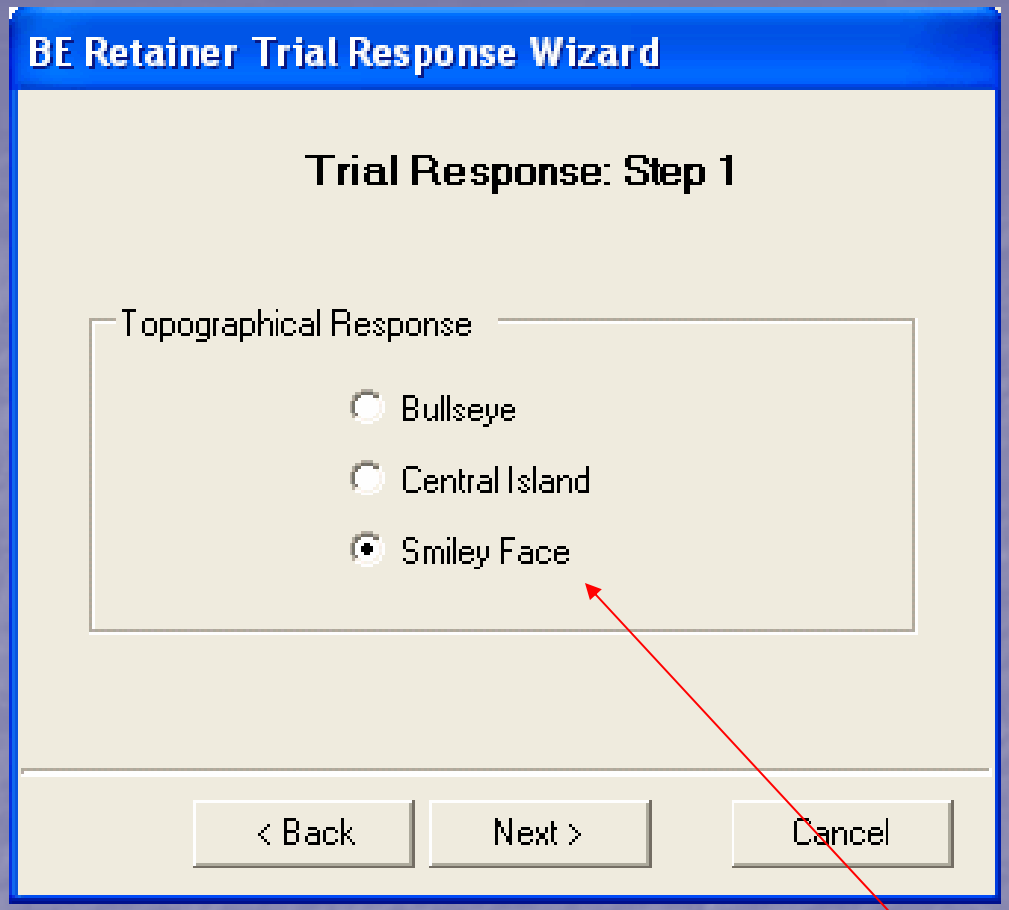


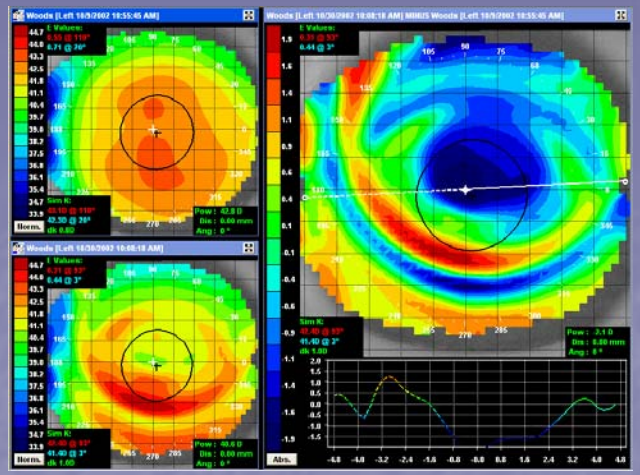


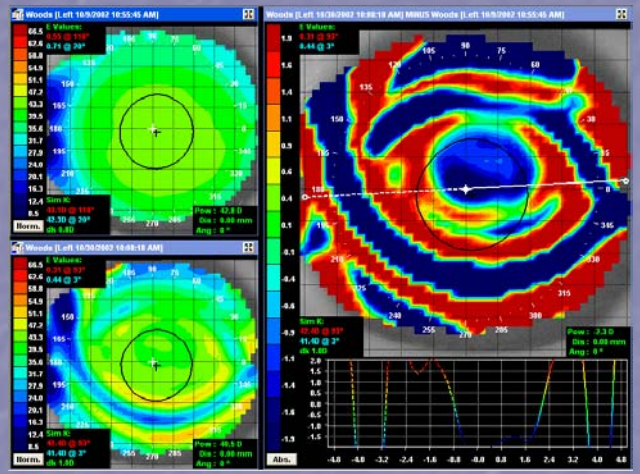


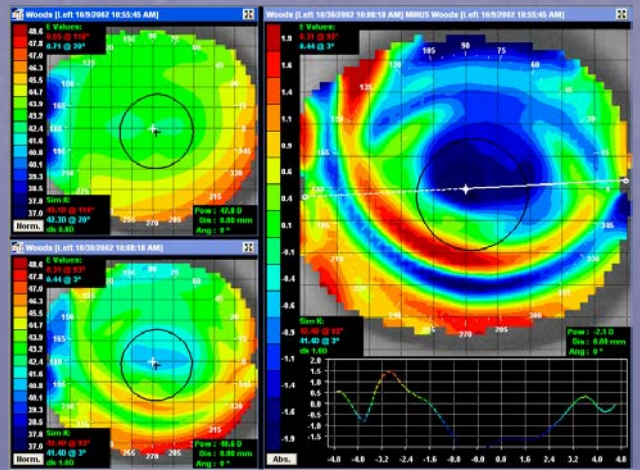

What was the topographical response?

Select "Trial Response"



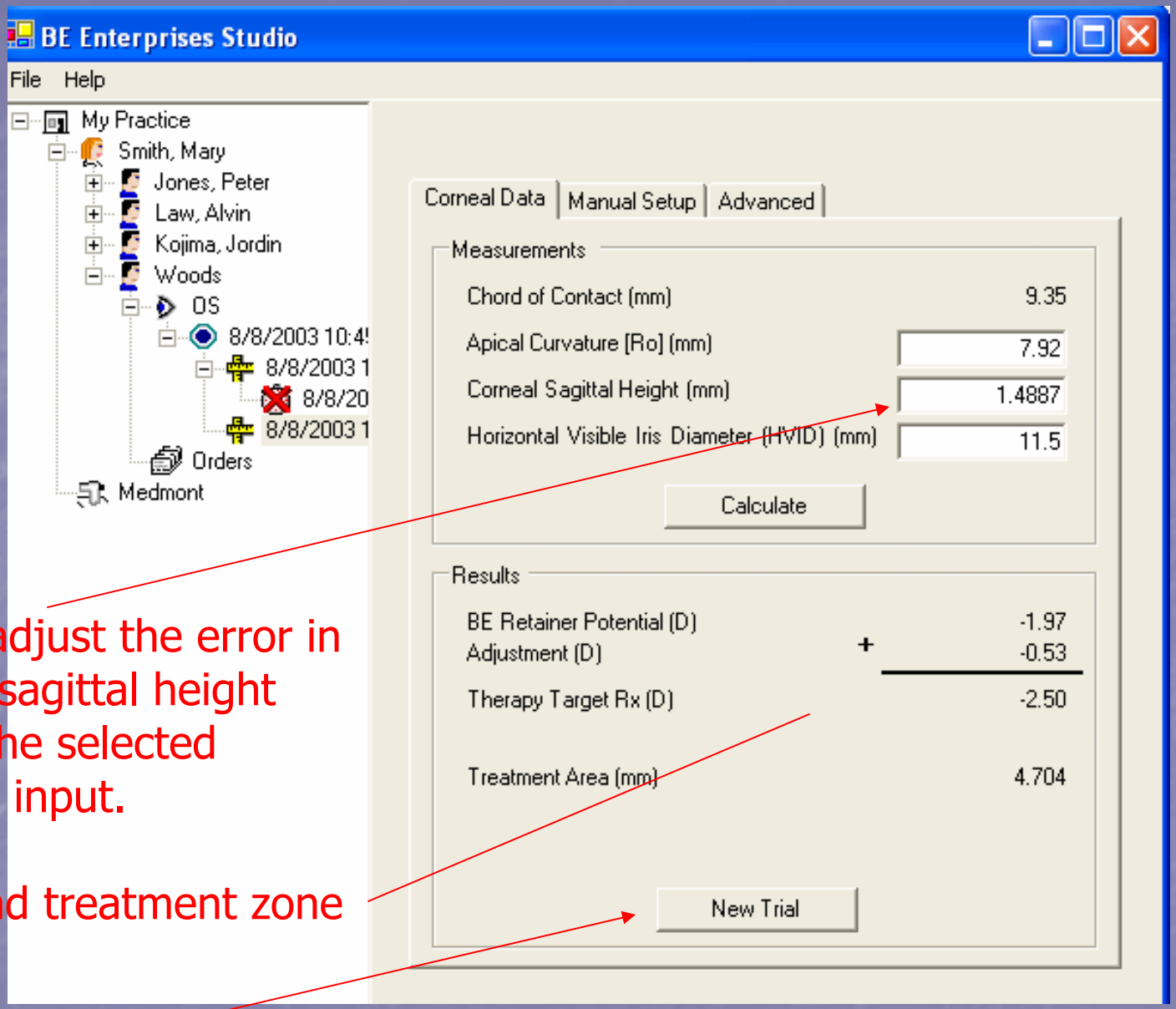




The topography indicated a “Smiley Face” topographical response

BE Retainer diagnostics are separated by 0.008mm increments (8 microns). In other words, the sagittal height difference between trials is 0.008mm or 8 microns. If it is desired to change the trial by 1 step (8 microns), select ONE standard deviation (if your topographer standard deviation "default" is 8 microns). Then select "Next"

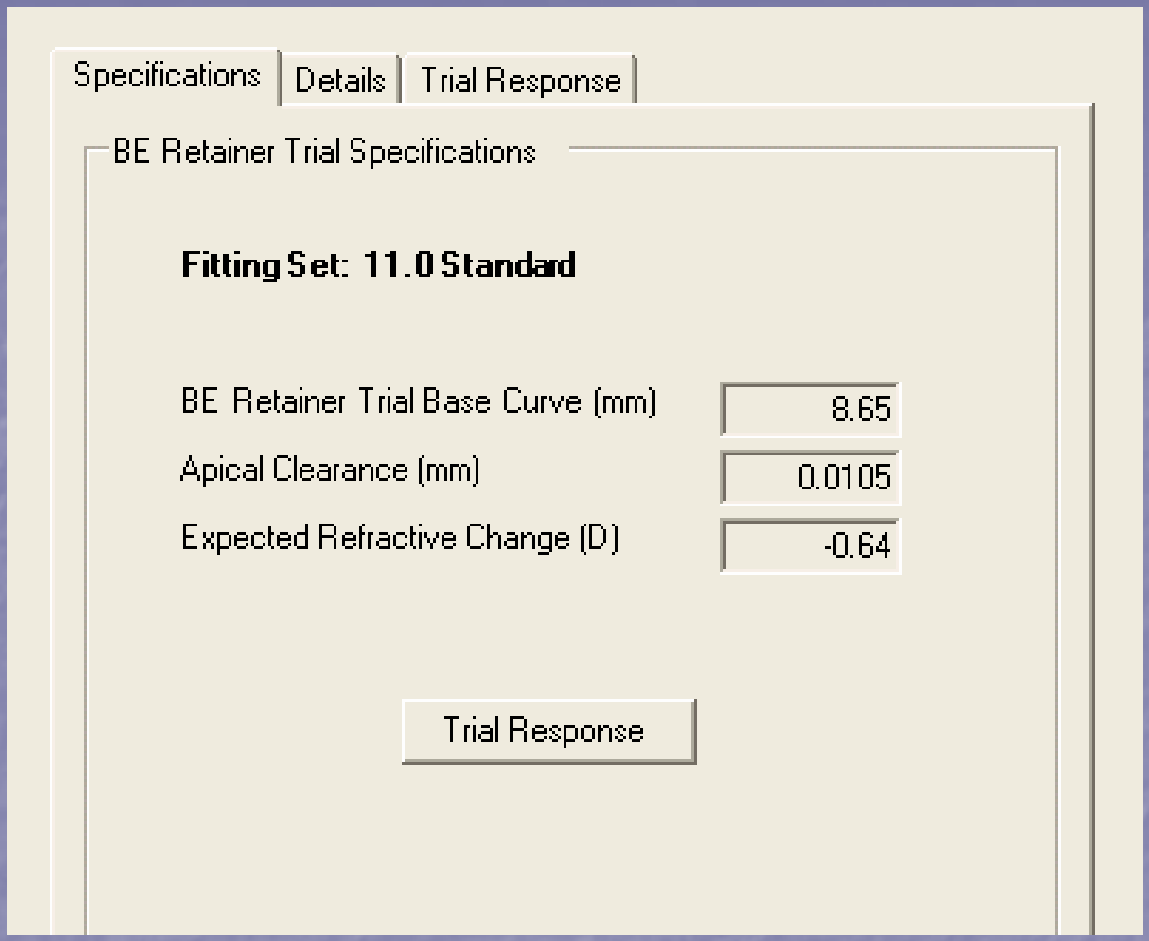
Select “Finish” to recalculate the corneal data




The software will adjust the error in the topographer's sagittal height measurement by the selected standard deviation input.

A new potential and treatment zone is calculated

Select "New Trial"



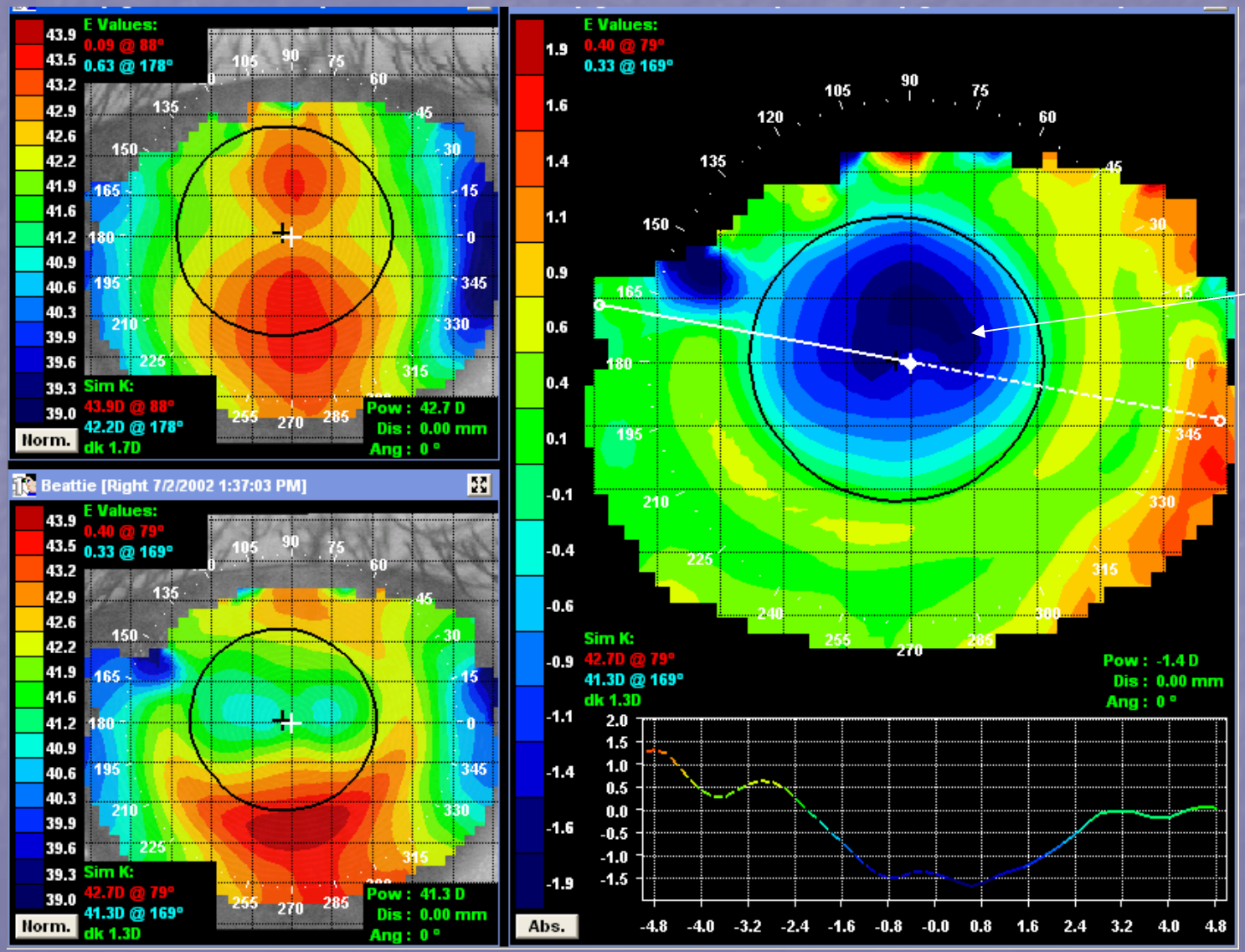

A "Smiley Face" topographical response has been selected with an 8 micron standard deviation error. The BE Retainer software has selected the next steeper trial (now 8.65, formerly 8.70). In rare instances the entered standard deviation does not result in the desired increment step. In such cases, increase or decrease the SD to result in the desired trial parameter. Retrial to create a "Bulls-eye" topographical response.

Smiley Face topographical responses are the result of a cone angle too loose and/or a sagittal height too low

Retrial in steeper BE Retainer diagnostics (higher in sag) until a Bulls-eye results

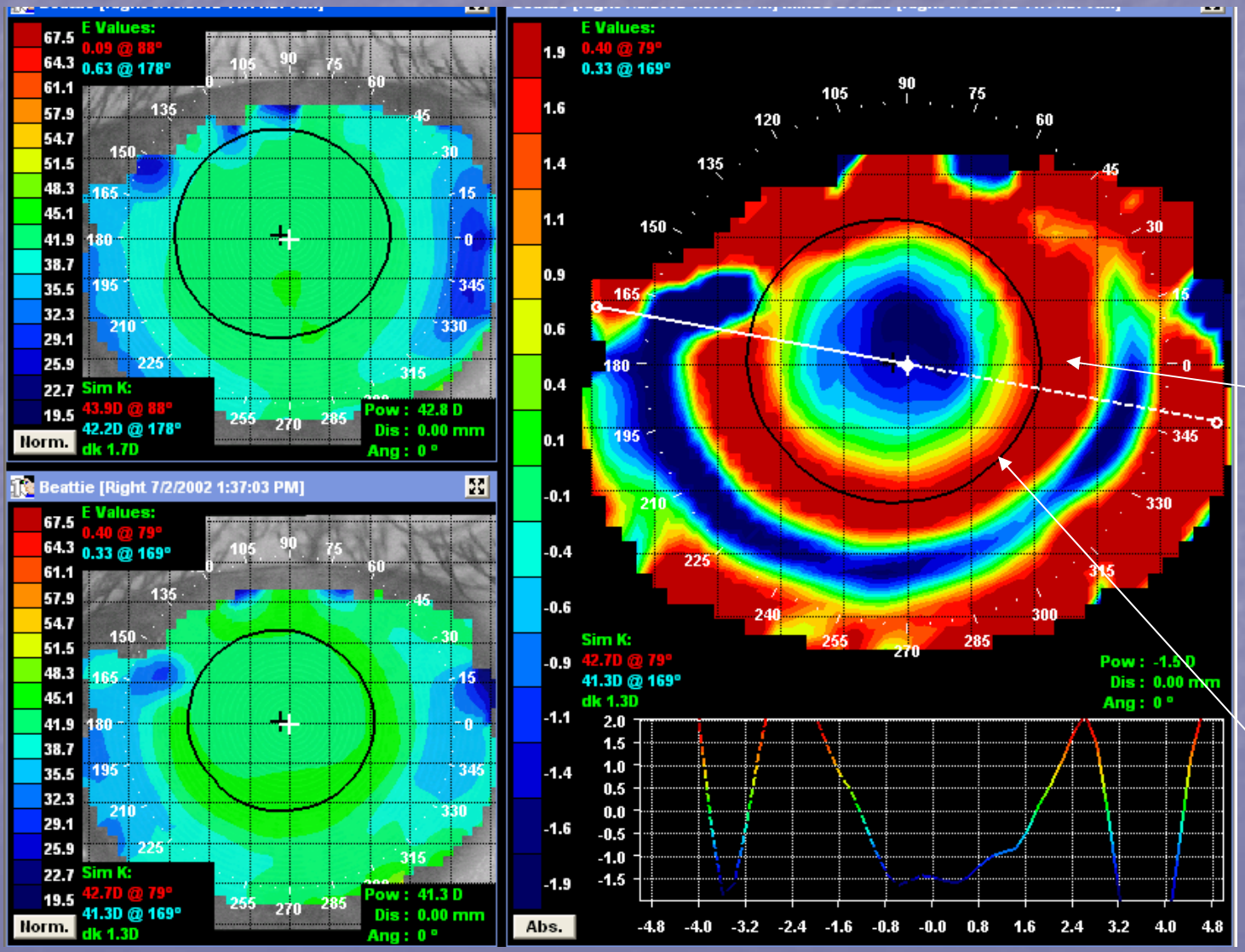
In rare cases, when the topography data is poor or the patient has a difficult cornea to capture on, it can be required to go numerous trial steps steeper than baseline

# Axial Subtractive



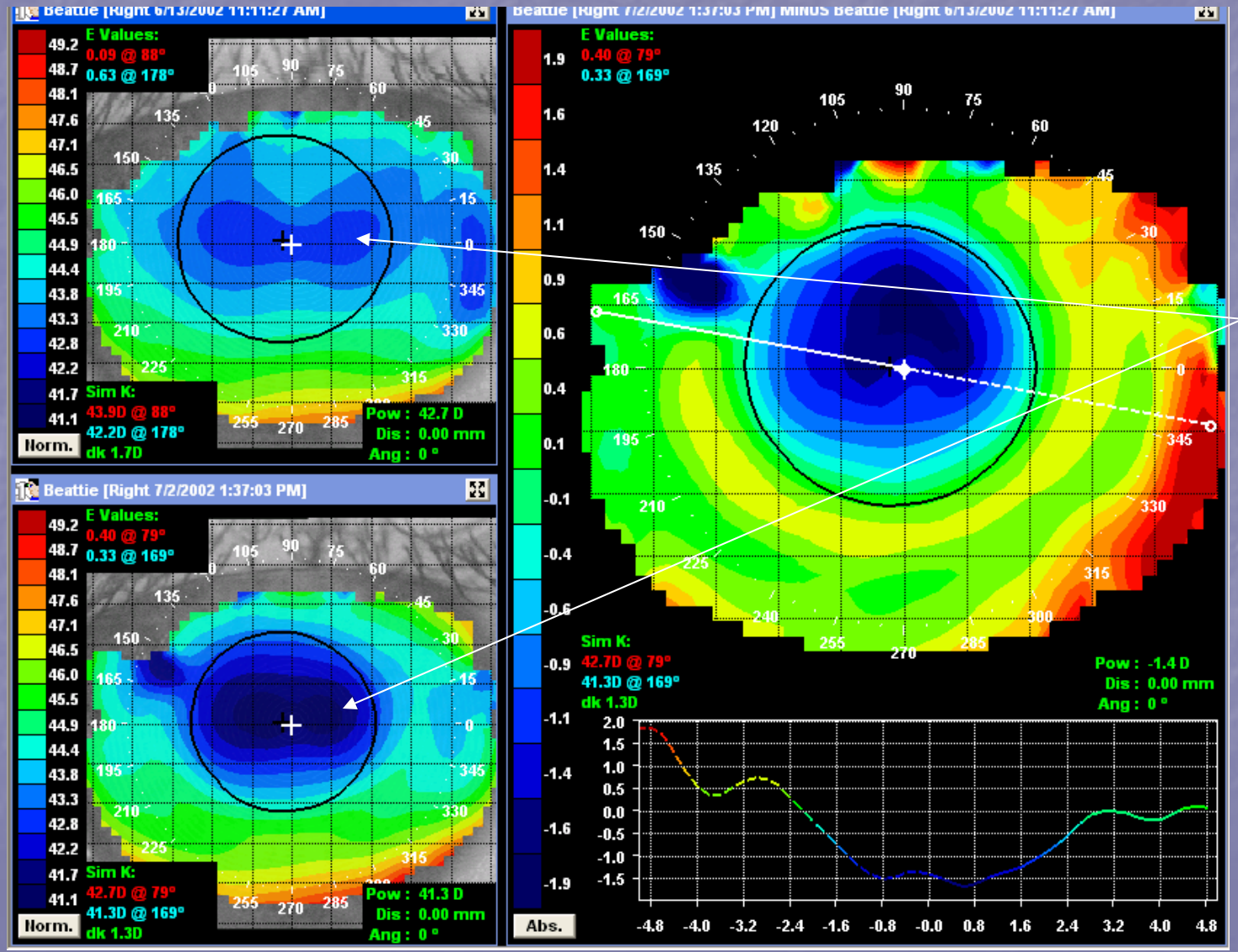

Trial fit to achieve a "Bulls-eye". Note the centered effects of the treatment zone (Parallel relationship with the pupil)

# Tangential Subtractive




The tangential shows the position of the BE Retainer following Optimal Orthokeratology. Note the parallel relationship of the red ring of epithelium pulled para-central, centered perfectly to the pupil (black ring). A perfect "Bulls-eye" response!

# Refractive Power




In a Bulls-eye response, the Refractive Power Map will show centered Rx effects following Optimal Orthokeratology. Compare the pre and post fit corneal refractive power to determine the position of the therapy effects.

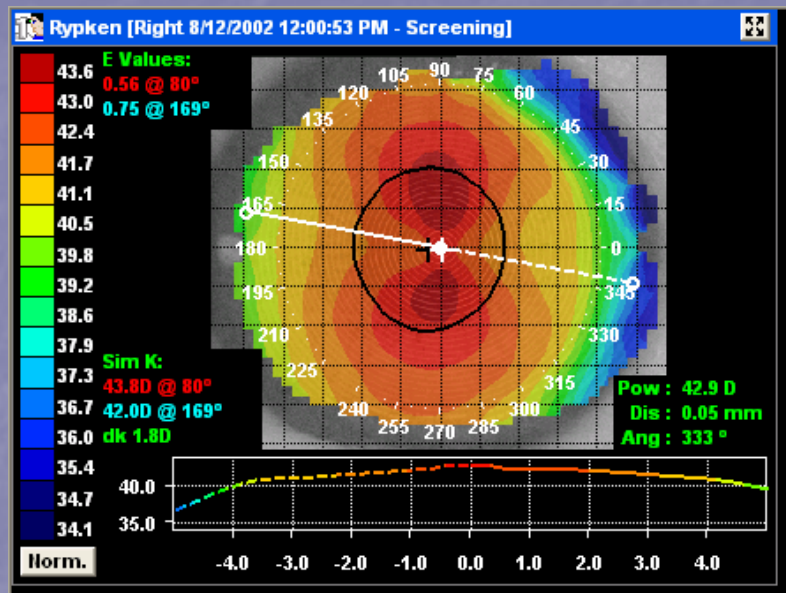
Trial Fit until a Bulls-eye topographical response results

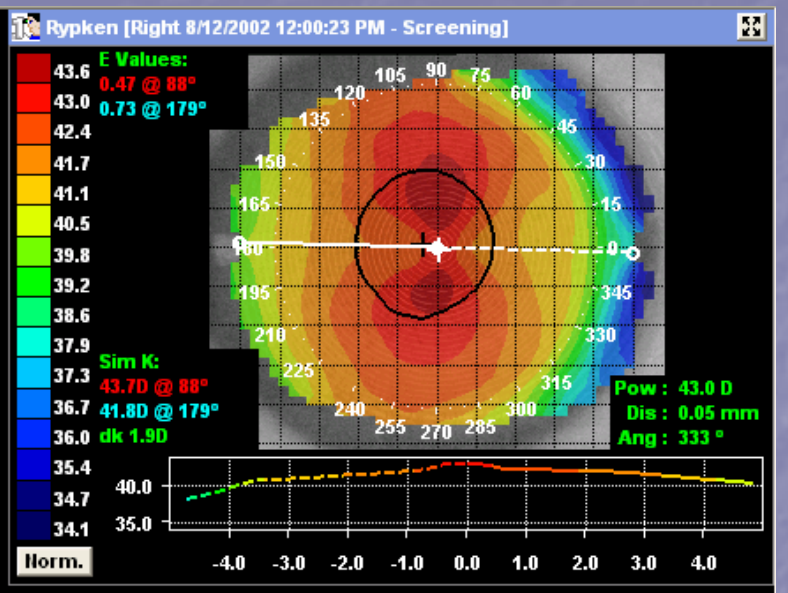
Successful custom orders result from Bulls-eye trials

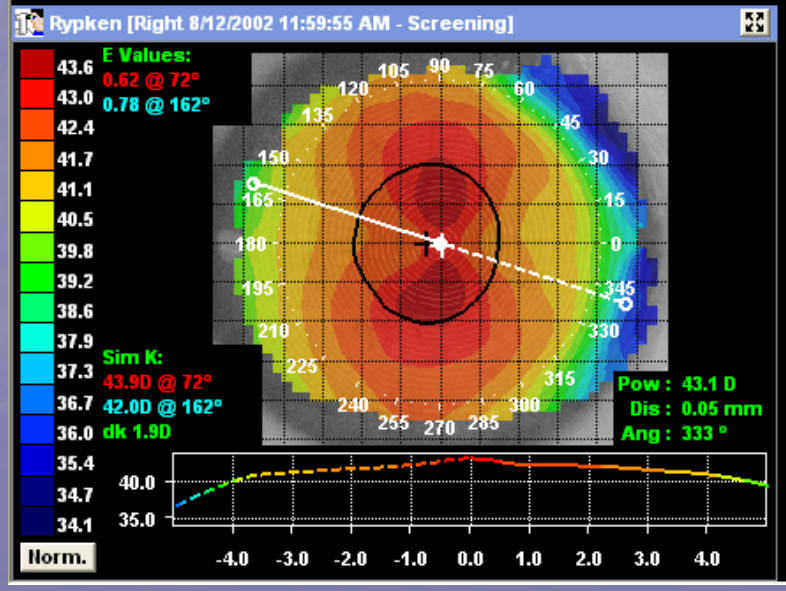
# Case 2

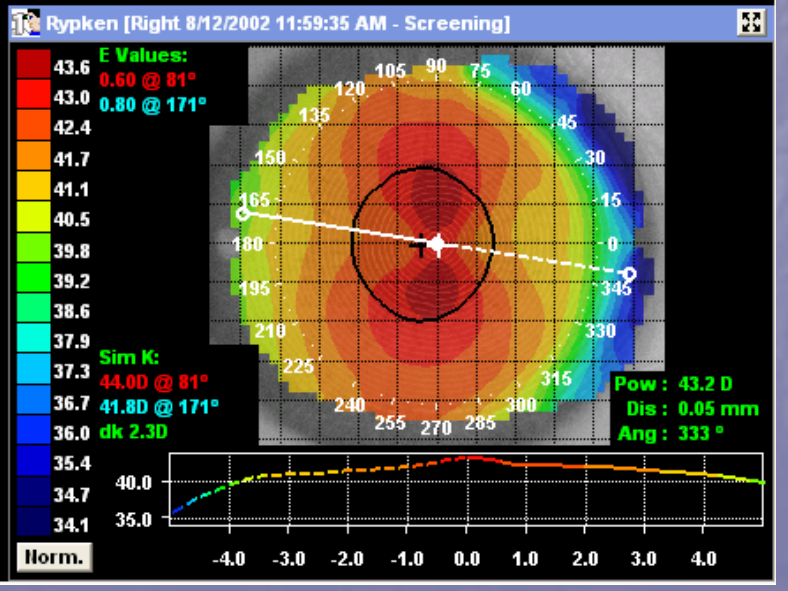
Patient: Rypken

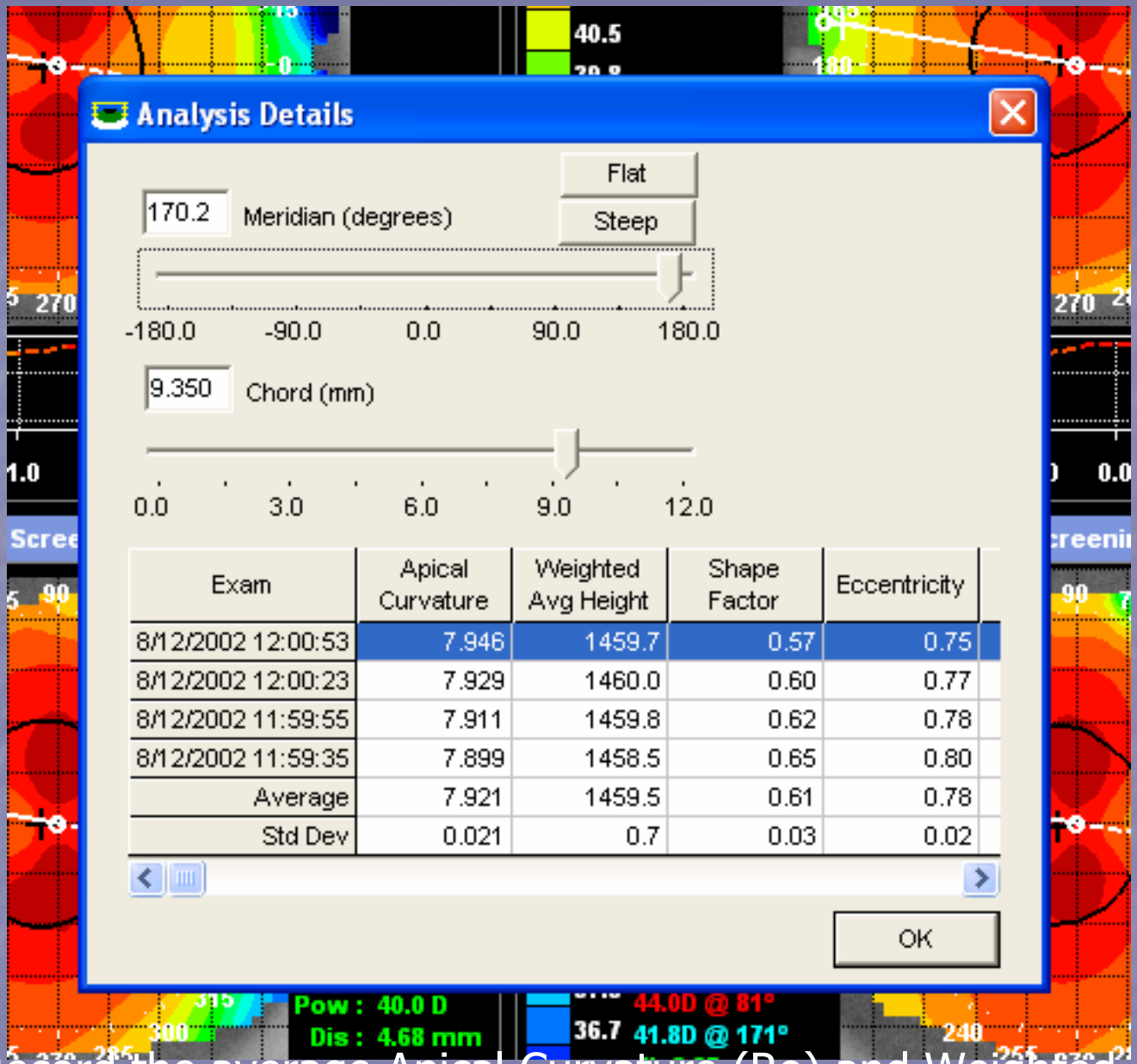
# 4 Independent Captures OU





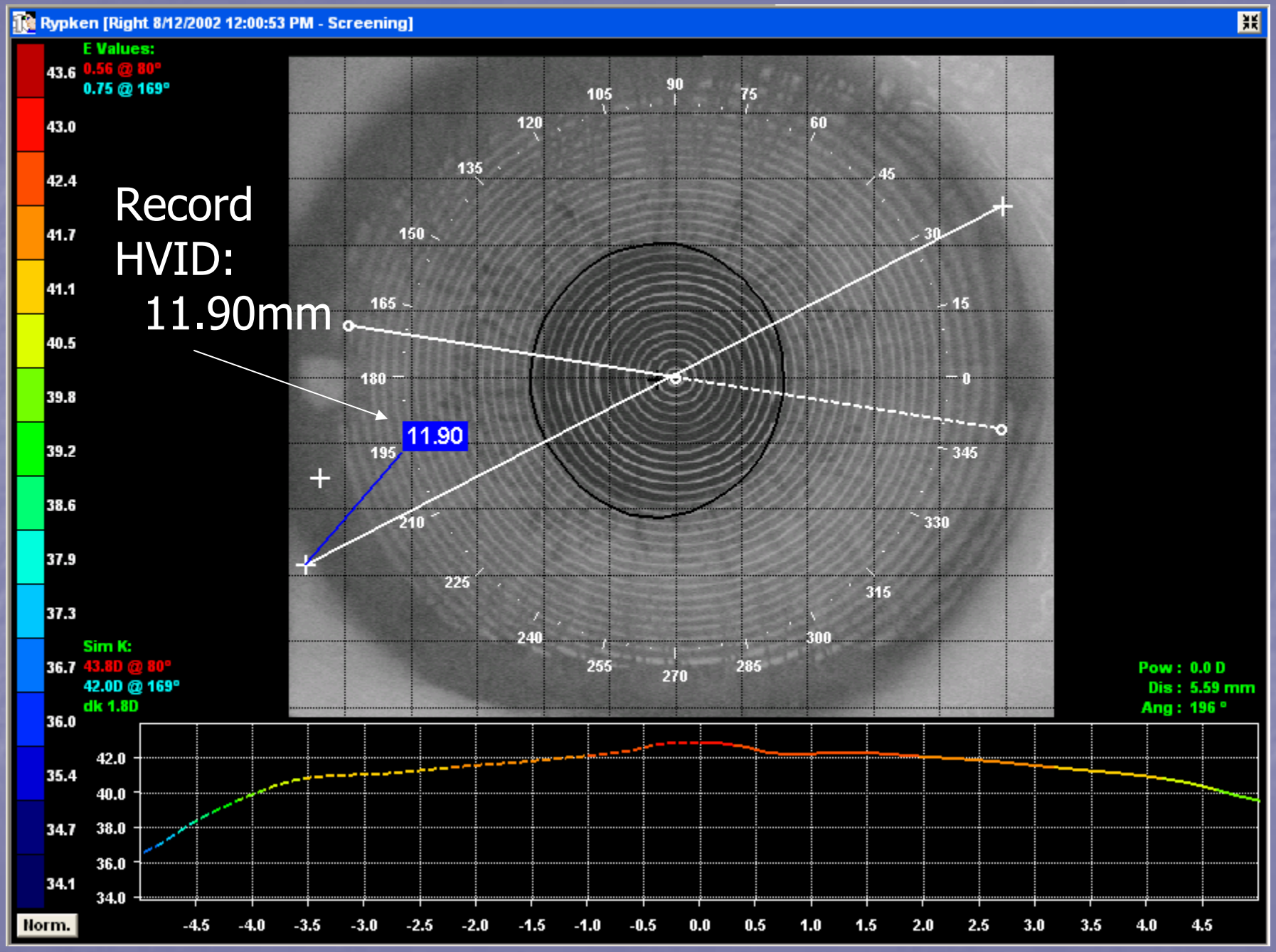

| Exam | Apical Curvature | Weighted Avg Height | Shape Factor | Eccentricity |
|---|---|---|---|---|
| 8/12/2002 12:00:53 | 7.946 | 1459.7 | 0.57 | 0.75 |
| 8/12/2002 12:00:23 | 7.929 | 1460.0 | 0.60 | 0.77 |
| 8/12/2002 11:59:55 | 7.911 | 1459.8 | 0.62 | 0.78 |
| 8/12/2002 11:59:35 | 7.899 | 1458.5 | 0.65 | 0.80 |
| Average | 7.921 | 1459.5 | 0.61 | 0.78 |
| Std Dev | 0.021 | 0.7 | 0.03 | 0.02 |

# Record:

Apical Curvature (Ro)
7.921

Weighted Average Height (Sag)
1459.5
convert to mm:
1.4595

Record the average Apical Curvature (Ro) and Weighted Average Height (Sag) OR Eccentricity. Be sure the standard deviation error is low. Otherwise throw out maps that are obviously in error and retake any additional maps required.


Rypken [Right 8/12/2002 12:00:53 PM - Screening]
E Values:
0.56 @ 80°
0.75 @ 169°
43.6
43.0
42.4
41.7
41.1
40.5
39.8
39.2
38.6
37.9
37.3
36.7
36.0
35.4
34.7
34.1
Record
HVID:
11.90mm
11.90
90
105
75
120
60
135
45
150
30
165
15
180
0
195
345
210
330
225
315
240
300
255
270
285
Sim K:
43.8D @ 80°
42.0D @ 169°
dk 1.8D
Pow : 0.0 D
Dis : 5.59 mm
Ang : 196 °
42.0
40.0
38.0
36.0
34.0
-4.5
-4.0
-3.5
-3.0
-2.5
-2.0
-1.5
-1.0
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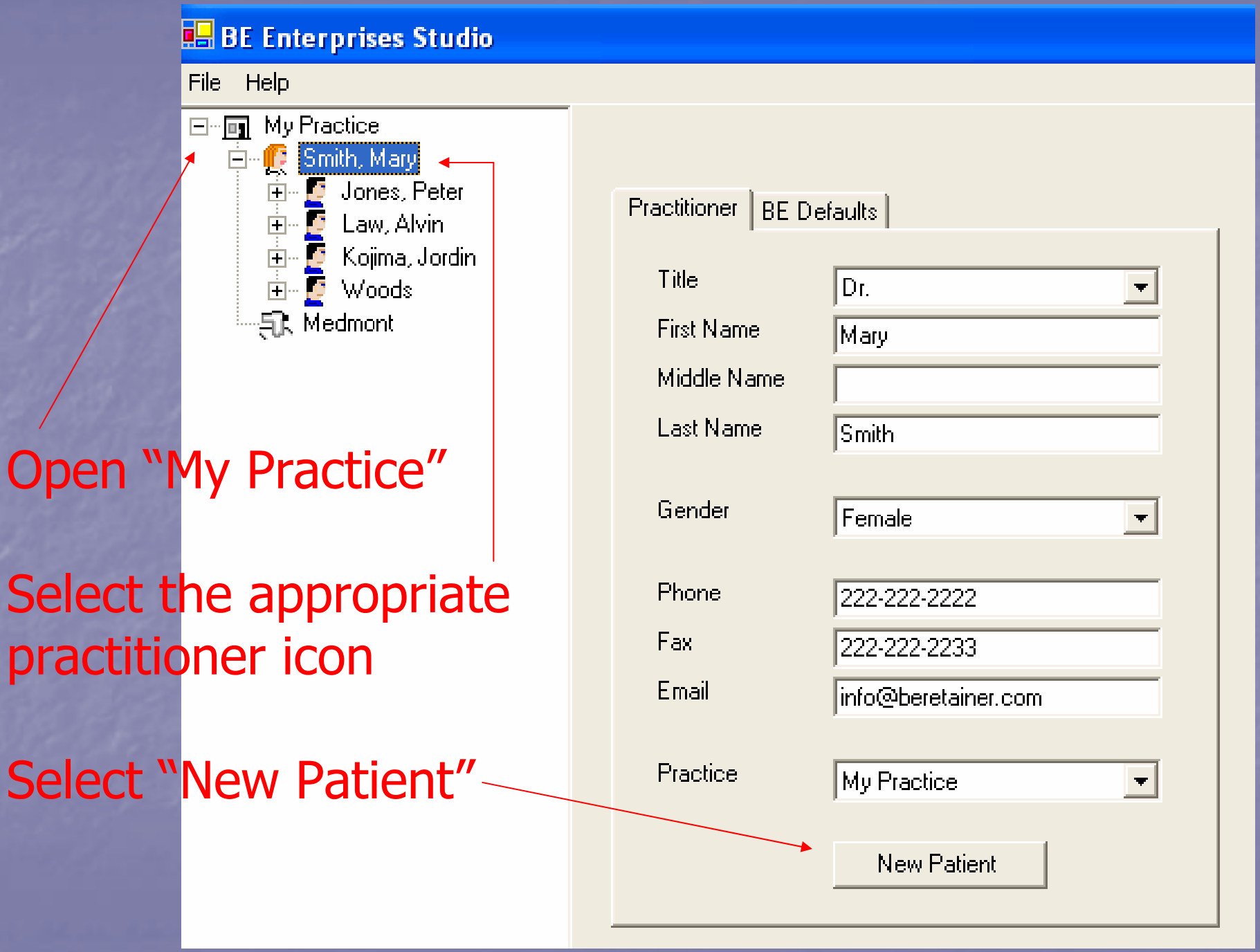
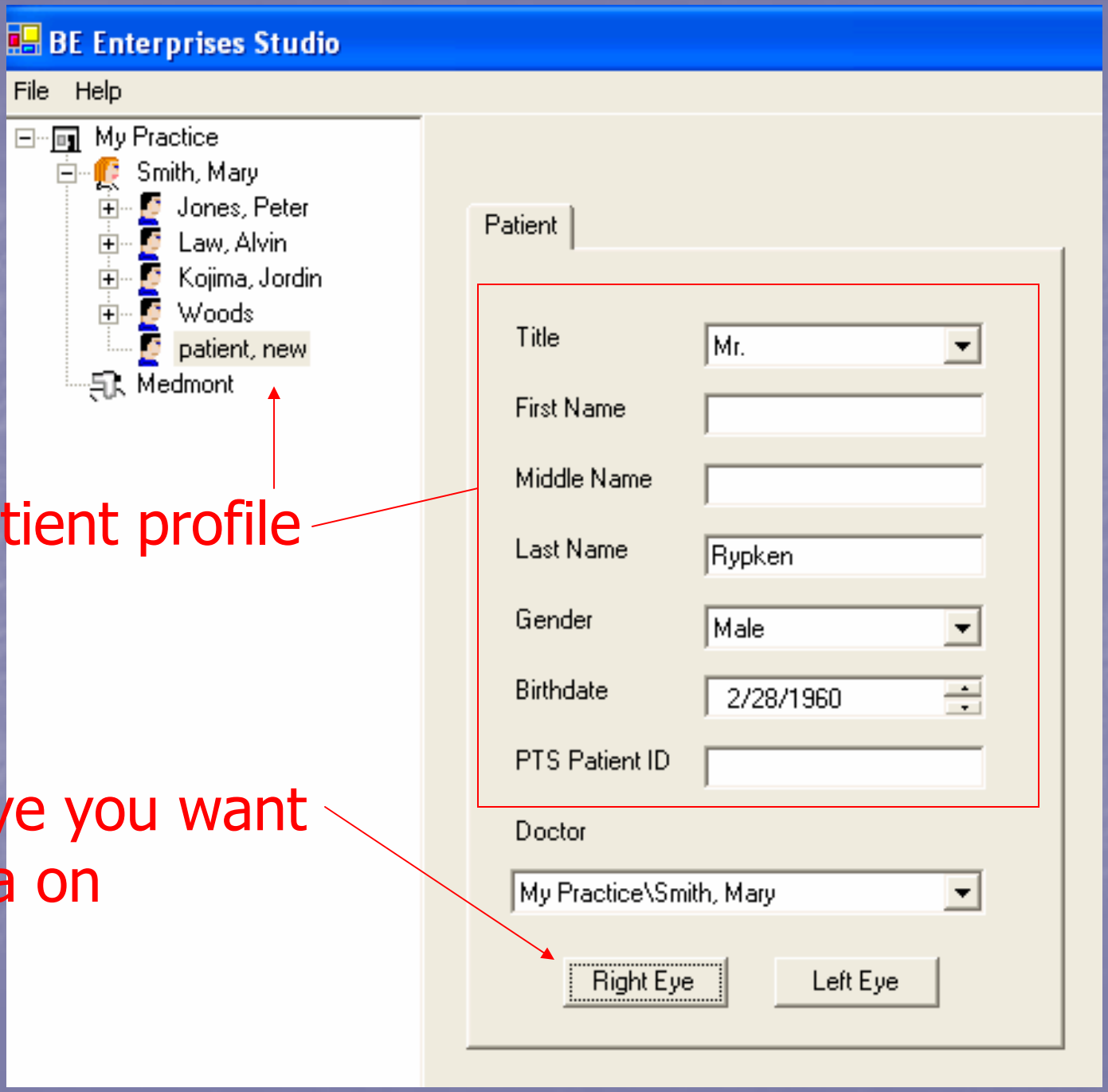
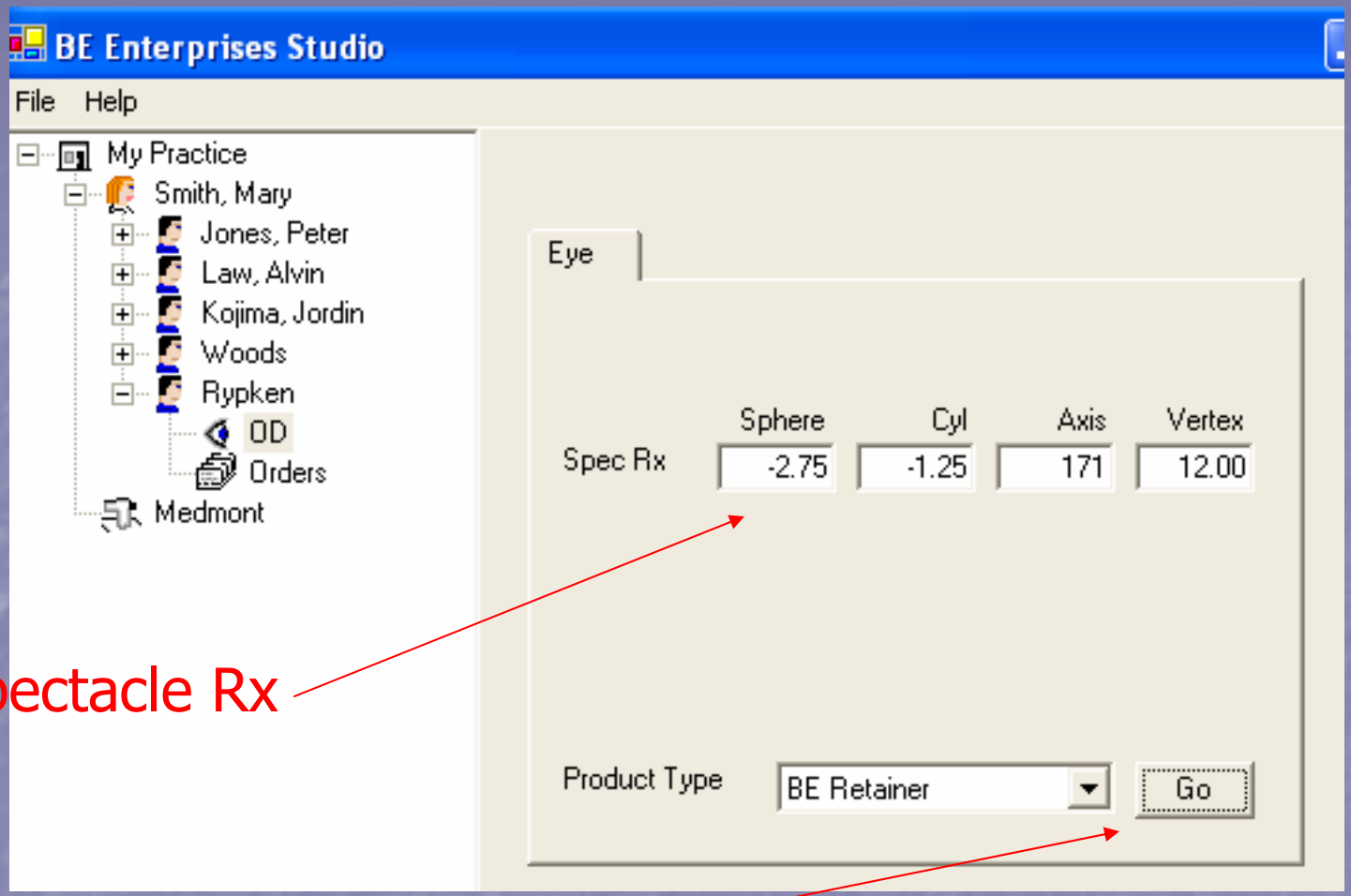
4.5
Norm.


BE Enterprises Studio
File
Help
My Practice
Smith, Mary
Jones, Peter
Law, Alvin
Kojima, Jordin
Woods
Medmont
Practitioner
BE Defaults
Title
Dr.
First Name
Mary
Middle Name
Last Name
Smith
Gender
Female
Phone
222-222-2222
Fax
222-222-2233
Email
info@beretainer.com
Practice
My Practice
New Patient
Open "My Practice"
Select the appropriate practitioner icon
Select "New Patient"



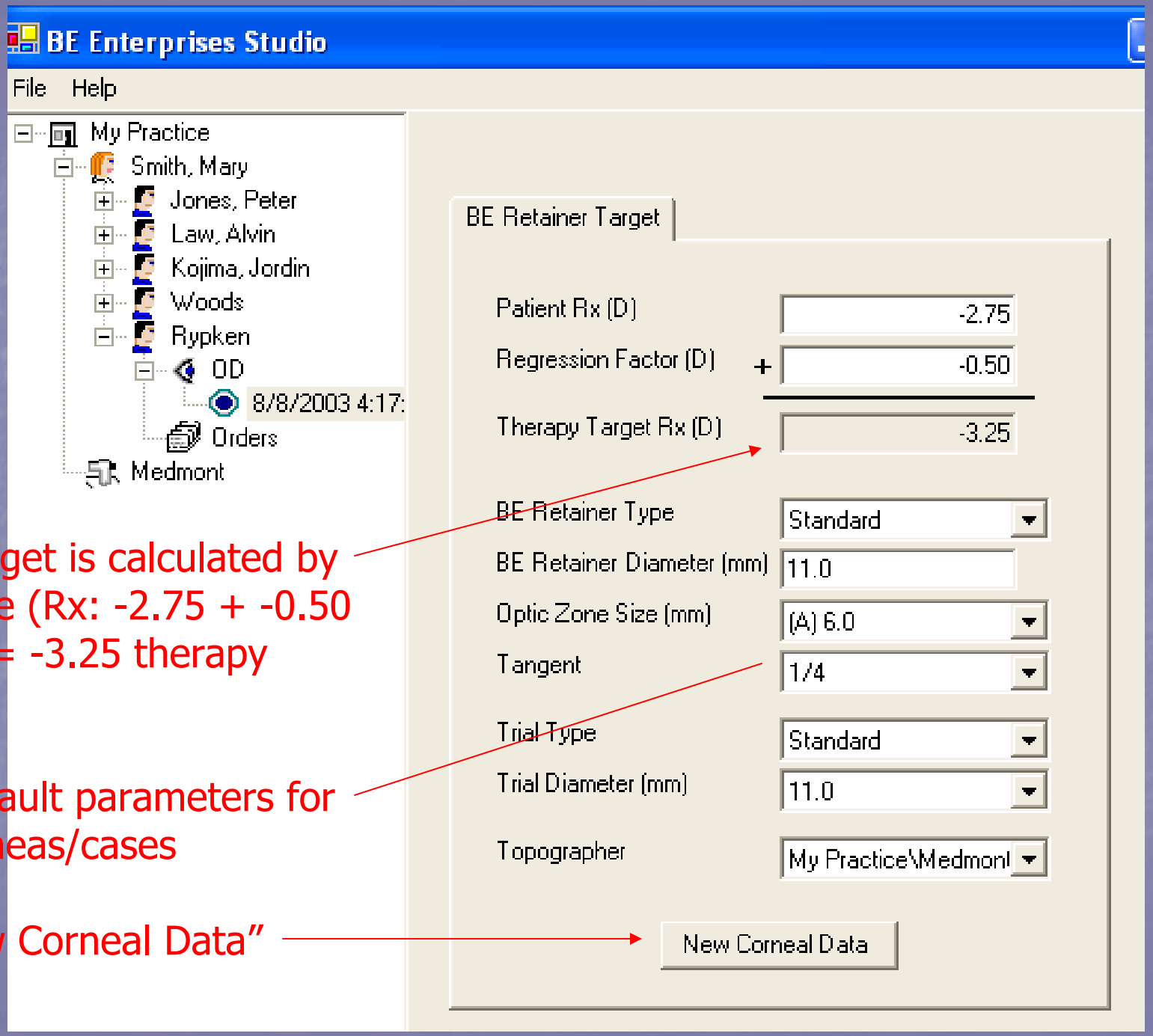

Enter the patient profile information

Select the eye you want to enter data on




Enter the Spectacle Rx

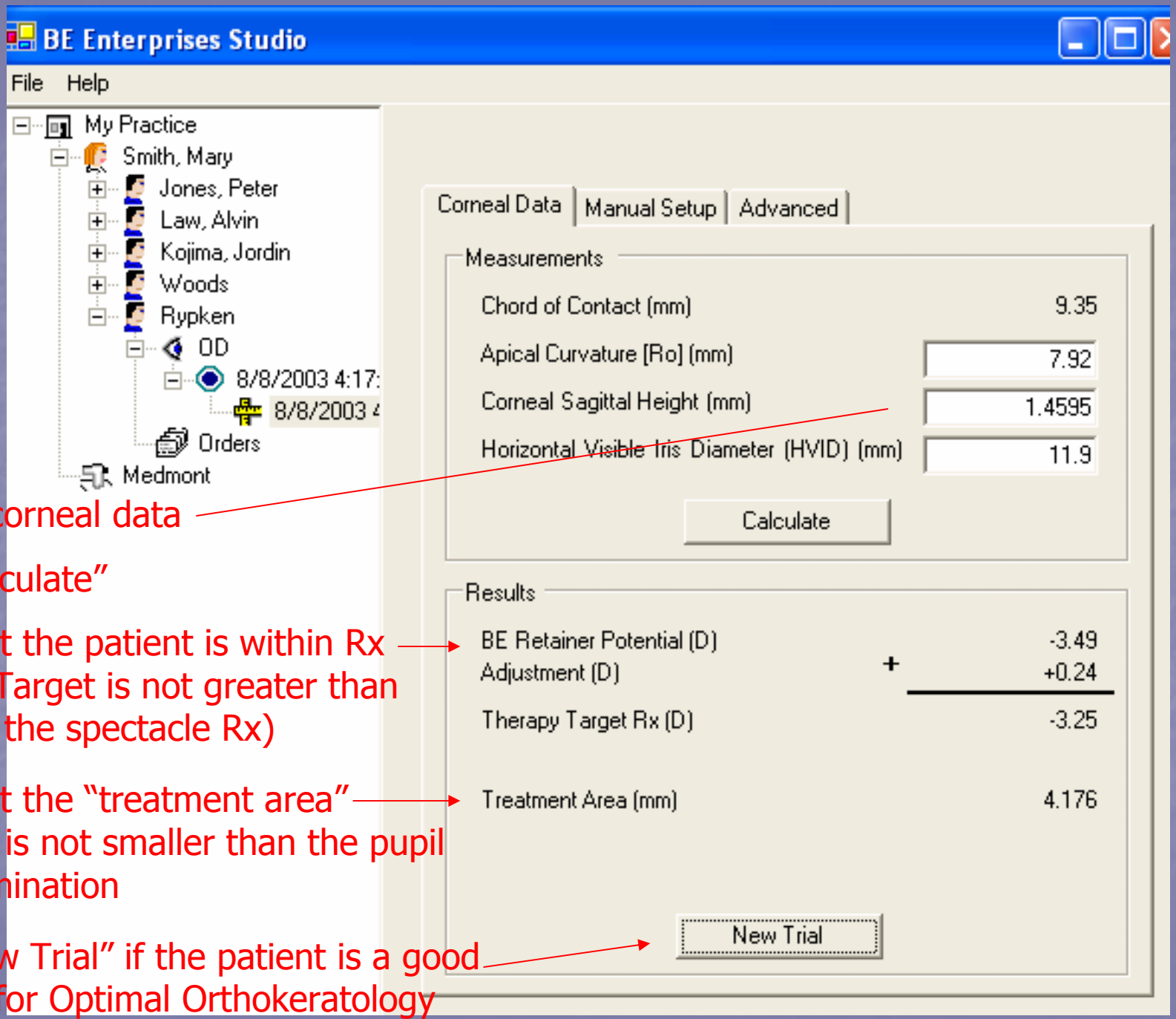
Select "Go"




Therapy target is calculated by the software (Rx: -2.75 + -0.50 regression = -3.25 therapy target Rx)

Use the default parameters for normal corneas/cases

Select "New Corneal Data"



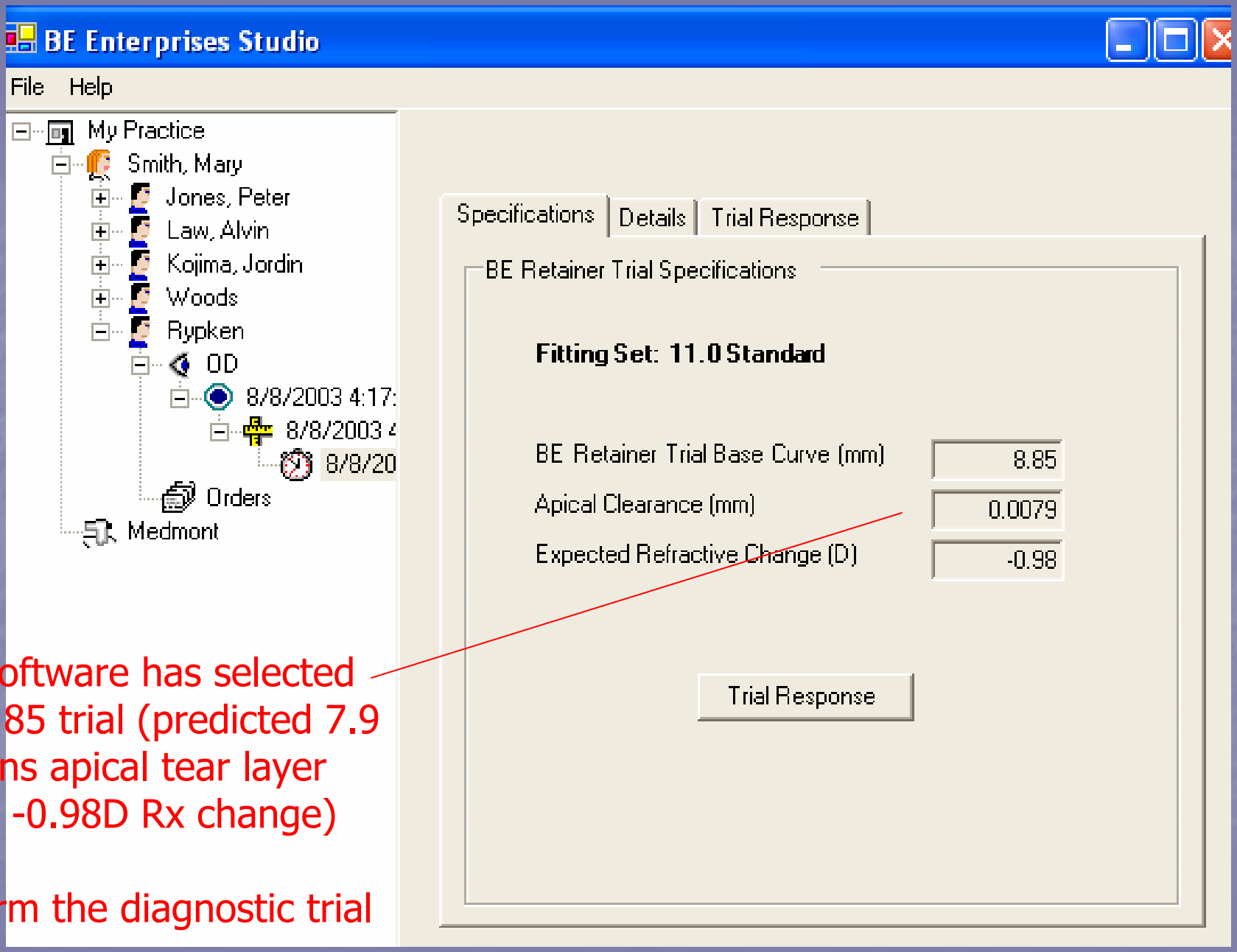

Enter the corneal data

Select "Calculate"

Ensure that the patient is within Rx potential (Target is not greater than -1.00 over the spectacle Rx)

Ensure that the "treatment area" (+1.0mm) is not smaller than the pupil in dim illumination

Select "New Trial" if the patient is a good candidate for Optimal Orthokeratology




The software has selected the 8.85 trial (predicted 7.9 microns apical tear layer and a -0.98D Rx change)

Perform the diagnostic trial

# Trial Evaluation

- Dispense the calculated BE Retainer diagnostic (check letter engravement)
- Instruct the patient on the proper insertion and removal techniques
- Patient inserts the BE Retainer at the end of the day
- Schedule the patient for a return to the office early in the AM

# Post-trial Evaluation

- Slit Lamp Evaluation
  - Check that the trial is not bound (press with finger on the superior and inferior sclera 3x to free)
  - Check for the proper letter engravement on each eye (correct trial in the correct eye)
  - Remove trials
  - Check, record and grade staining if present (instill artificial tears if the staining appears to be bound mucus and re-evaluate)
- Acuity and Subjective Refraction
- Perform Topography (within 20 minutes of trial removal)
  - Capture 1 good quality topography on each eye (large capture area, minimize ring jam)

# Topographical Analysis

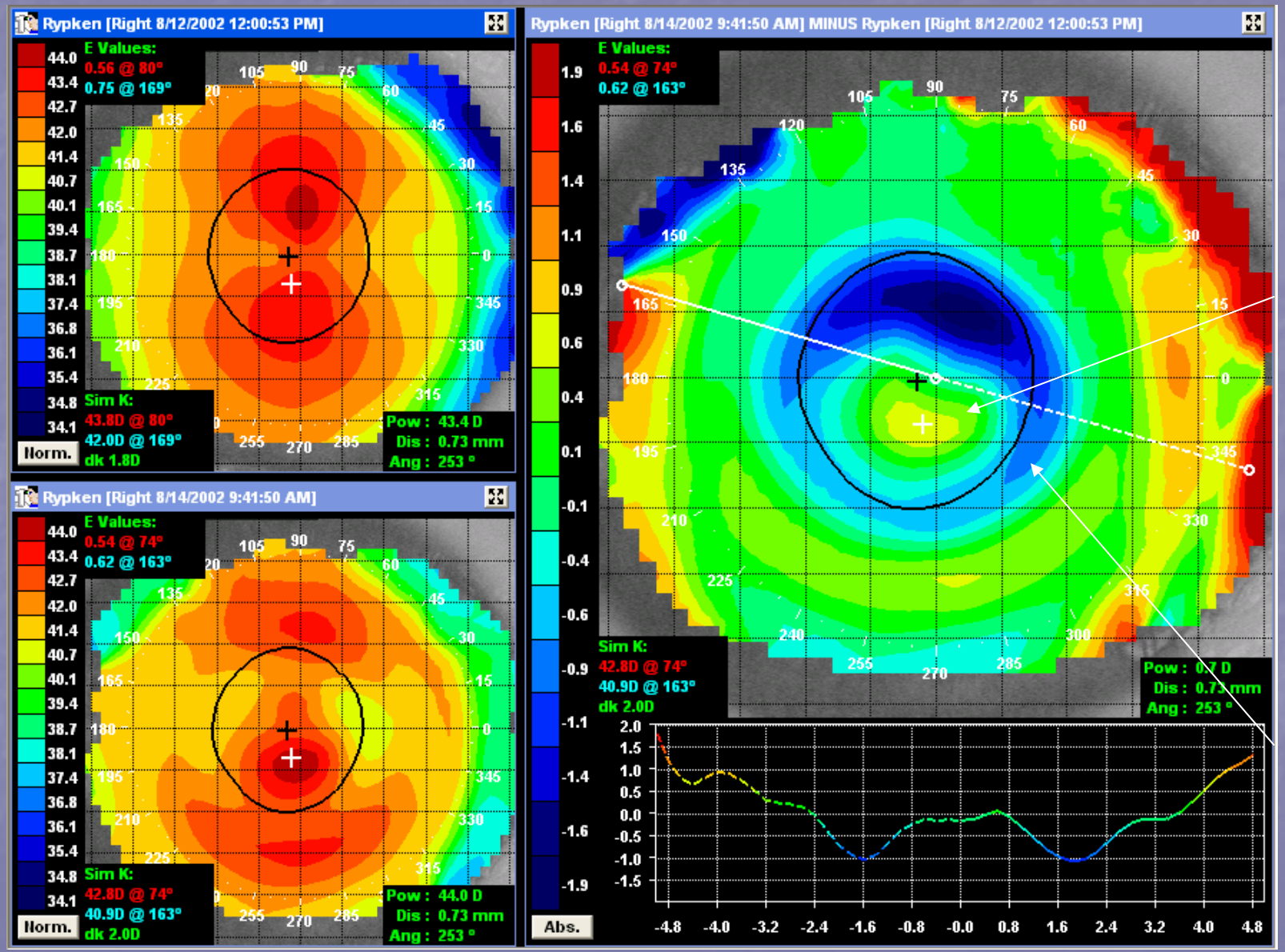
- For each eye:
  - Select the best pretreatment map
    - Large capture area, avoid maps with anomalies due to tear inconsistency or topography error
  - Select the best post-treatment map
    - Large capture area, avoid maps with anomalies due to tear inconsistency or topography error
  - Select the “Subtractive” or “Difference” map function (comparison map option that displays the difference between pre and post corneal shape)
- What was the result?

# Employing Subtractive/Difference Maps

- The Key to evaluating the corneal response following Optimal Orthokeratology wear:

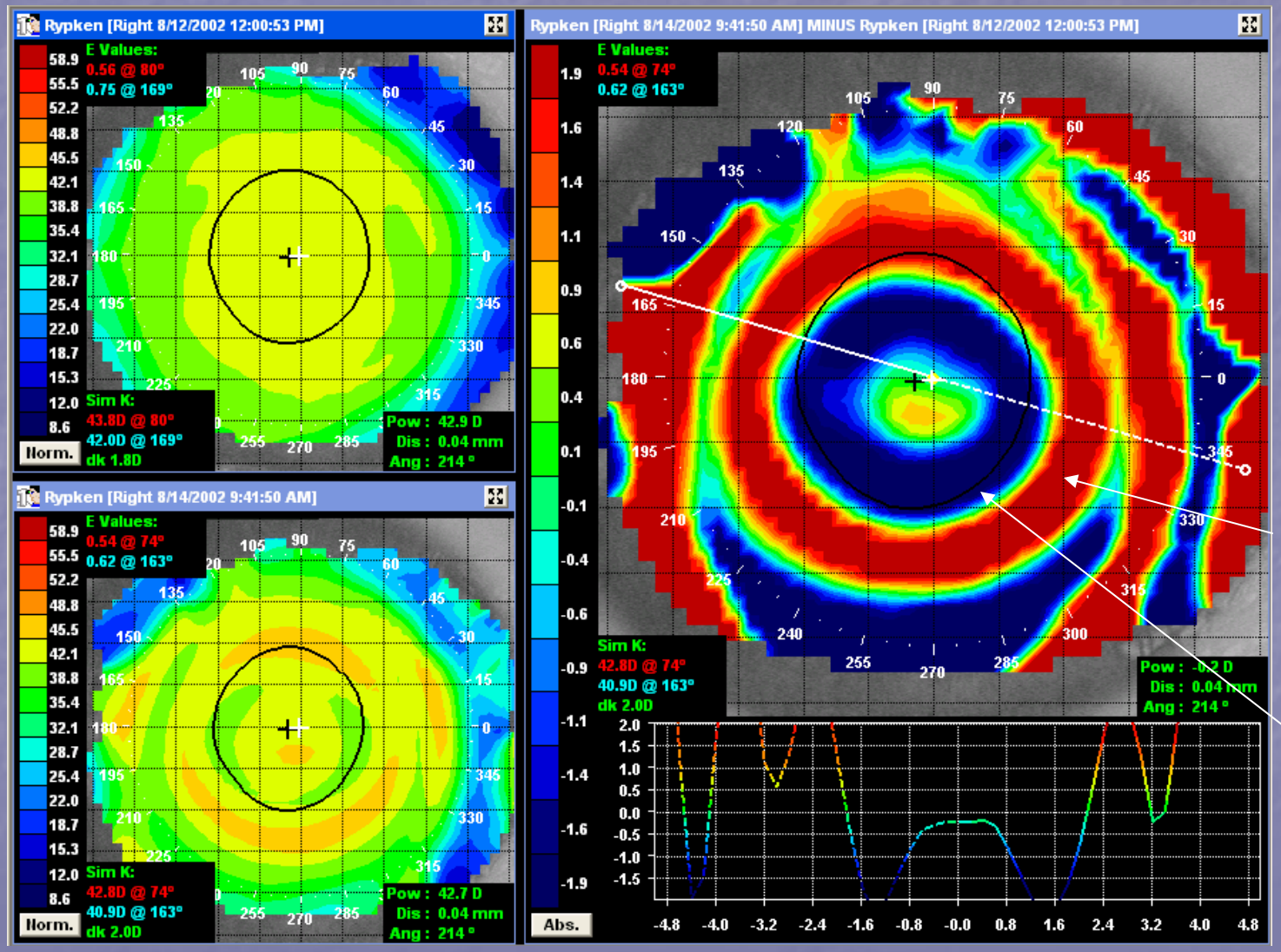
- Axial Power Subtractive: measures the Rx change, defines treatment zone position
- Tangential Power Subtractive: defines the position of the BE Retainer during wear
- Refractive Power Subtractive: Measures the treatment zone size and defines the position of the Rx change following Optimal Orthokeratology

# Axial Power Subtractive



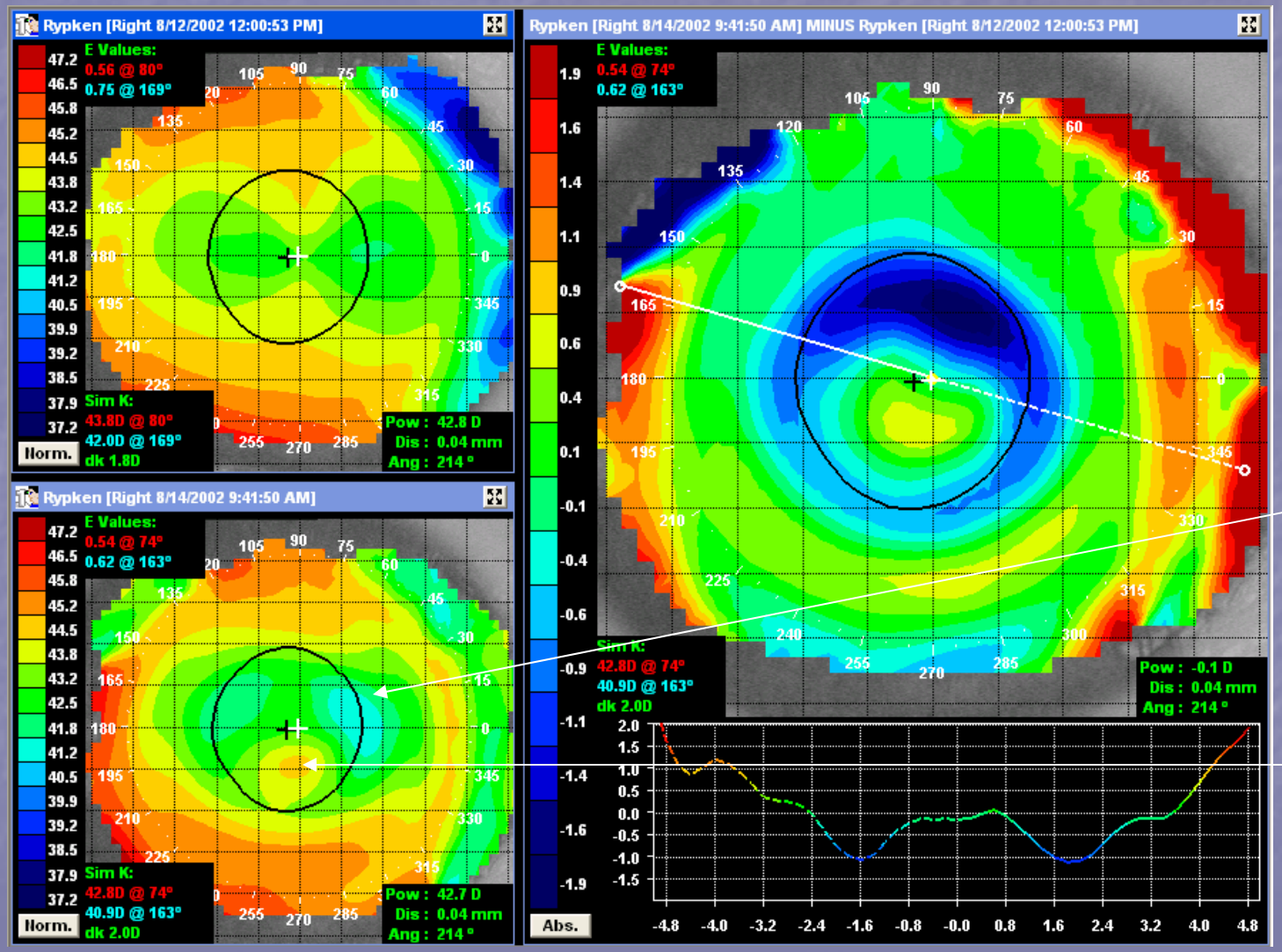

The Axial Power Subtractive indicates a steepening of the apical curvature. Note the yellow "island" of steepening surrounded by a blue compress-ion zone.

# Tangential Power Subtractive




The Tangential Power Subtractive shows the position of the BE Retainer following wear. Note the inferior decentration of the effect. The red ring of epithelium is displaced low in relationship with the pupil. A tight cone angle causes the BE Retainer to position low

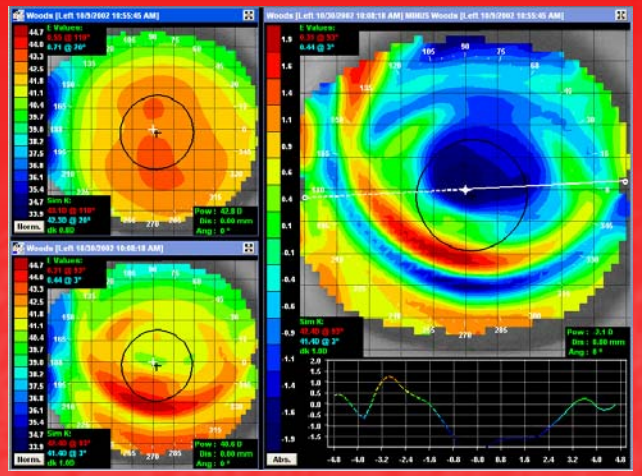
# Refractive Power Subtractive

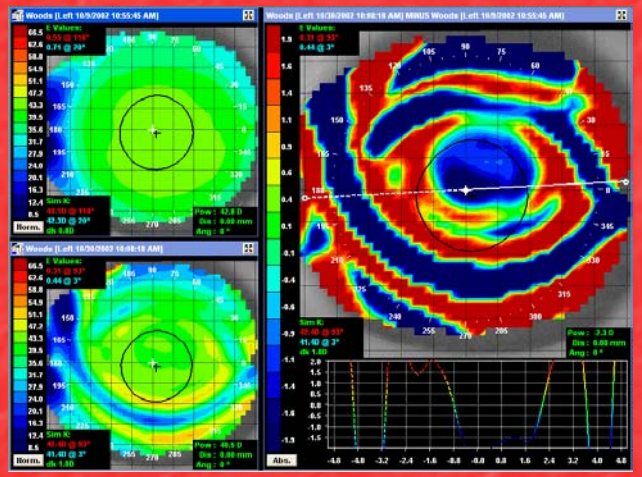


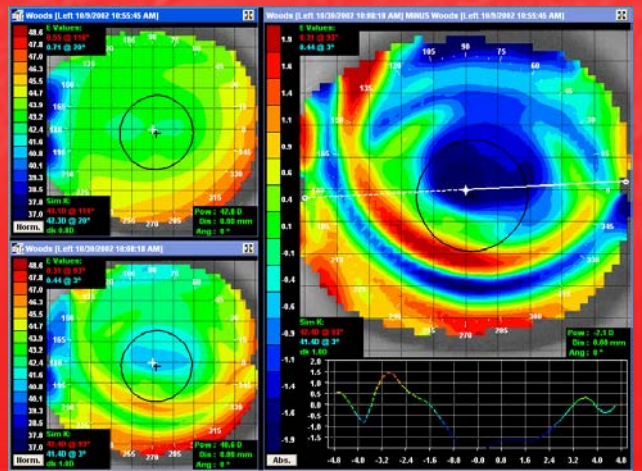

The Refractive Power Subtractive displays the change in corneal refractive power following Optimal Orthokeratology. Note the centered to slightly inferior position of the effect and the "island" of myopic increase.

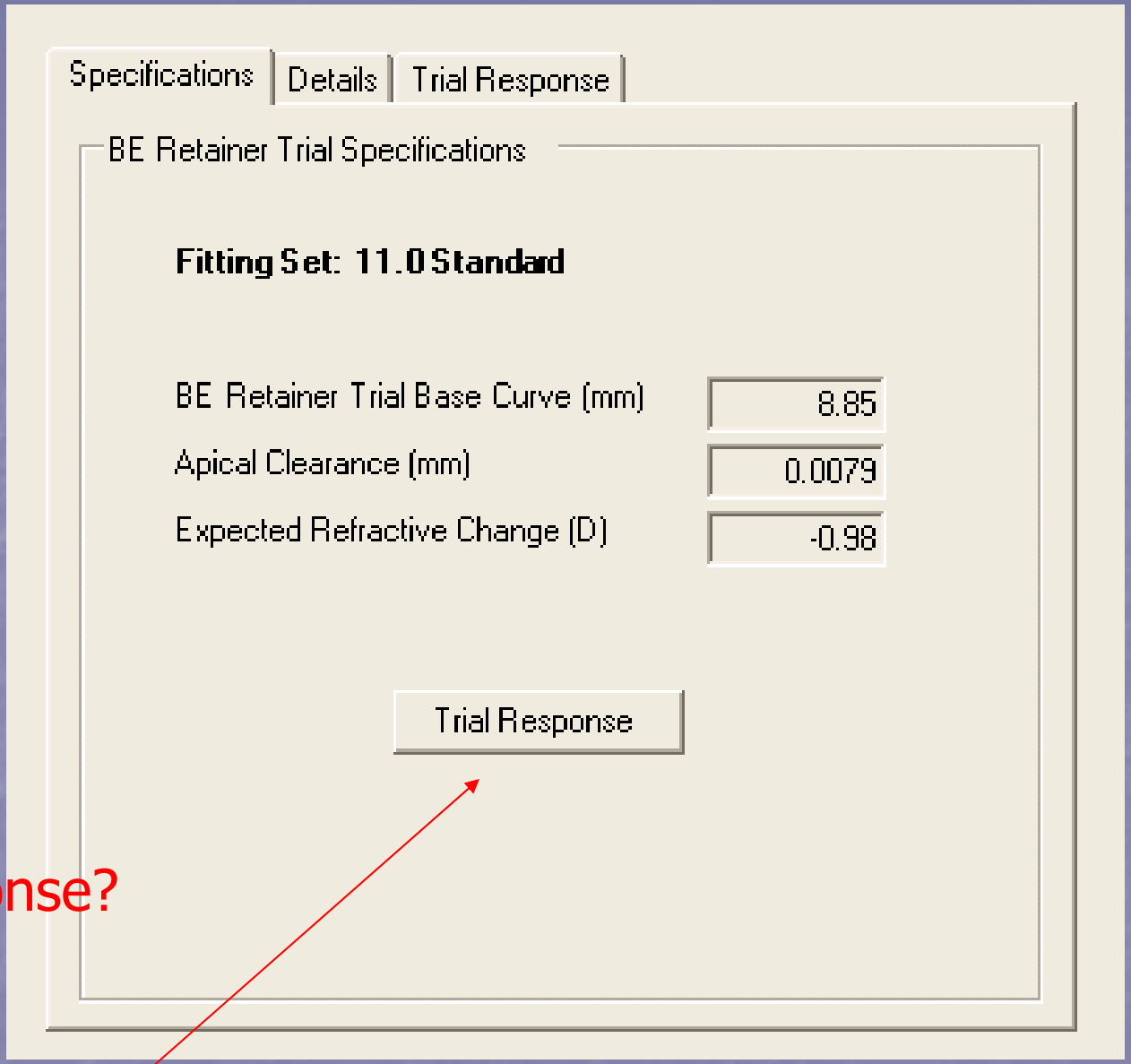
The key to analysis of Optimal Orthokeratology effect/results is the Subtractive/Difference Map

Learn to use these maps and understand them clearly for successful BE Retainer practice



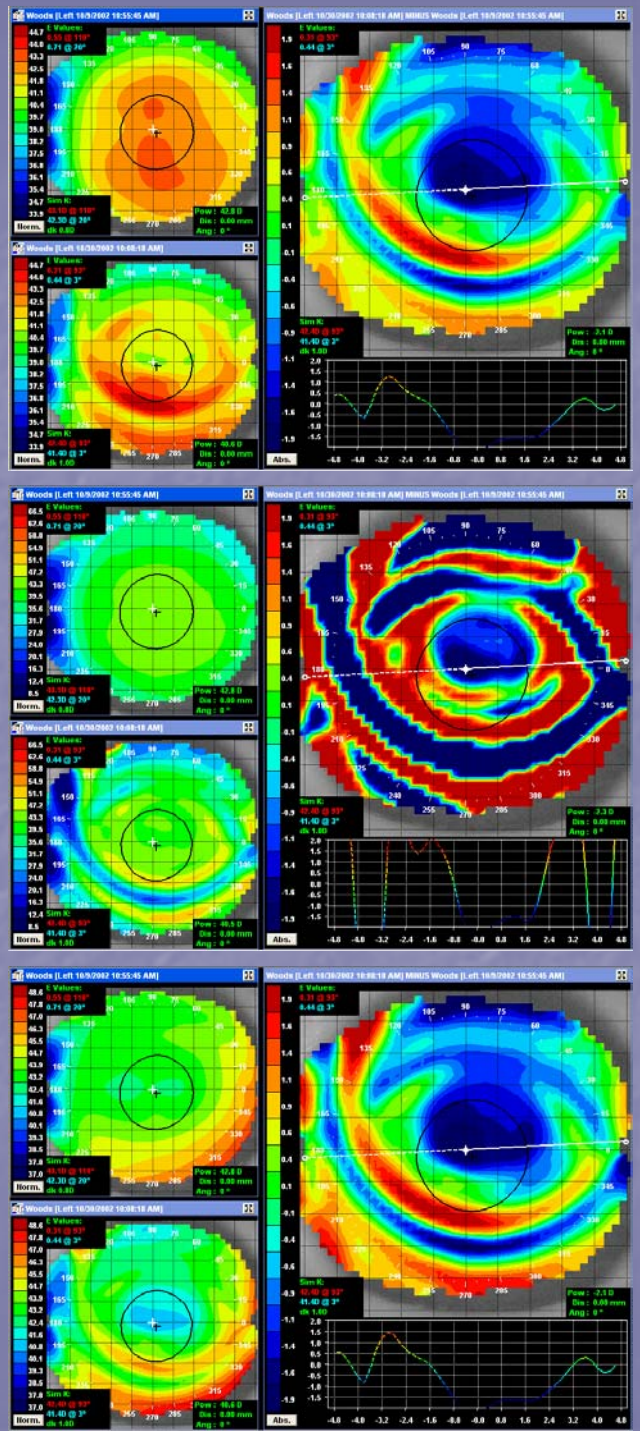




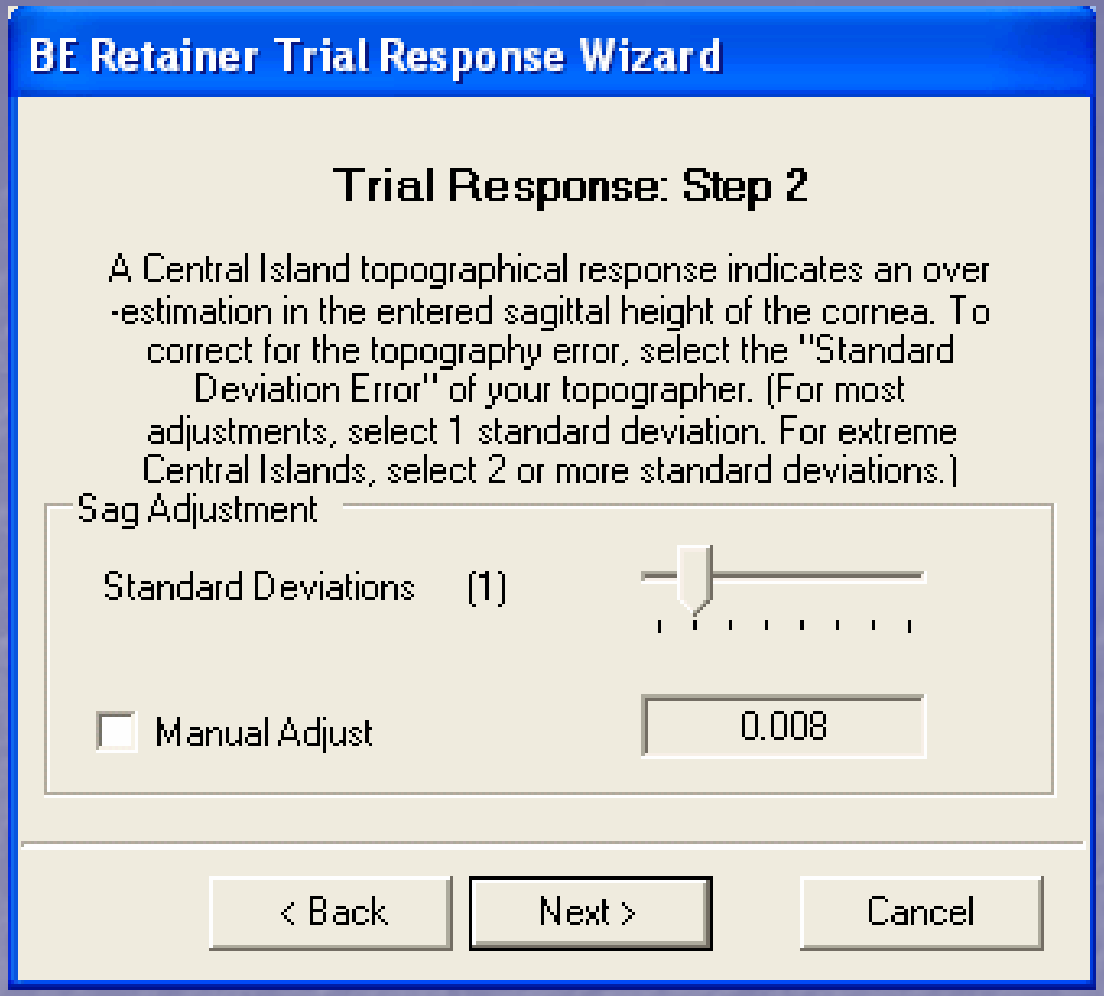



What was the topographical response?

Select "Trial Response"

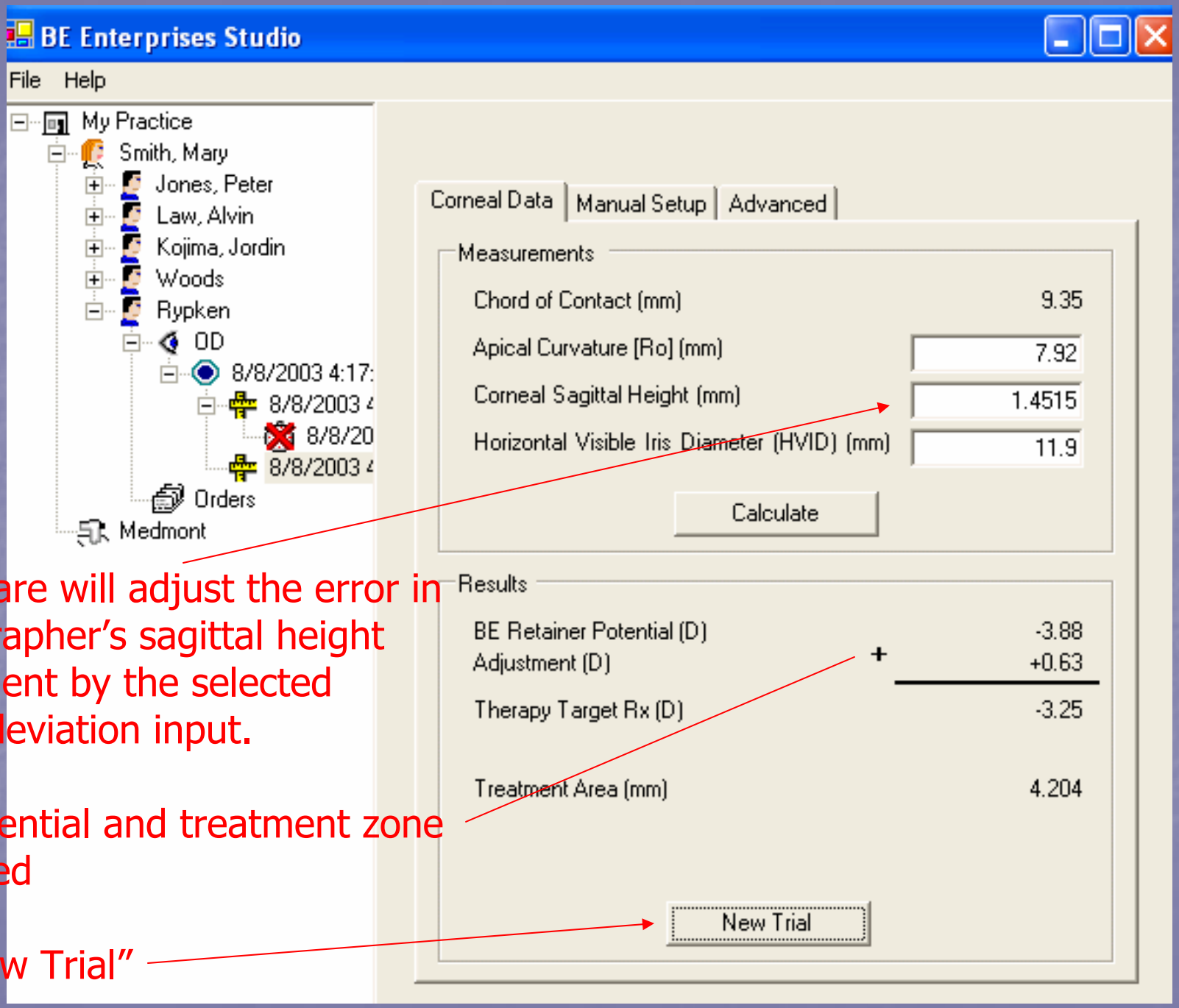


The topography indicated a "Central Island" topographical response




BE Retainer diagnostics are separated by 0.008mm increments (8 microns). In other words, the sagittal height difference between trials is 0.008mm or 8 microns. If it is desired to change the trial by 1 step (8 microns), select ONE standard deviation (if your topographer standard deviation "default" is 8 microns). Then select "Next"

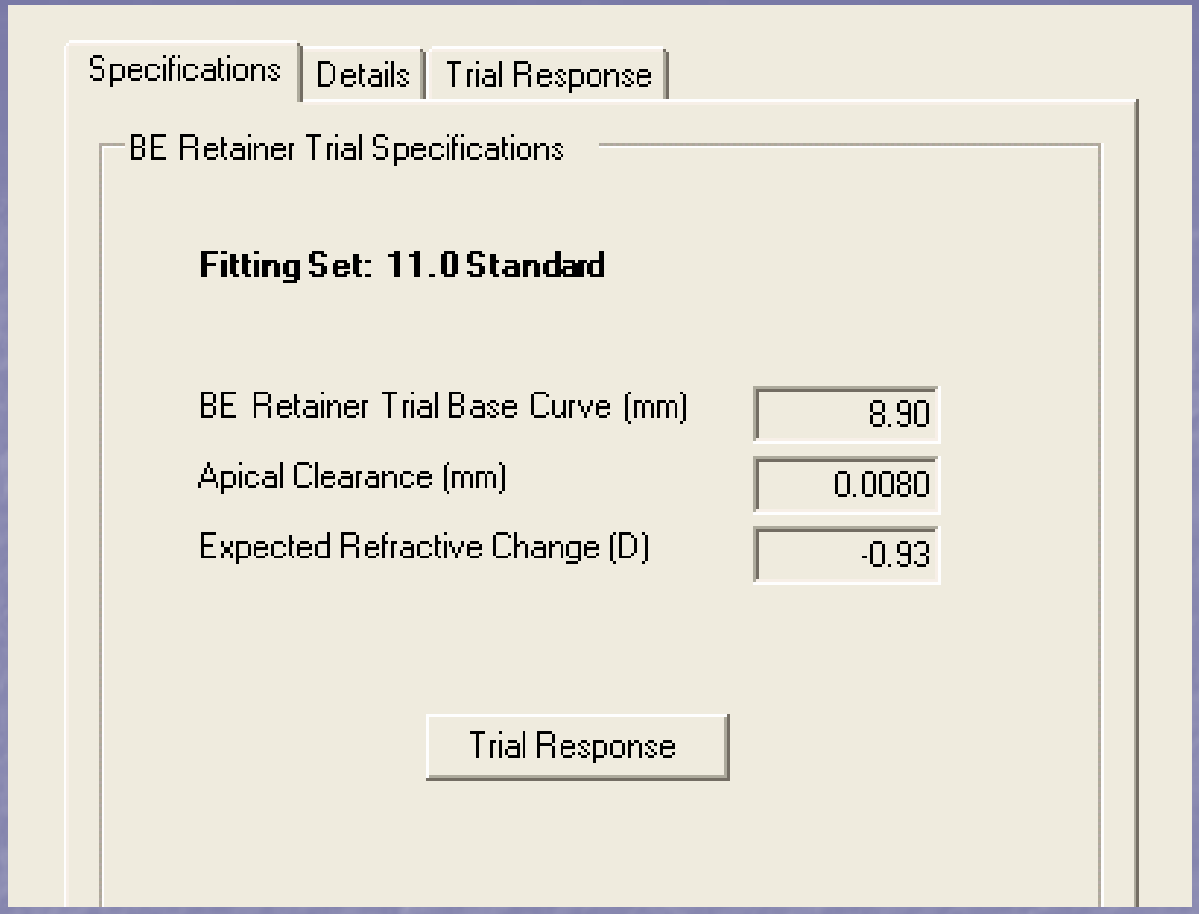
Select “Finish” to recalculate the corneal data




The software will adjust the error in the topographer's sagittal height measurement by the selected standard deviation input.

A new potential and treatment zone is calculated

Select "New Trial"



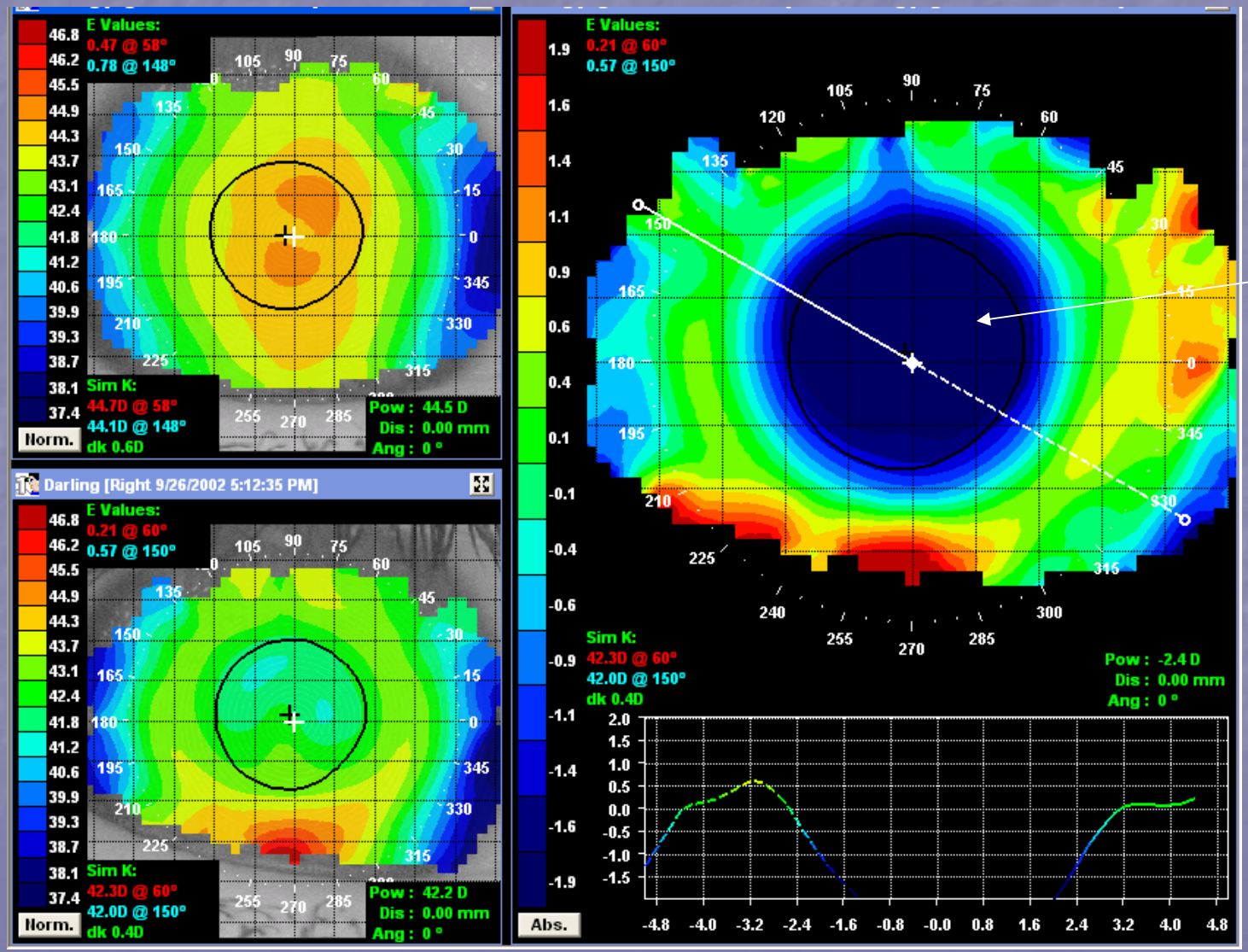

A "Central Island" topographical response has been selected with an 8 micron standard deviation error. The BE Retainer software has selected the next flatter trial (now 8.90, formerly 8.85). In rare instances the entered standard deviation does not result in the desired increment step. In such cases, increase or decrease the SD to result in the desired trial parameter. Retrial to create a "Bulls-eye" topographical response.

Central Island topographical responses are the result of a cone angle too tight and/or a sagittal height too high

Retrial in flatter BE Retainer diagnostics (lower in sag) until a Bulls-eye results

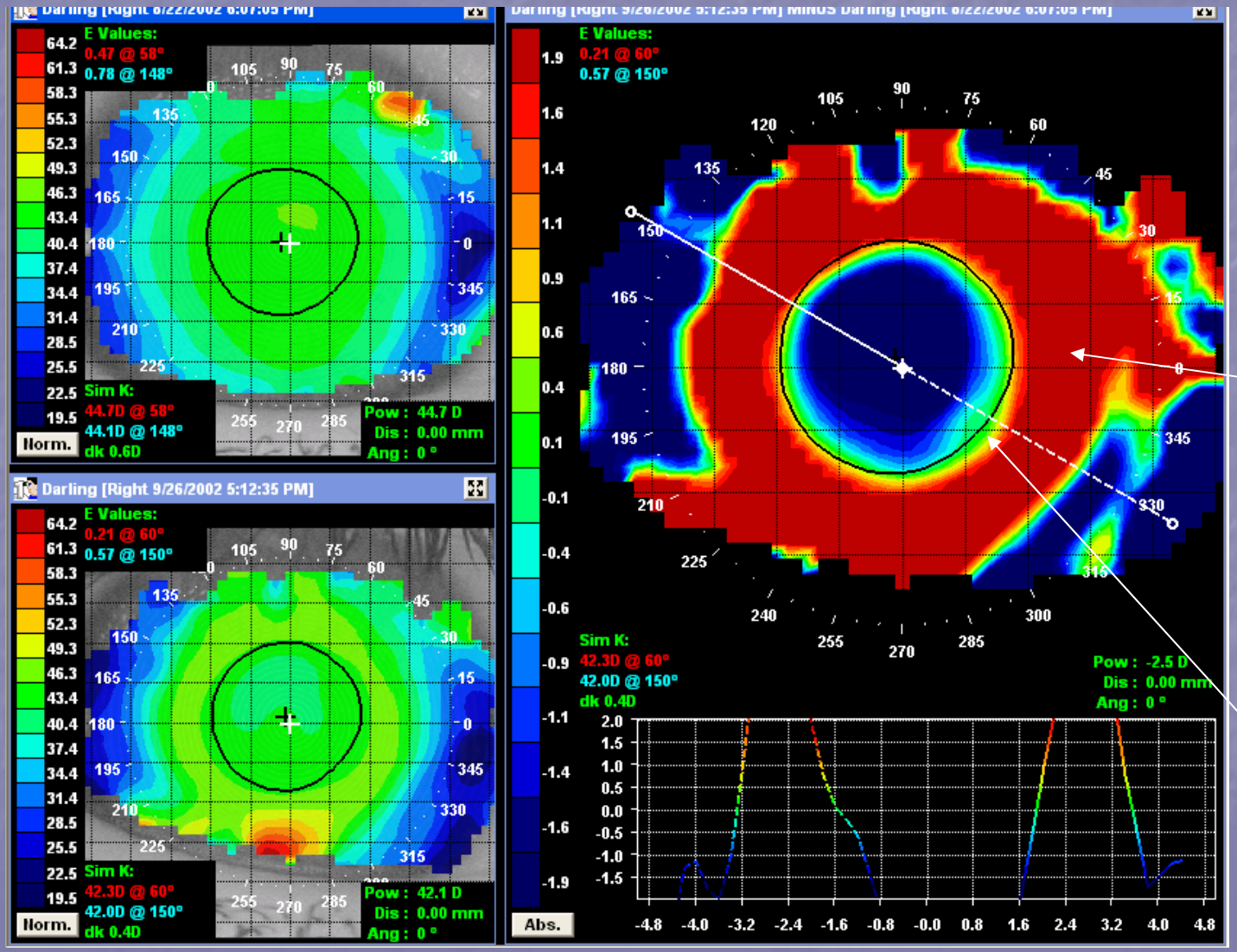
In rare cases, when the topography data is poor or the patient has a difficult cornea to capture on, it can be required to trial numerous steps flatter than baseline

# Axial Power Subtractive



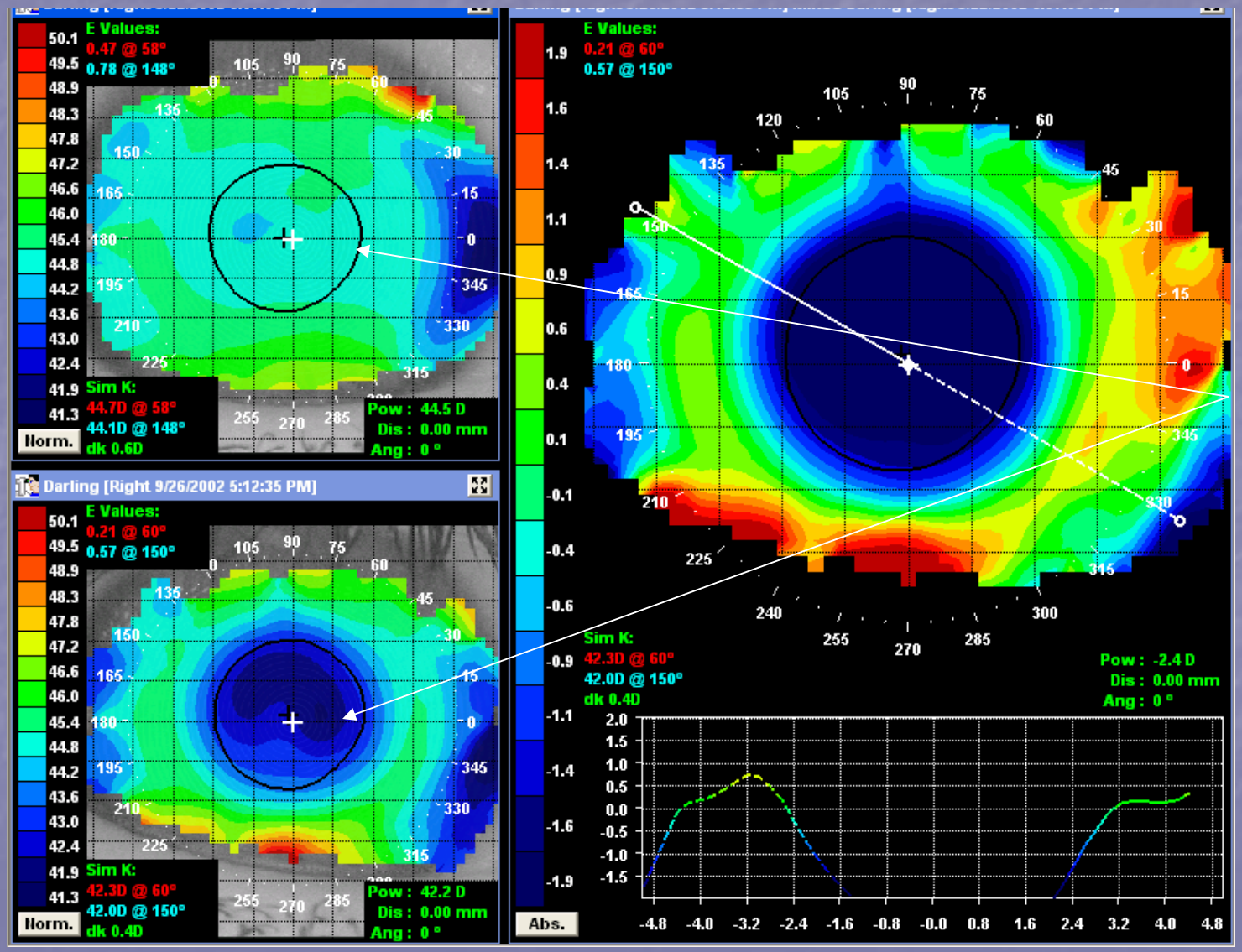

Trial fit to achieve a "Bulls-eye". Note the centered effects of the treatment zone (Blue zone - parallel relationship with the pupil – black ring)

# Tangential Power Subtractive




The tangential shows the position of the BE Retainer following Optimal Orthokeratology. Note the parallel relationship of the red ring of epithelium pulled para-central, centered perfectly to the pupil (black ring). A perfect "Bulls-eye" response!

# Refractive Power Subtractive




In a Bulls-eye response, the Refractive Power Map will show centered Rx effects following Optimal Orthokeratology. Compare the pre and post fit corneal refractive power to determine the position of the therapy effects. Note the perfectly centered refractive effects following Optimal Orthokeratology

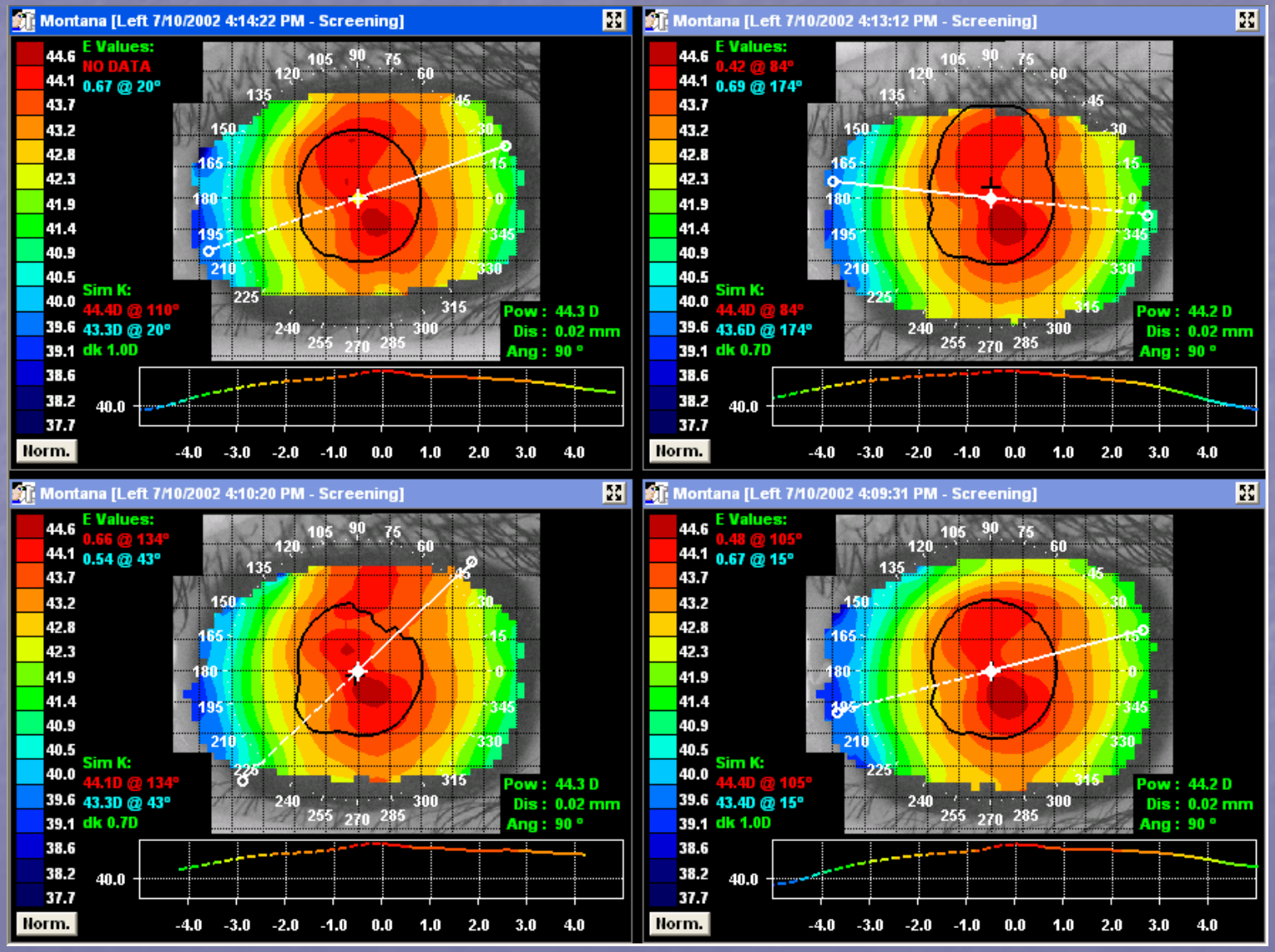
Trial Fit until a Bulls-eye topographical response results

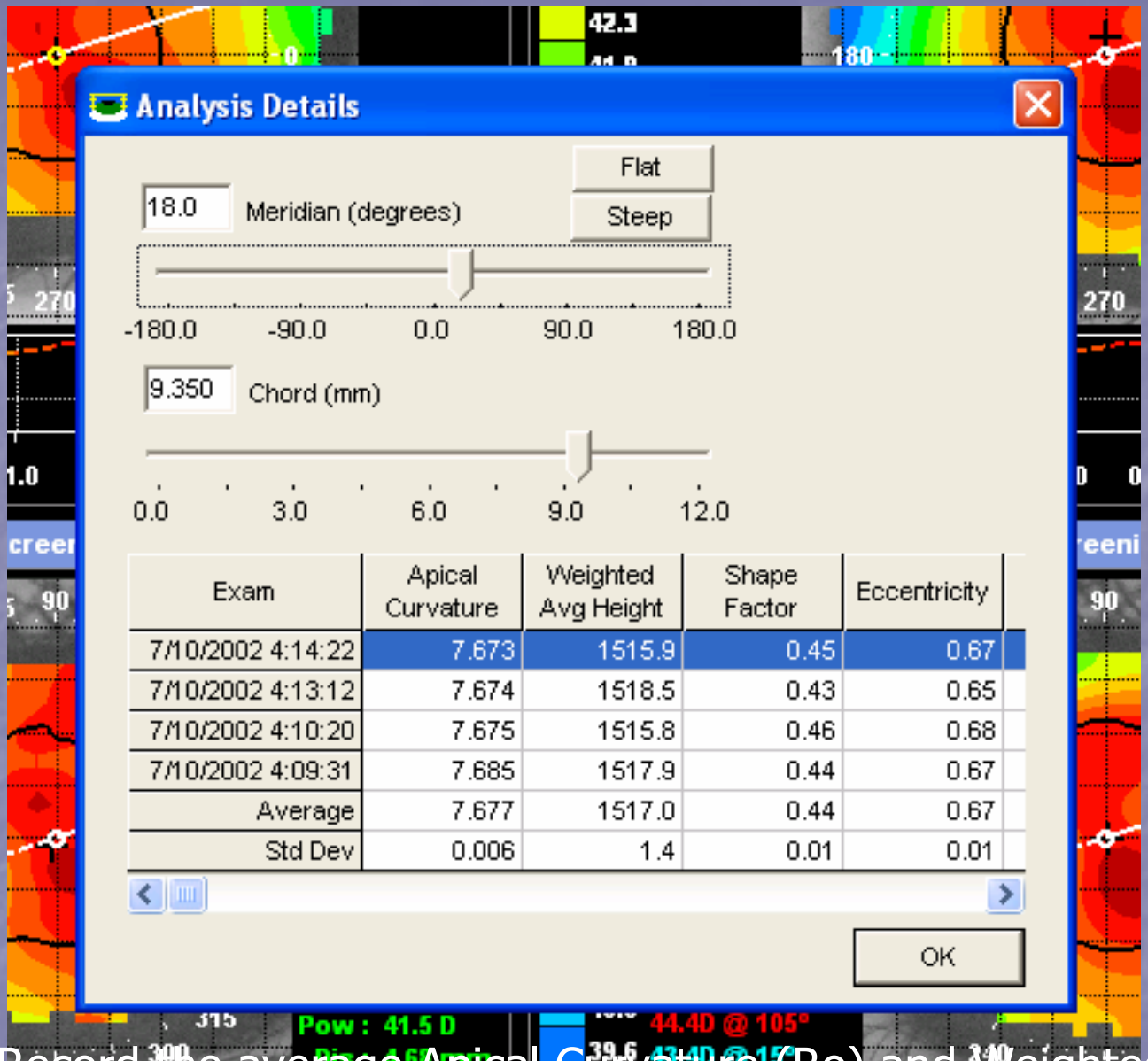
Successful custom orders result from Bulls-eye trials

# Case 3

Patient: Montana

# 4 Independent Captures OU






| Exam | Apical Curvature | Weighted Avg Height | Shape Factor | Eccentricity |
|---|---|---|---|---|
| 7/10/2002 4:14:22 | 7.673 | 1515.9 | 0.45 | 0.67 |
| 7/10/2002 4:13:12 | 7.674 | 1518.5 | 0.43 | 0.65 |
| 7/10/2002 4:10:20 | 7.675 | 1515.8 | 0.46 | 0.68 |
| 7/10/2002 4:09:31 | 7.685 | 1517.9 | 0.44 | 0.67 |
| Average | 7.677 | 1517.0 | 0.44 | 0.67 |
| Std Dev | 0.006 | 1.4 | 0.01 | 0.01 |

# Record:

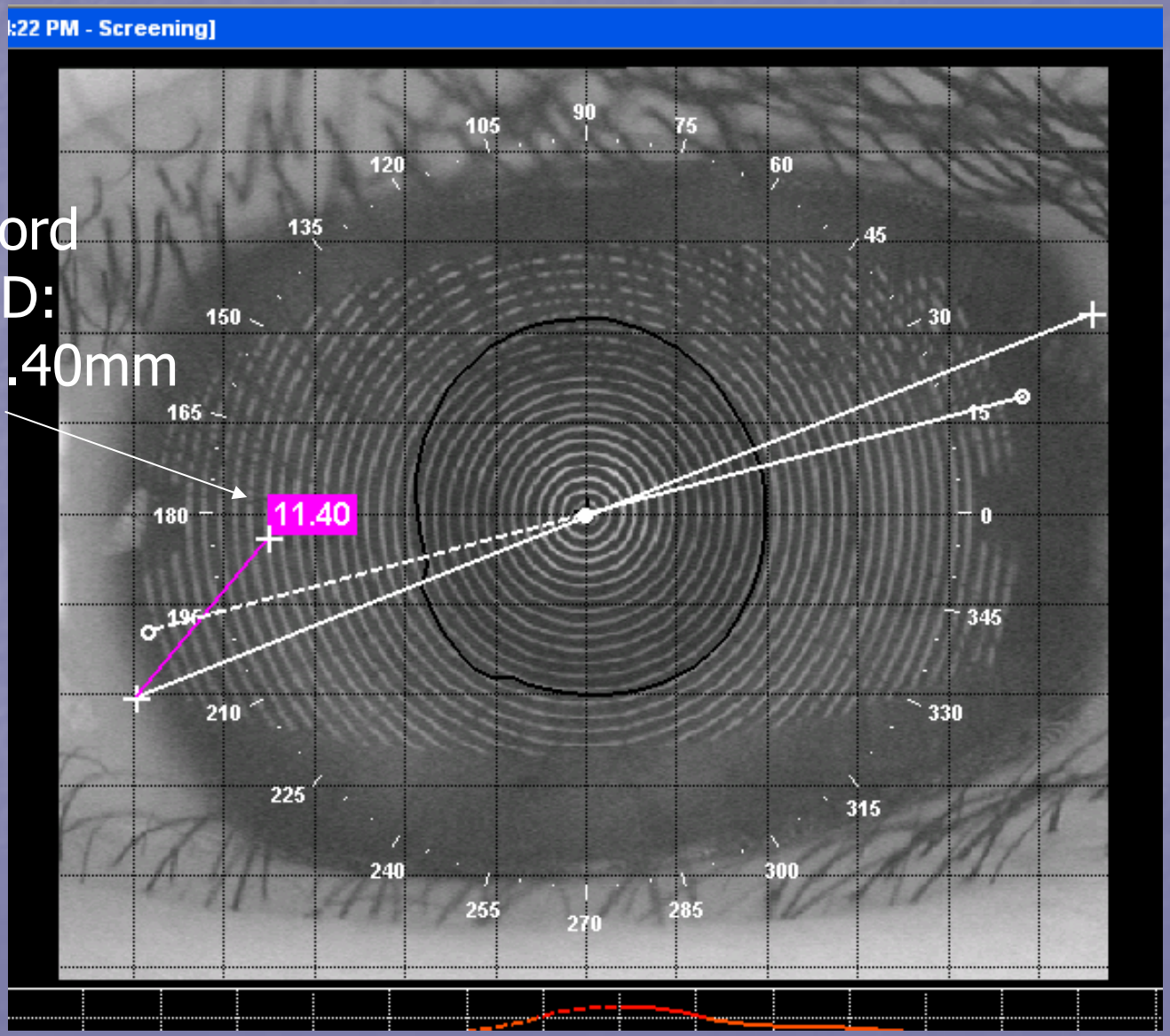
Apical Curvature (Ro)
7.677

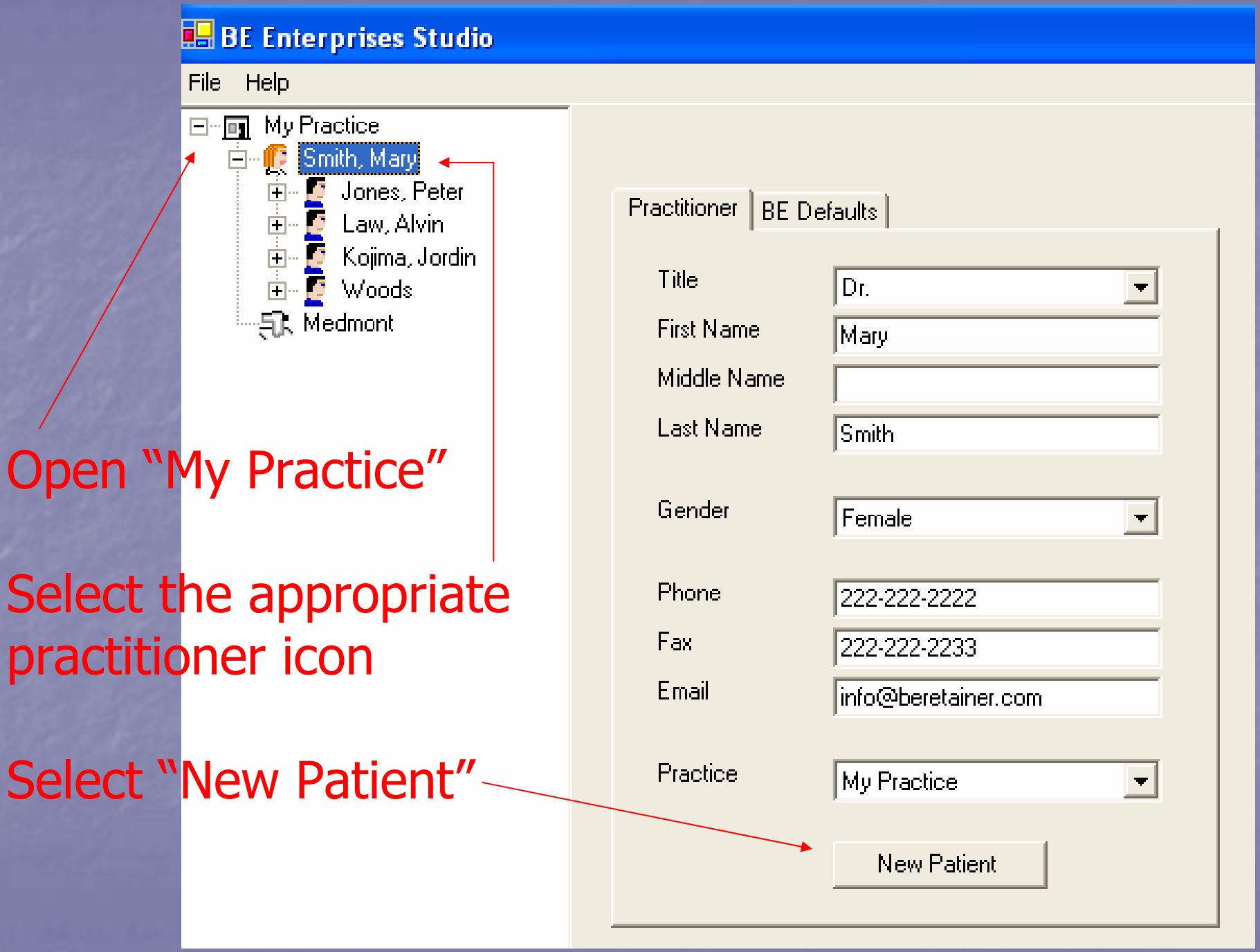
Weighted Average Height (Sag)
1517.0
convert to mm:
1.5170

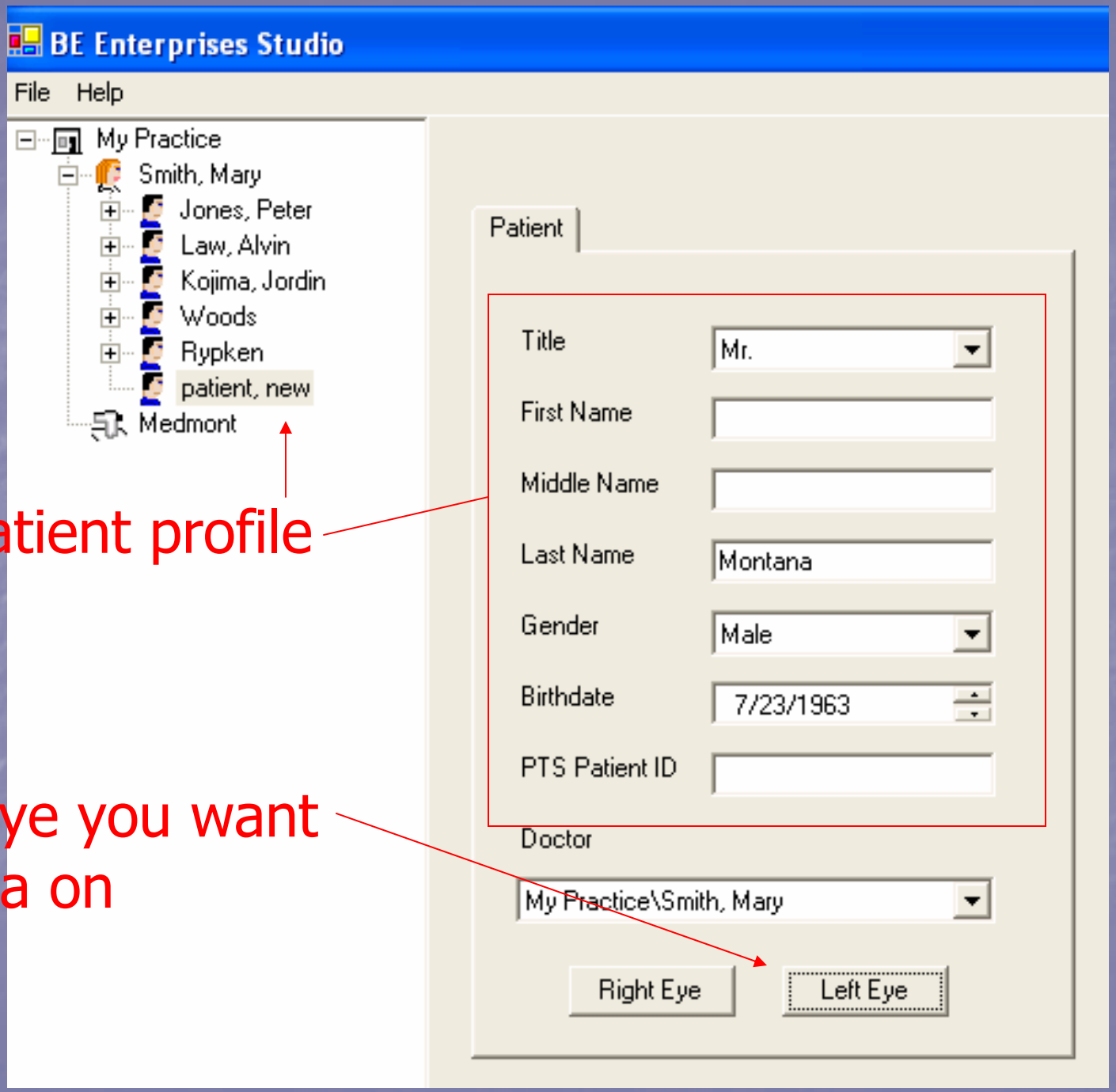
Record the average Apical Curvature (Ro) and Weighted Average Height (Sag) OR Eccentricity. Be sure the standard deviation error is low. Otherwise throw out maps that are obviously in error and retake any additional maps required.

# Measure Iris Diameter (HVID)

Record HVID:
11.40mm

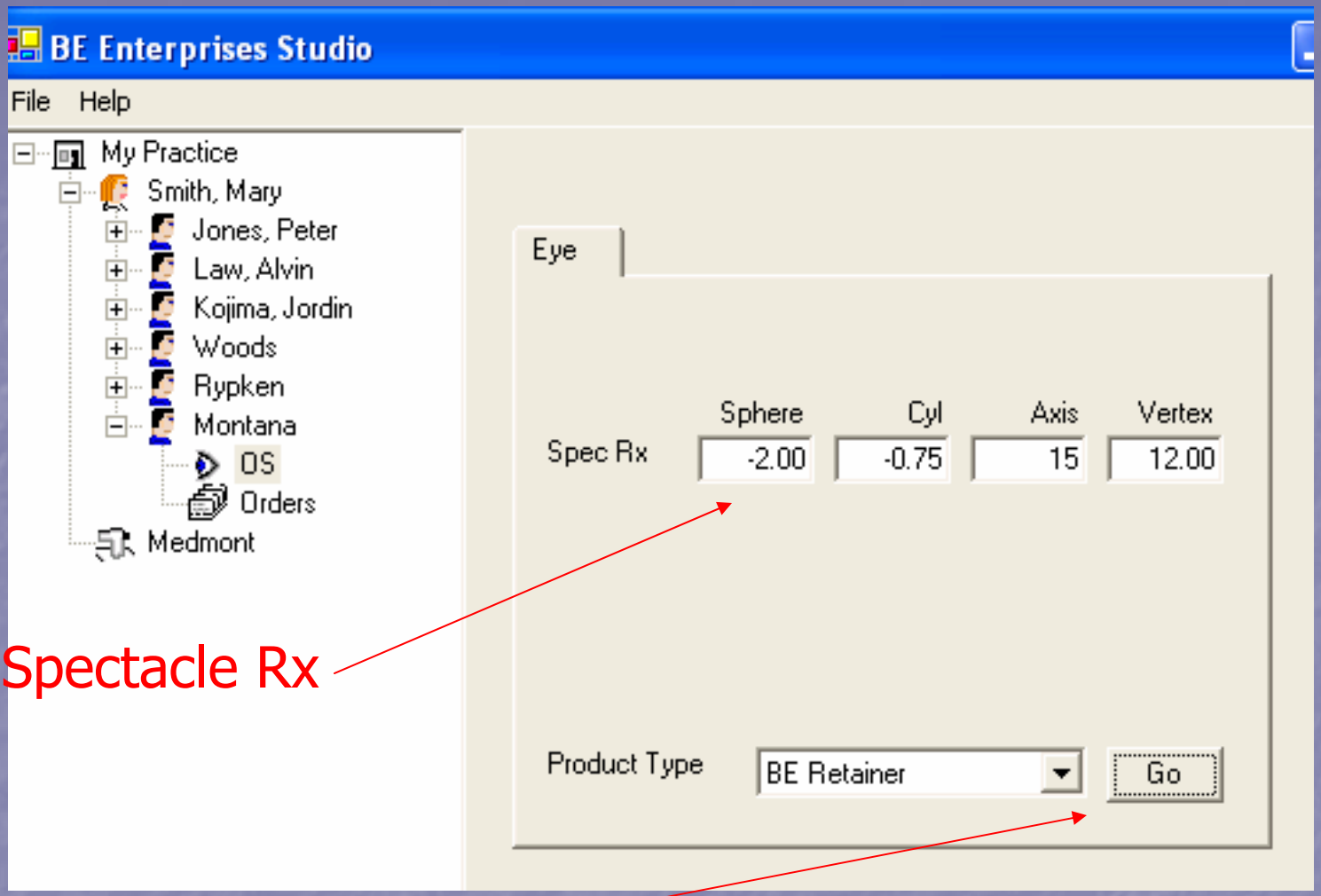



BE Enterprises Studio
File
Help
My Practice
Smith, Mary
Jones, Peter
Law, Alvin
Kojima, Jordin
Woods
Medmont
Practitioner
BE Defaults
Title
Dr.
First Name
Mary
Middle Name
Last Name
Smith
Gender
Female
Phone
222-222-2222
Fax
222-222-2233
Email
info@beretainer.com
Practice
My Practice
New Patient
Open "My Practice"
Select the appropriate practitioner icon
Select "New Patient"



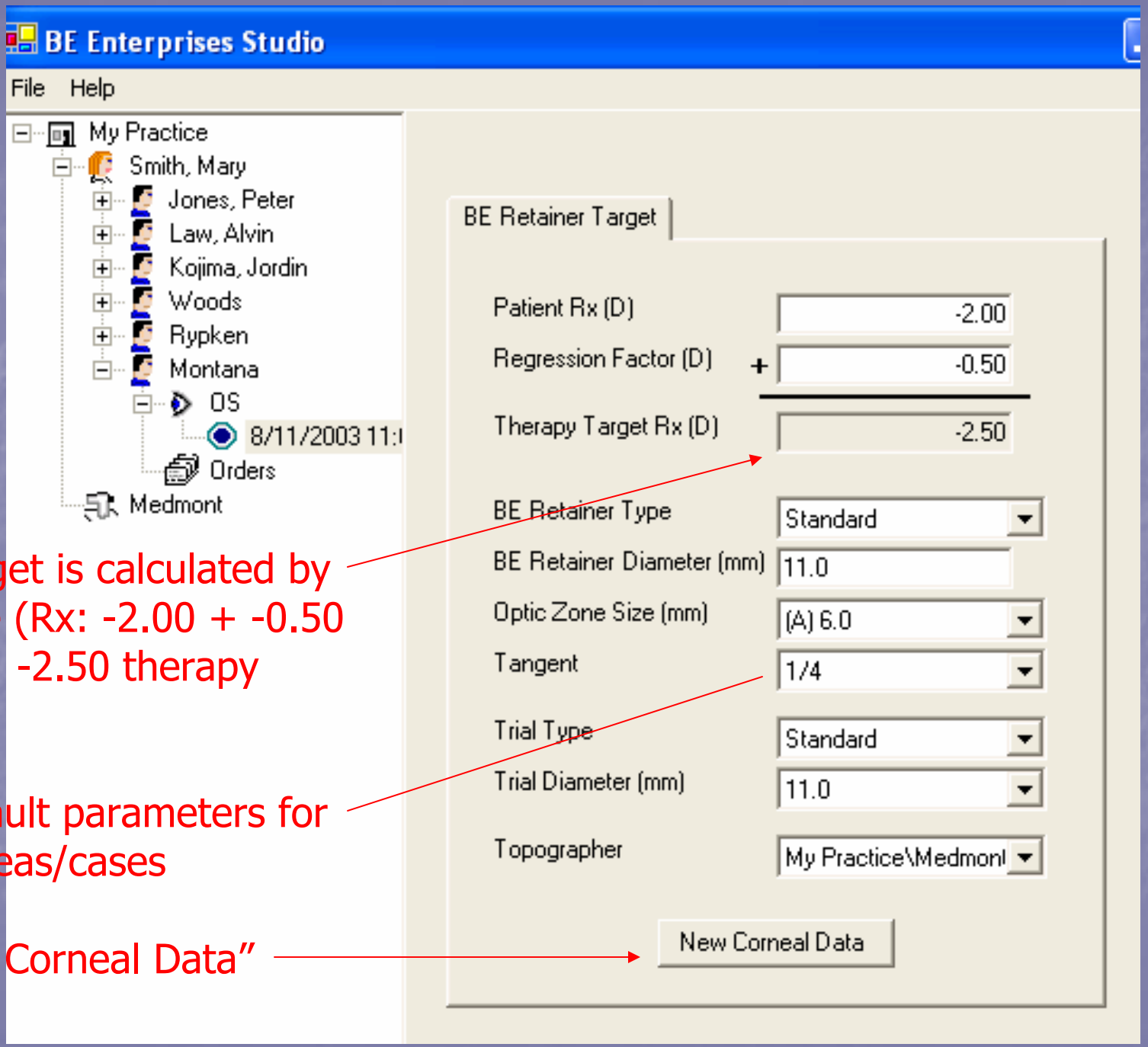

Enter the patient profile information

Select the eye you want to enter data on




Enter the Spectacle Rx

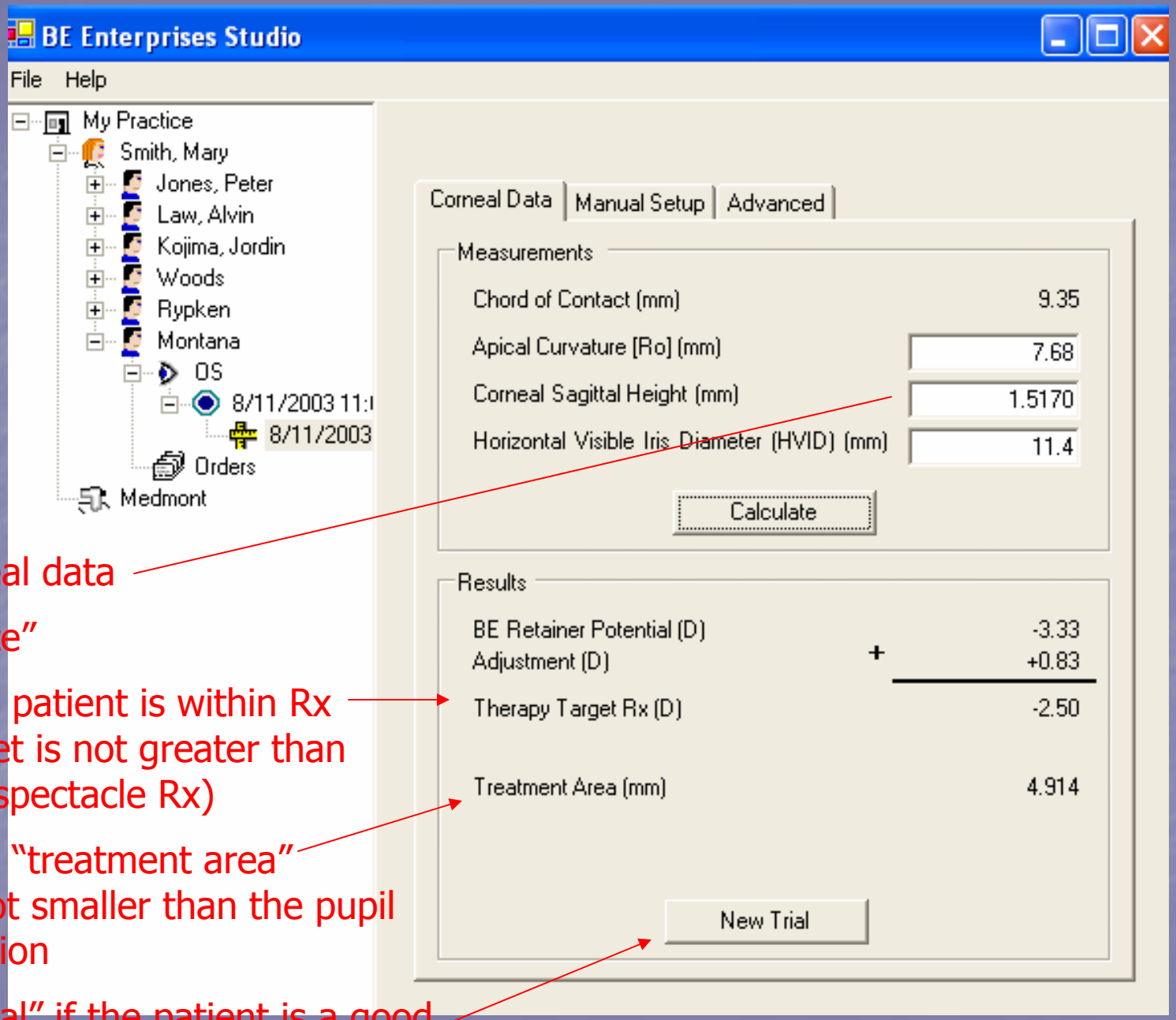
Select "Go"




Therapy target is calculated by the software (Rx: -2.00 + -0.50 regression = -2.50 therapy target Rx)

Use the default parameters for normal corneas/cases

Select "New Corneal Data"



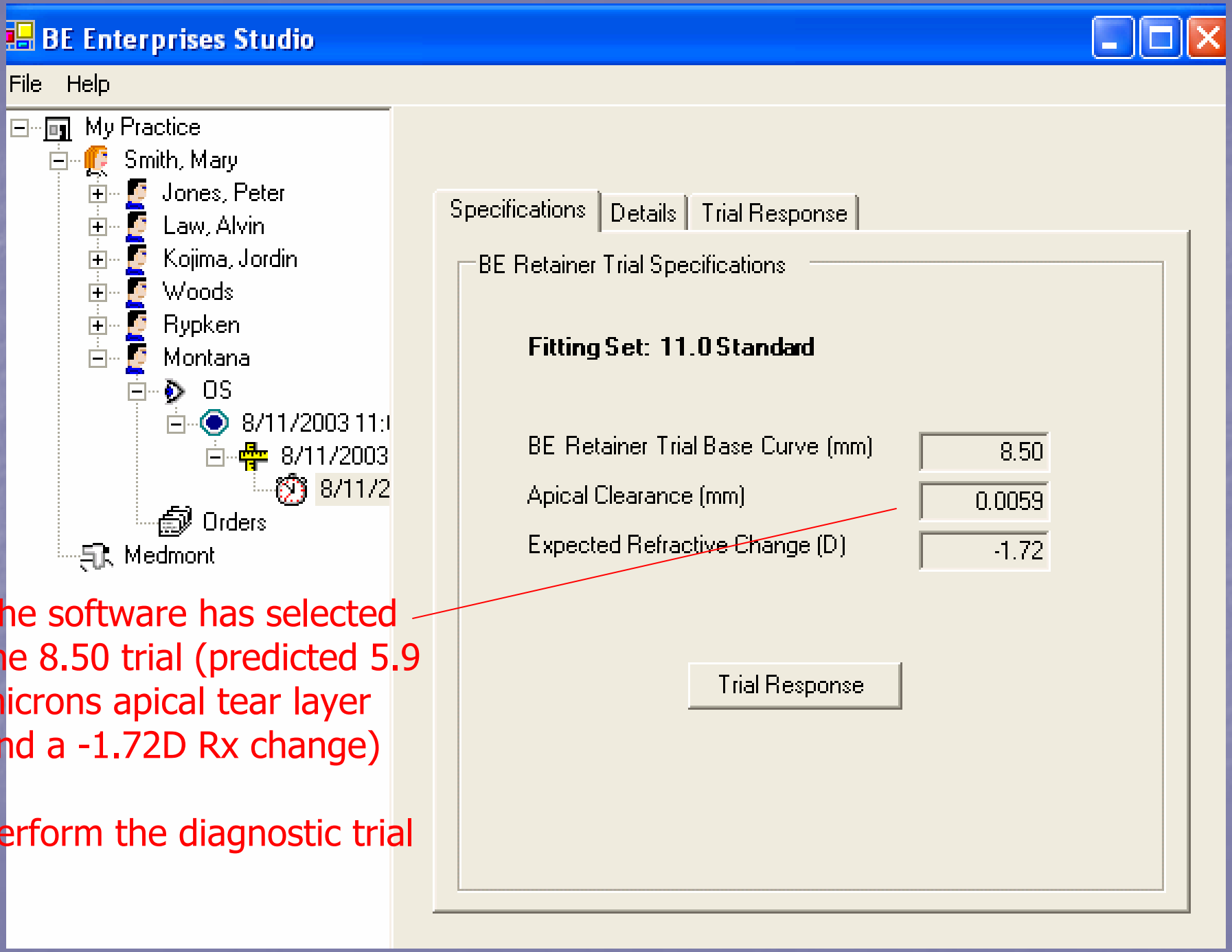

Enter the corneal data

Select "Calculate"

Ensure that the patient is within Rx potential (Target is not greater than -1.00 over the spectacle Rx)

Ensure that the "treatment area" (+1.0mm) is not smaller than the pupil in dim illumination

Select "New Trial" if the patient is a good candidate for Optimal Orthokeratology


BE Enterprises Studio
File
Help
My Practice
Smith, Mary
Jones, Peter
Law, Alvin
Kojima, Jordin
Woods
Rypken
Montana
OS
8/11/2003 11:
8/11/2003
8/11/2
Orders
Medmont
Specifications
Details
Trial Response
BE Retainer Trial Specifications
Fitting Set: 11.0 Standard
BE Retainer Trial Base Curve (mm)
8.50
Apical Clearance (mm)
0.0059
Expected Refractive Change (D)
-1.72
Trial Response
The software has selected the 8.50 trial (predicted 5.9 microns apical tear layer and a -1.72D Rx change)
Perform the diagnostic trial

# Trial Evaluation

- Dispense the calculated BE Retainer diagnostic (check letter engravement)
- Instruct the patient on the proper insertion and removal techniques
- Patient inserts the BE Retainer at the end of the day
- Schedule the patient for a return to the office early in the AM

# Post-trial Evaluation

- Slit Lamp Evaluation
  - Check that the trial is not bound (press with finger on the superior and inferior sclera 3x to free)
  - Check for the proper letter engravement on each eye (correct trial in the correct eye)
  - Remove trials
  - Check, record and grade staining if present (instill artificial tears if the staining appears to be bound mucus and re-evaluate)
- Acuity and Subjective Refraction
- Perform Topography (within 20 minutes of trial removal)
  - Capture 1 good quality topography on each eye (large capture area, minimize ring jam)

# Topographical Analysis

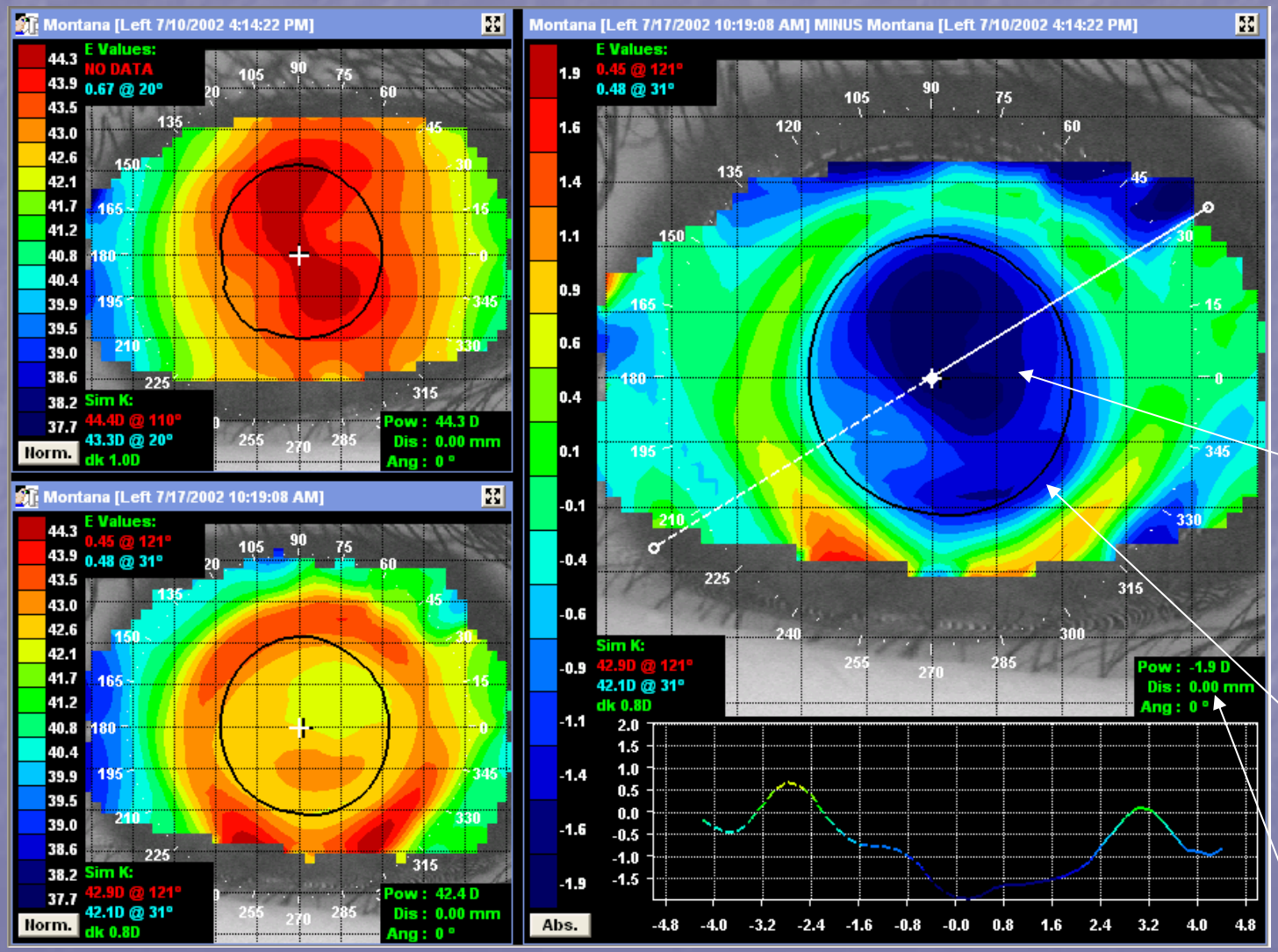
- For each eye:
  - Select the best pretreatment map
    - Large capture area, avoid maps with anomalies due to tear inconsistency or topography error
  - Select the best post-treatment map
    - Large capture area, avoid maps with anomalies due to tear inconsistency or topography error
  - Select the “Subtractive” or “Difference” map function (comparison map option that displays the difference between pre and post corneal shape)
- What was the result?

# Employing Subtractive/Difference Maps

- The Key to evaluating the corneal response following Optimal Orthokeratology wear:

- Axial Power Subtractive: measures the Rx change, defines treatment zone position
- Tangential Power Subtractive: defines the position of the BE Retainer during wear
- Refractive Power Subtractive: Measures the treatment zone size and defines the position of the Rx change following Optimal Orthokeratology

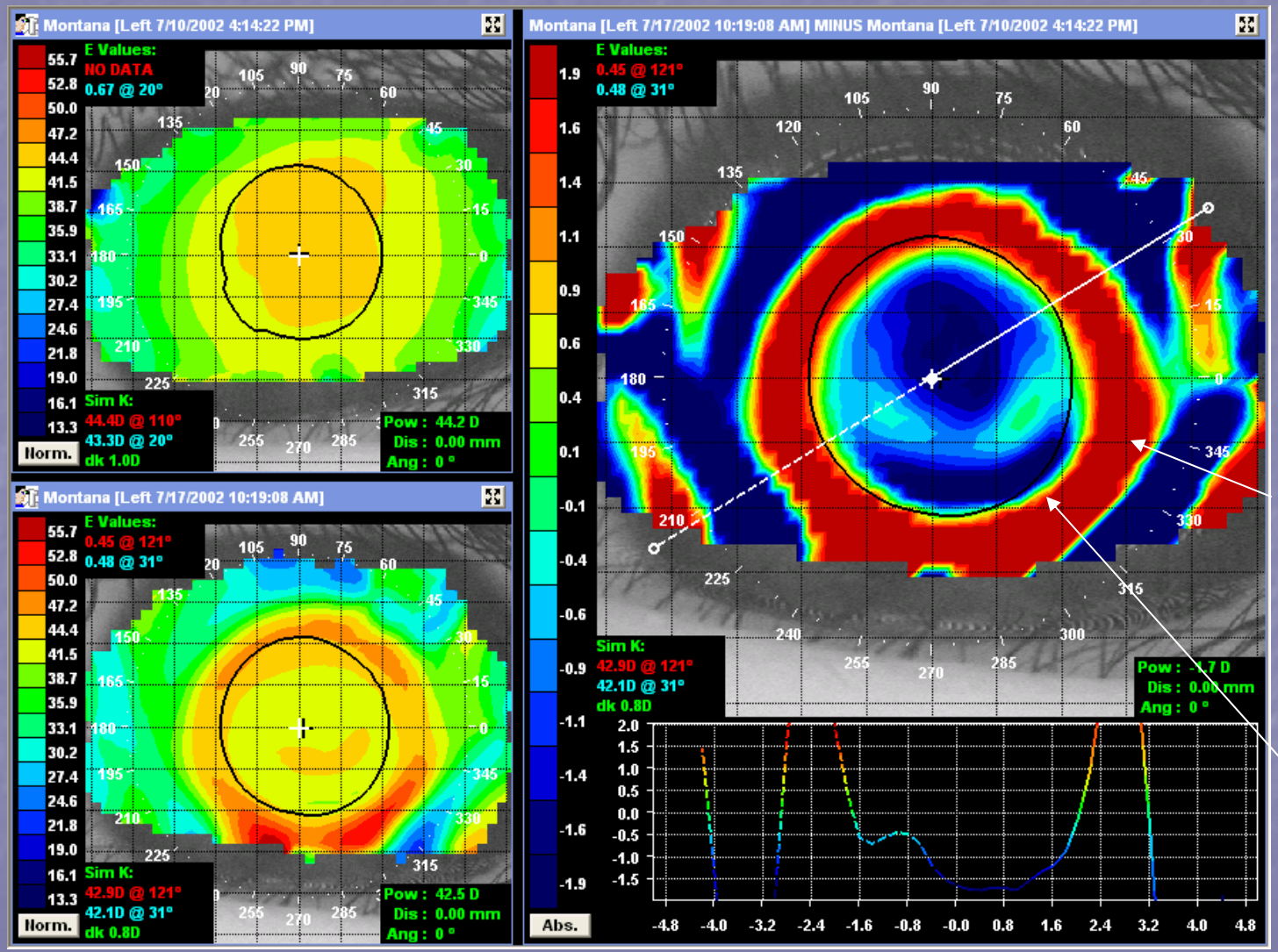
# Axial Power Subtractive
# 1st Trial




The Axial Power Subtractive displays the position of the optic zone and the Rx change following wear. Note the very centered treatment area (blue) in relationship with the pupil (black ring).

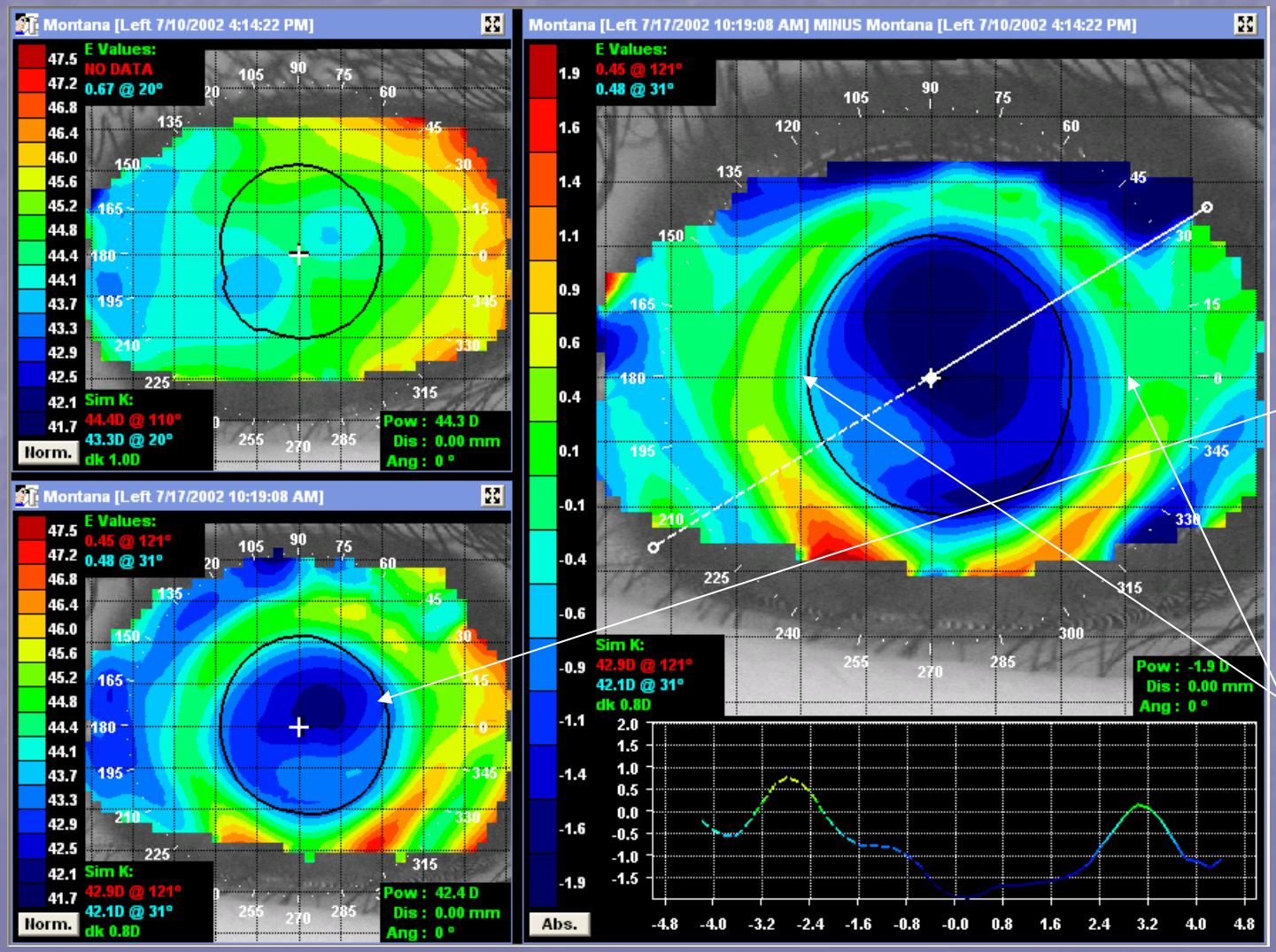
Also note the 1.90Dp change in 1 night

# Tangential Power Subtractive



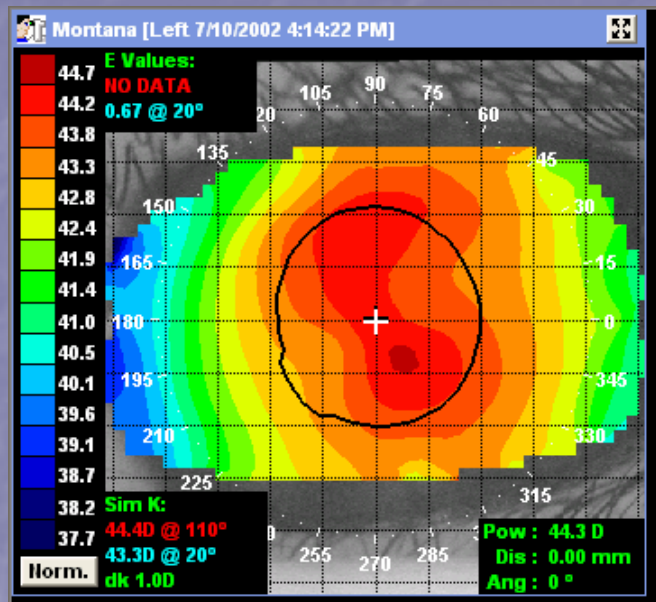

The tangential shows the position of the BE Retainer following Optimal Orthokeratology. Note the parallel relationship of the red ring of epithelium pulled para-central, centered perfectly to the pupil (black ring). A perfect "Bulls-eye" response!

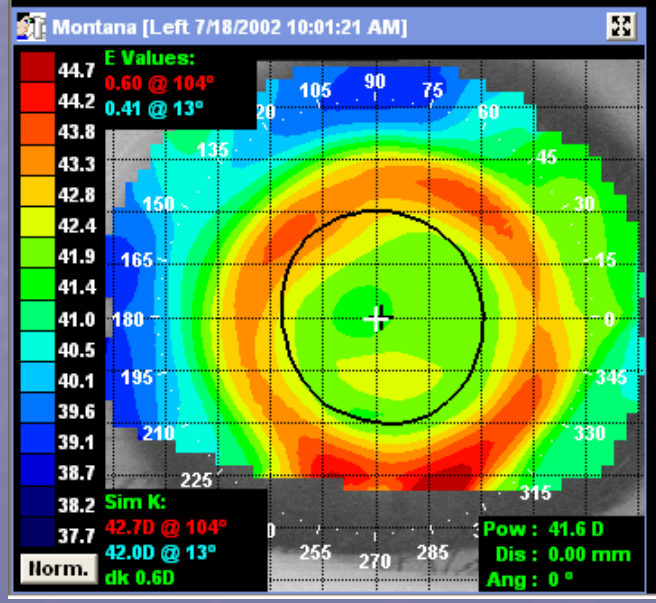
# Refractive Power Subtractive

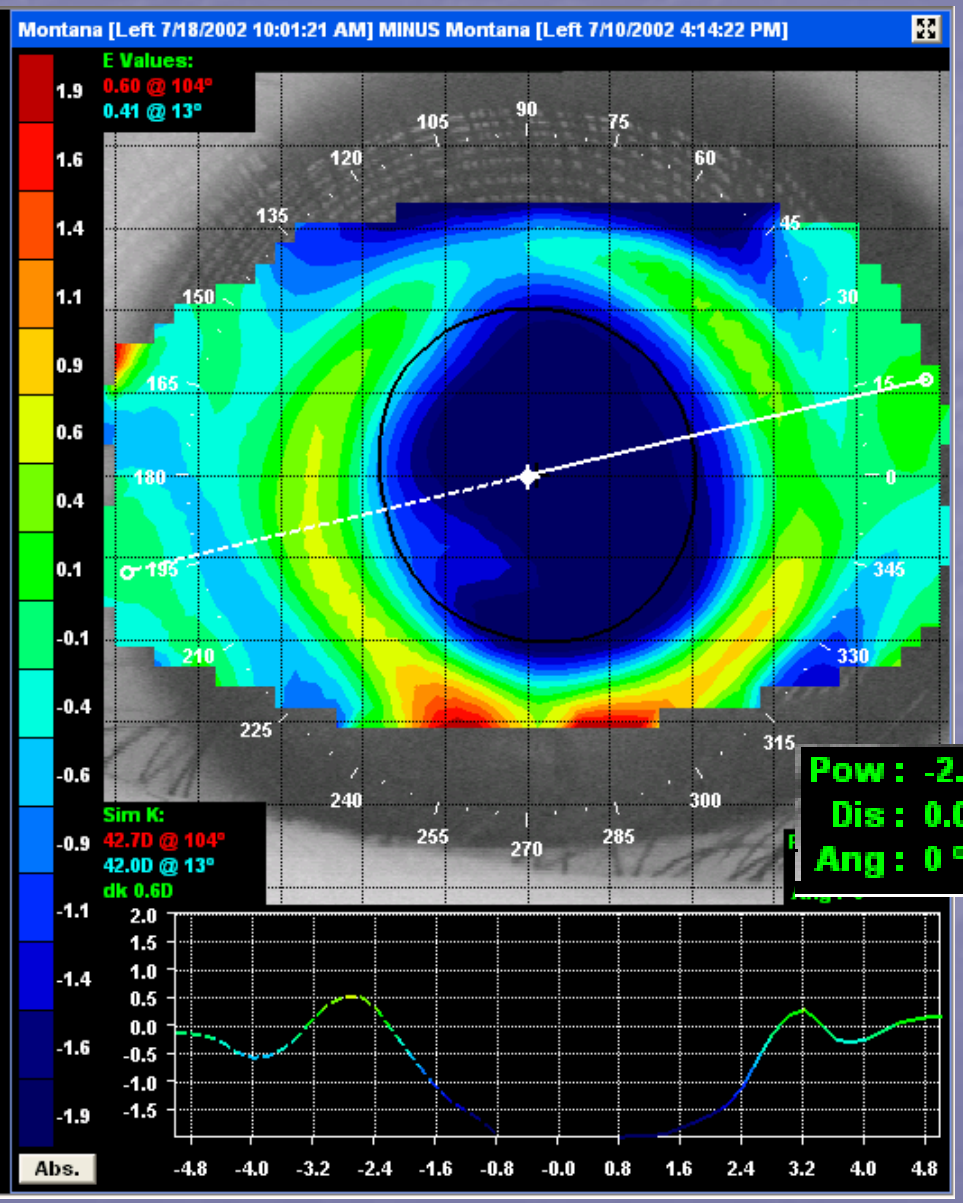



The Refractive Power Subtractive displays the Rx effects of the therapy following wear. Note the very centered decrease in myopia centered to the pupil. The Refractive Power Subtractive is also effective at measuring the treatment zone size.

# 1st Trial: 2nd Day



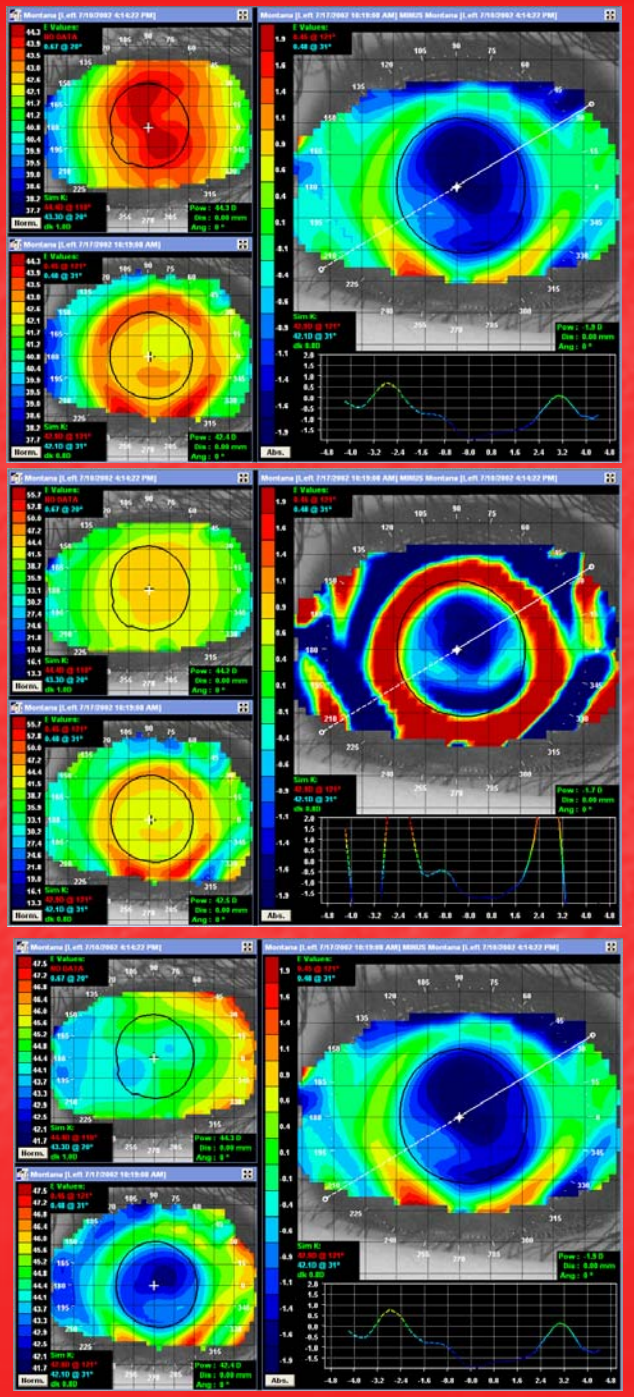



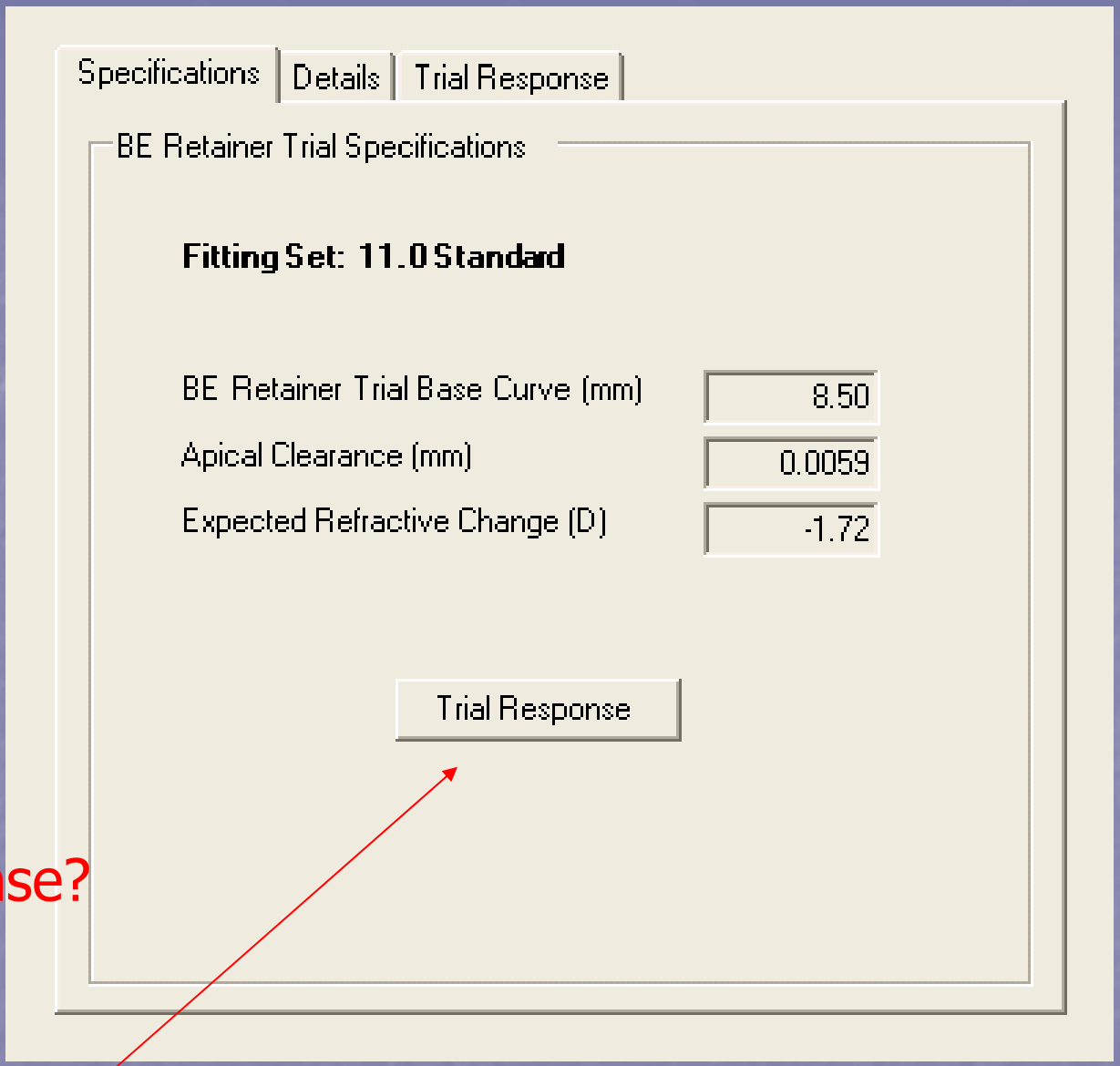




After 2 days in the same trial, the Rx change has increased from 1.90Dp to 2.70Dp effect!

The key to analysis of Optimal Orthokeratology effect/results is the Subtractive/Difference Map

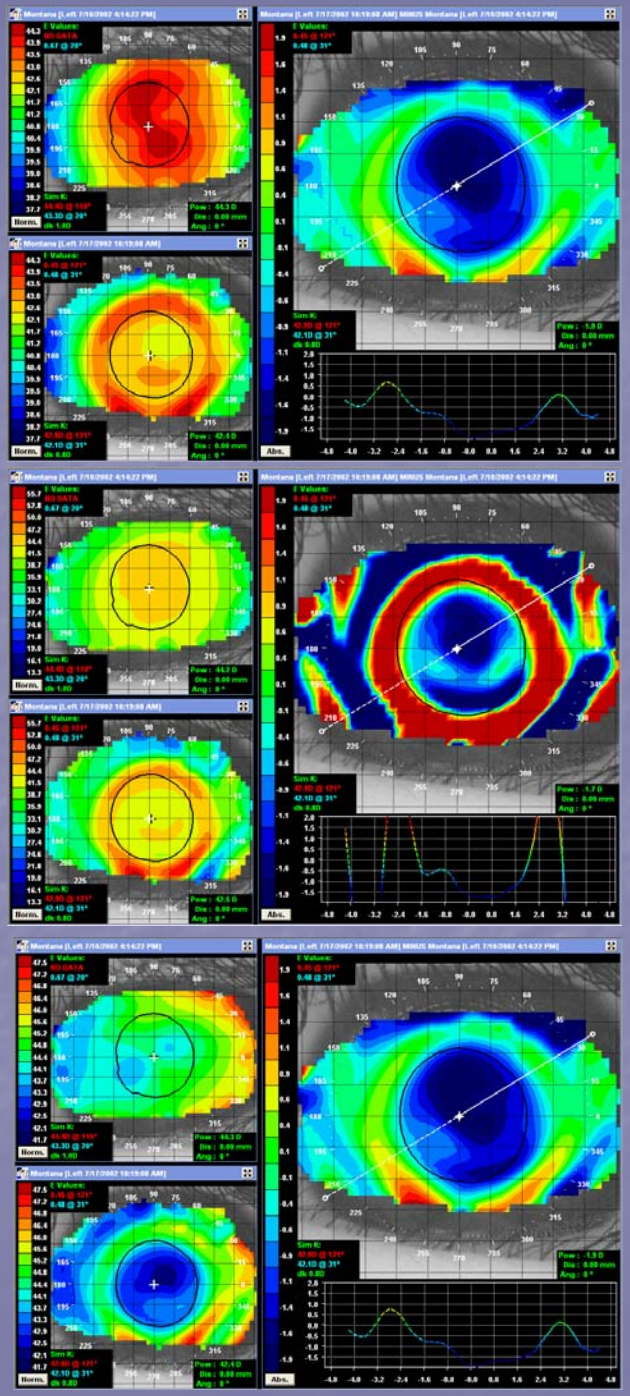
Learn to use these maps and understand them clearly for successful BE Retainer practice





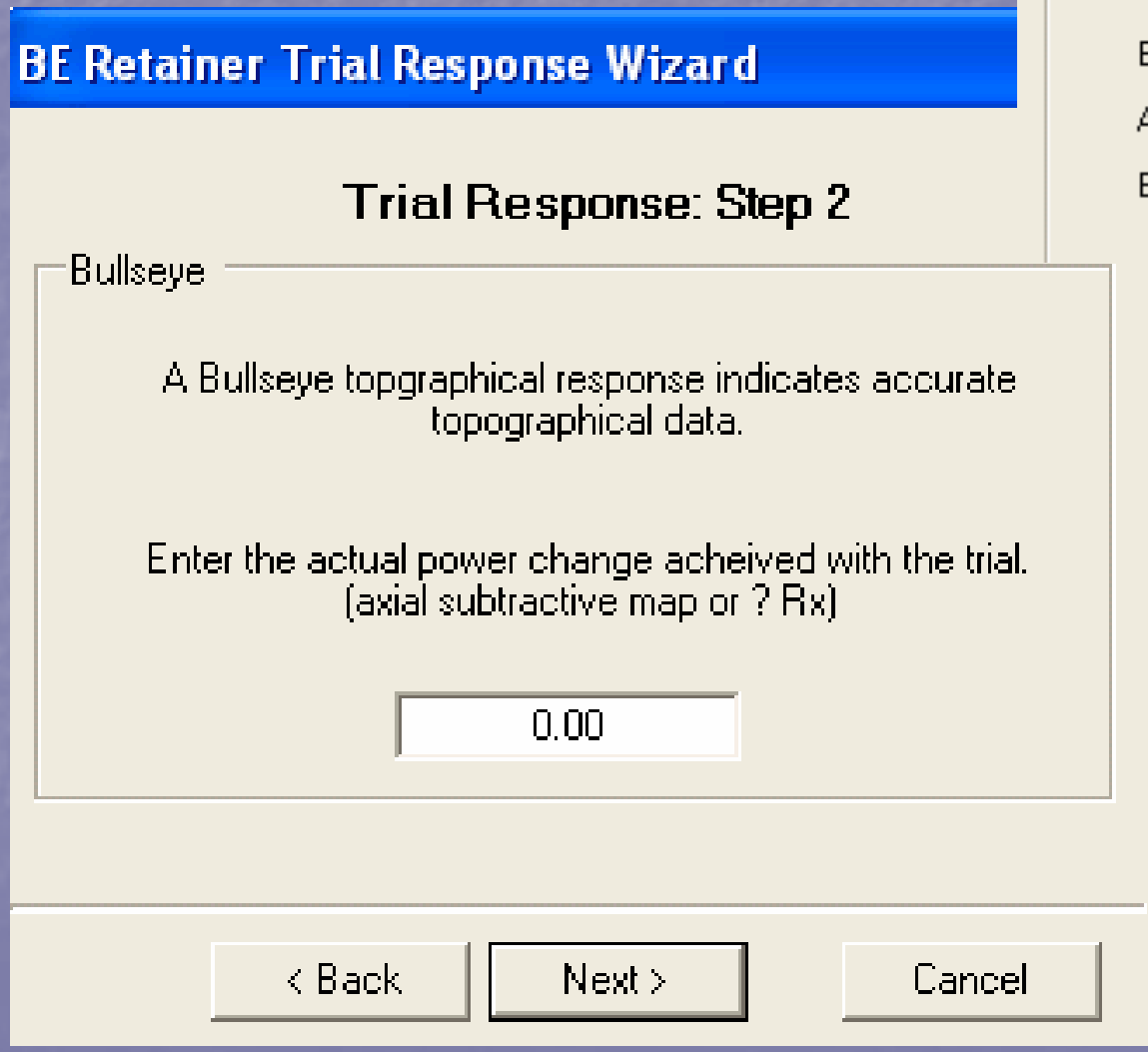

What was the topographical response?

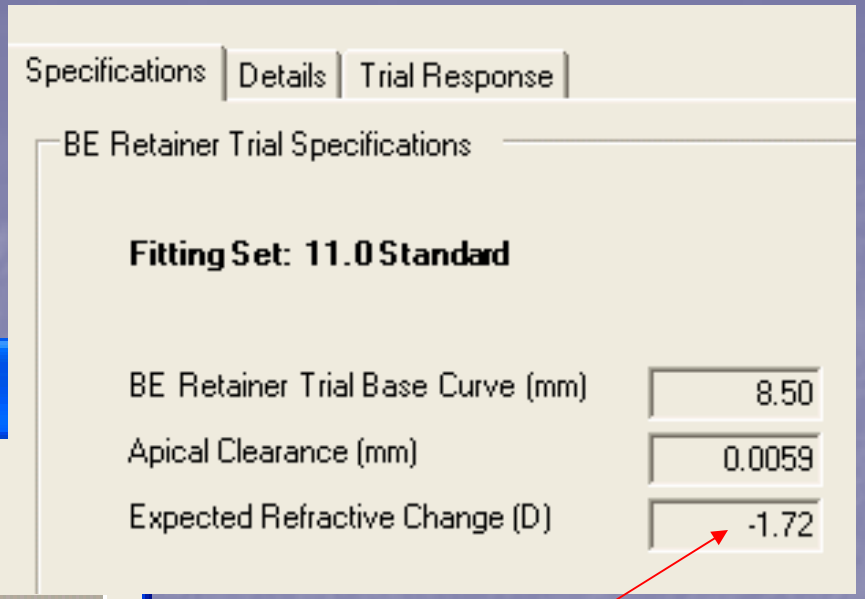
Select "Trial Response"



The topography indicated a “Bulls eye” topographical response

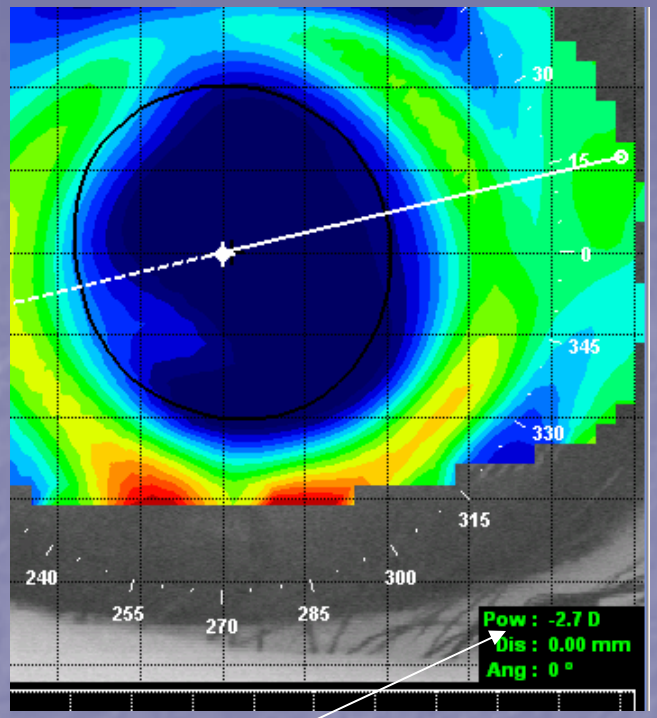
# Did the trial perform as predicted?




The trial was "predicted" to result with a certain Rx change. If the trial performed as predicted, the corneal data was 100% correct. If the trial performed outside of refractive expectation, the corneal data was slightly in error. The BE Retainer software will account for this error and adjust the custom order parameters to result in the ideal BE Retainer parameters.

# What was the actual Rx change achieved with the trial?




BE Retainer Trial Response Wizard

Trial Response: Step 2

Bullseye

A Bullseye topgraphical response indicates accurate topographical data.

Enter the actual power change acheived with the trial. (axial subtractive map or Δ Rx)

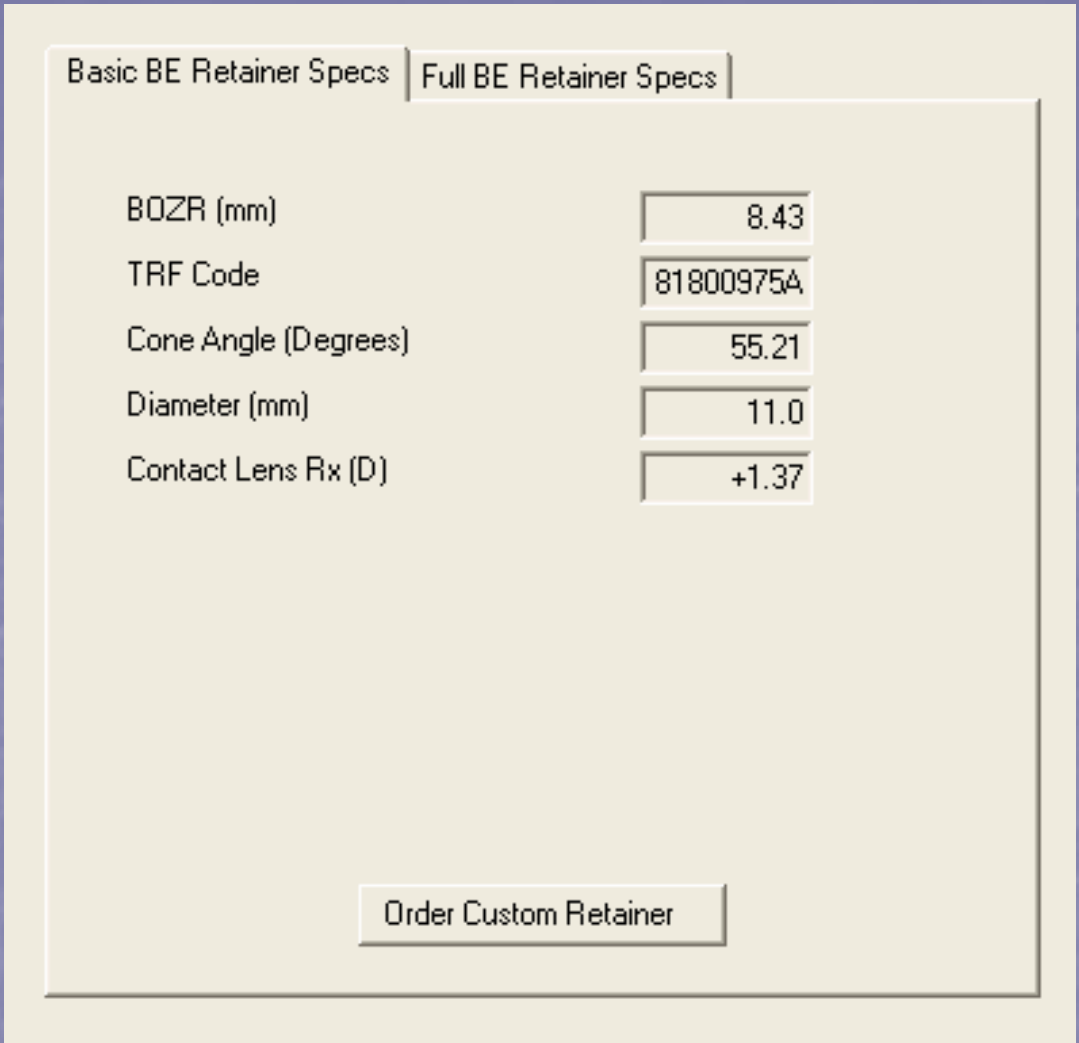
-2.70

< Back | Next > | Cancel

Select the "axial power subtractive" map to display the change in apical corneal power. There is a 1:1 relationship between the change in ACP and the Rx change. Another method would be to measure the difference in pre and post treatment Rx.

Although the BE Retainer diagnostic did not perform within the refractive prediction, the error in corneal data was minute. I.e.. The trial was predicted to have a -1.72Dp Rx change but instead the change was -2.70Dp.

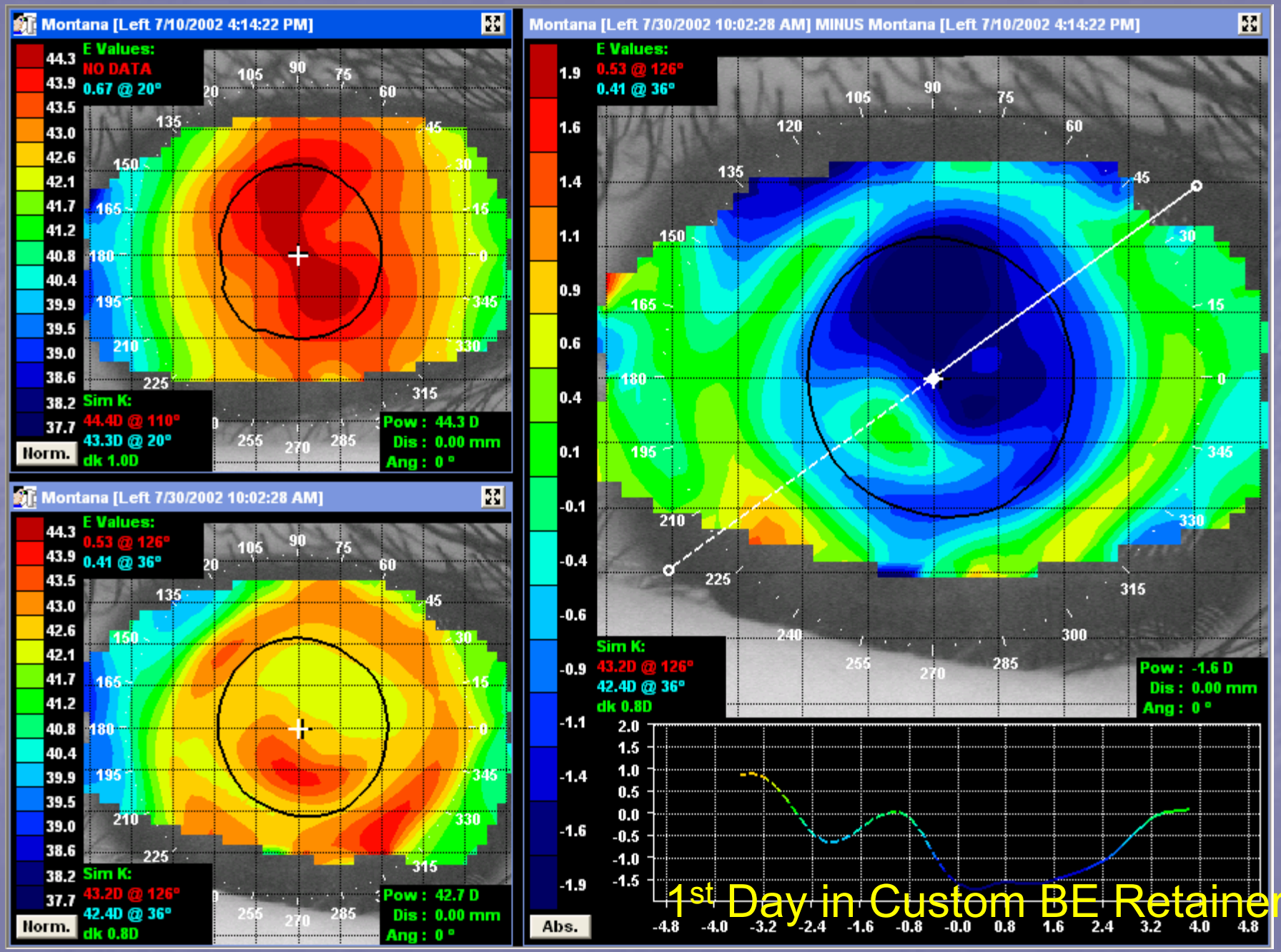
The BE Retainer software will adjust for this small error between what should have resulted refractively and what actually happened. In this case, the trial performed with greater effect than predicted and therefore was closer to the cornea than expected. The software will increase the sagittal height of the custom order parameters to result in the ideal target requested.

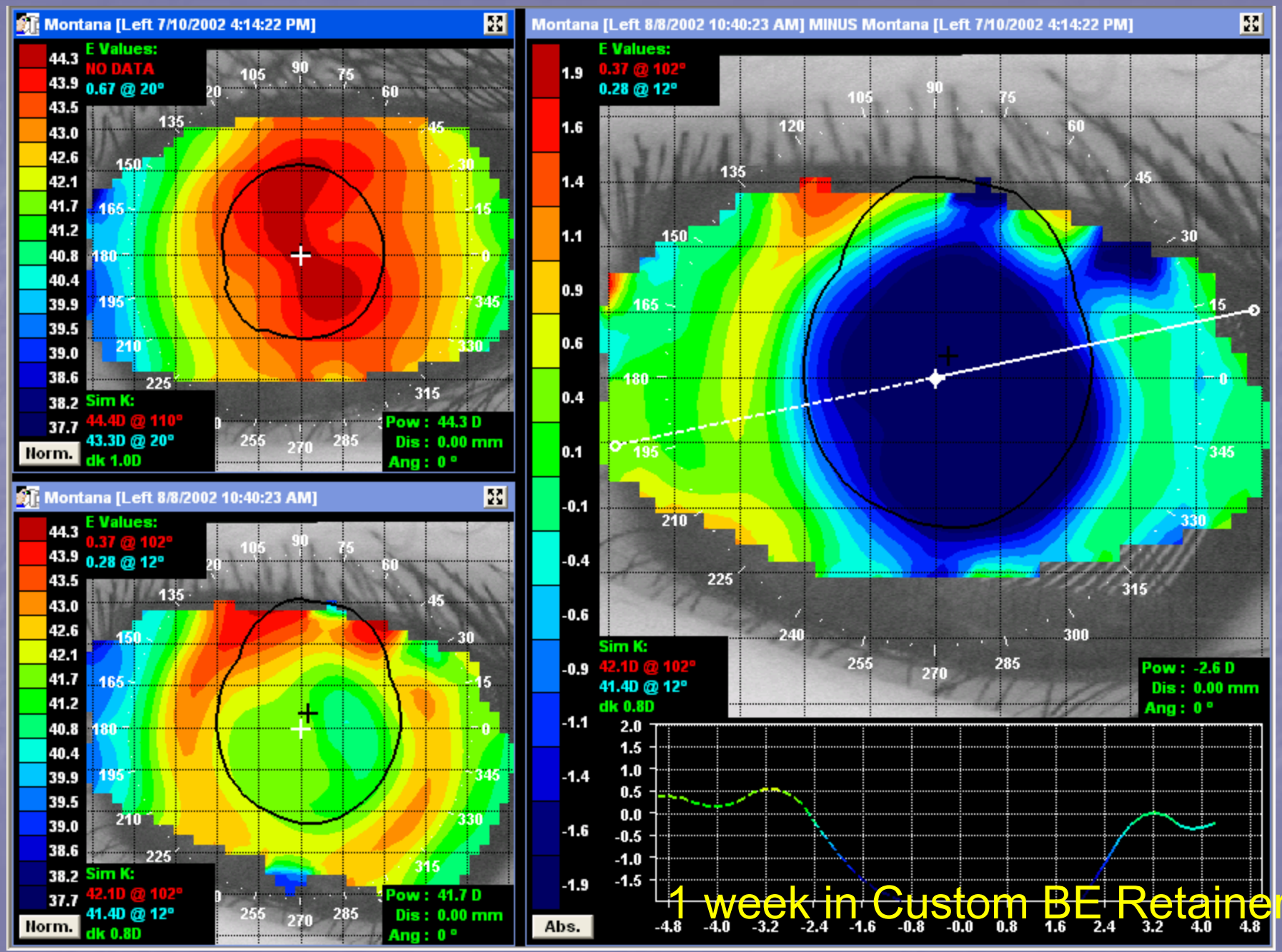


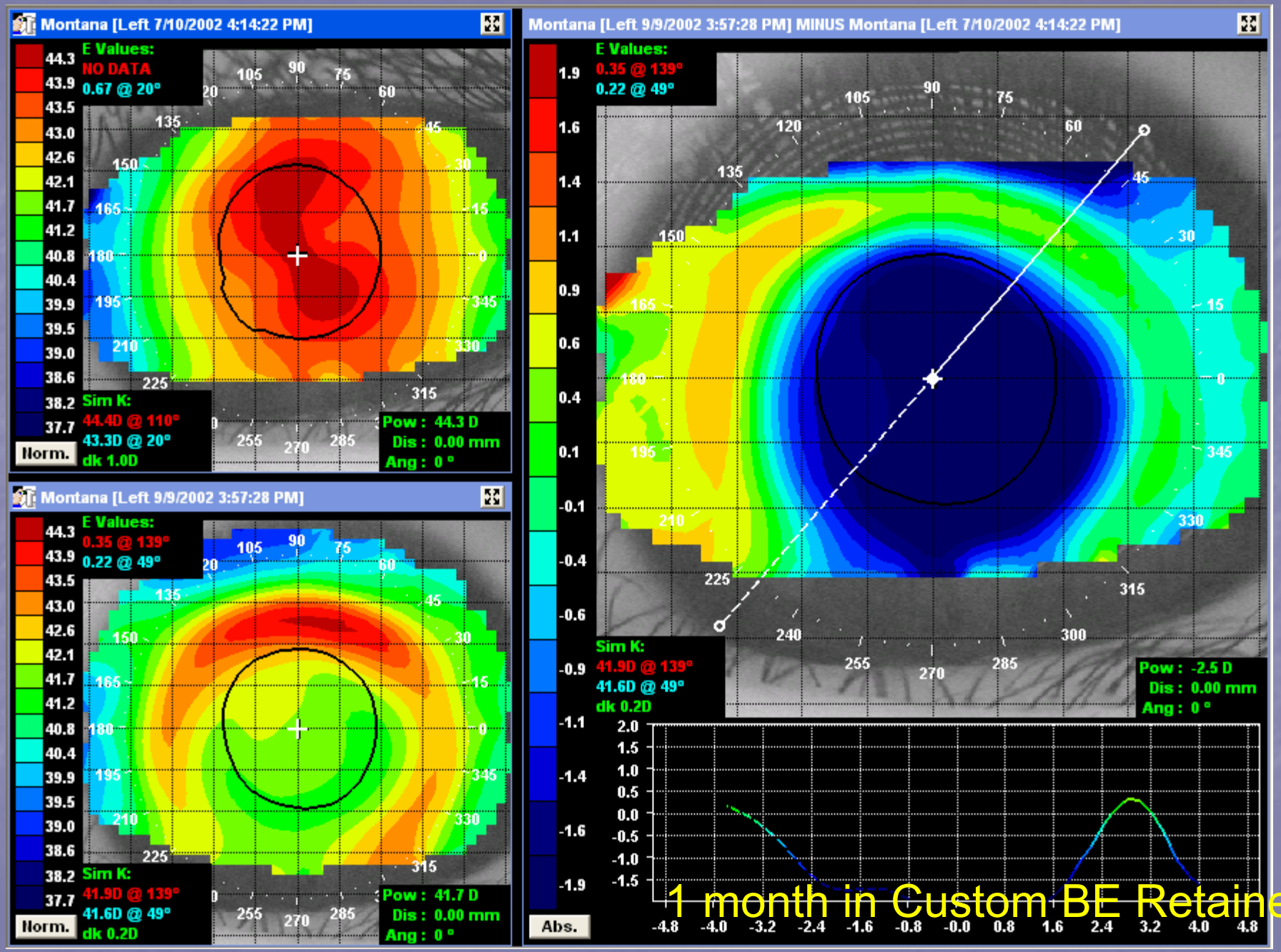

The BE Retainer software has generated the ideal custom order parameters to achieve the desired Optimal Orthokeratology therapy result.

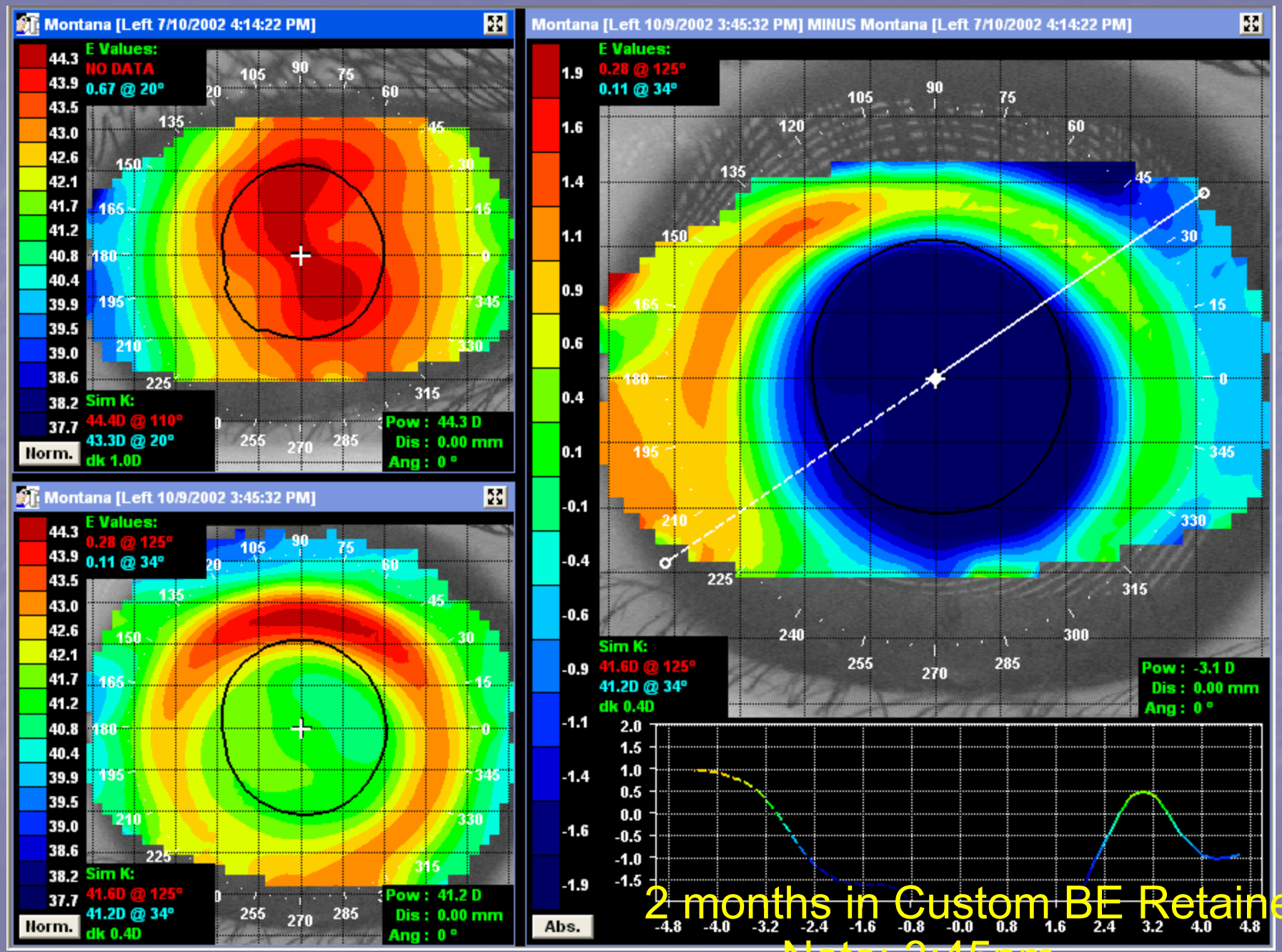
Select "Order Custom Retainer" to generate the BE Retainer order form. You may generate a form for both OD and OS simultaneously

The following is the topographical response for patient Montana generated by the previous trial procedure

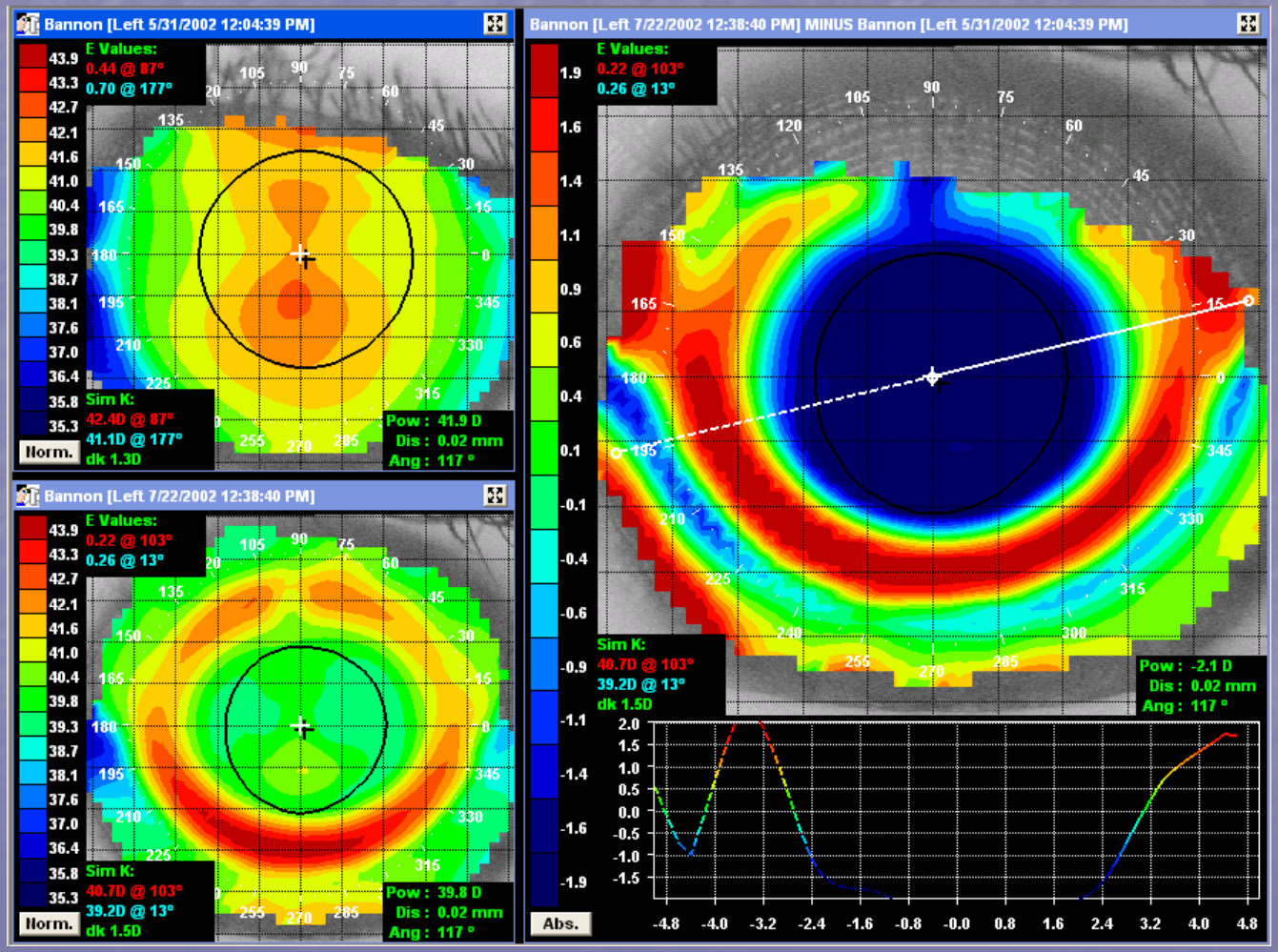

Montana [Left 7/10/2002 4:14:22 PM]
E Values:
NO DATA
0.67 @ 20°
Sim K:
44.4D @ 110°
43.3D @ 20°
dk 1.0D
Pow : 44.3 D
Dis : 0.00 mm
Ang : 0 °
Norm.
Montana [Left 7/30/2002 10:02:28 AM]
E Values:
0.53 @ 126°
0.41 @ 36°
Sim K:
43.2D @ 126°
42.4D @ 36°
dk 0.8D
Pow : 42.7 D
Dis : 0.00 mm
Ang : 0 °
Norm.
Montana [Left 7/30/2002 10:02:28 AM] MINUS Montana [Left 7/10/2002 4:14:22 PM]
E Values:
0.53 @ 126°
0.41 @ 36°
Sim K:
43.2D @ 126°
42.4D @ 36°
dk 0.8D
Pow : -1.6 D
Dis : 0.00 mm
Ang : 0 °
Abs.
1st Day in Custom BE Retainer


Montana [Left 7/10/2002 4:14:22 PM]
E Values:
NO DATA
0.67 @ 20°
Sim K:
44.4D @ 110°
43.3D @ 20°
dk 1.0D
Pow : 44.3 D
Dis : 0.00 mm
Ang : 0 °
Norm.
Montana [Left 8/8/2002 10:40:23 AM]
E Values:
0.37 @ 102°
0.28 @ 12°
Sim K:
42.1D @ 102°
41.4D @ 12°
dk 0.8D
Pow : 41.7 D
Dis : 0.00 mm
Ang : 0 °
Norm.
Montana [Left 8/8/2002 10:40:23 AM] MINUS Montana [Left 7/10/2002 4:14:22 PM]
E Values:
0.37 @ 102°
0.28 @ 12°
Sim K:
42.1D @ 102°
41.4D @ 12°
dk 0.8D
Pow : -2.6 D
Dis : 0.00 mm
Ang : 0 °
Abs.
1 week in Custom BE Retainer


Montana [Left 7/10/2002 4:14:22 PM]
E Values:
NO DATA
0.67 @ 20°
Sim K:
44.4D @ 110°
43.3D @ 20°
dk 1.0D
Pow : 44.3 D
Dis : 0.00 mm
Ang : 0 °
Norm.
Montana [Left 9/9/2002 3:57:28 PM]
E Values:
0.35 @ 139°
0.22 @ 49°
Sim K:
41.9D @ 139°
41.6D @ 49°
dk 0.2D
Pow : 41.7 D
Dis : 0.00 mm
Ang : 0 °
Norm.
Montana [Left 9/9/2002 3:57:28 PM] MINUS Montana [Left 7/10/2002 4:14:22 PM]
E Values:
0.35 @ 139°
0.22 @ 49°
Sim K:
41.9D @ 139°
41.6D @ 49°
dk 0.2D
Pow : -2.5 D
Dis : 0.00 mm
Ang : 0 °
Abs.
1 month in Custom BE Retainer


Montana [Left 7/10/2002 4:14:22 PM]
E Values:
NO DATA
0.67 @ 20°
Sim K:
44.4D @ 110°
43.3D @ 20°
dk 1.0D
Pow : 44.3 D
Dis : 0.00 mm
Ang : 0 °
Norm.
Montana [Left 10/9/2002 3:45:32 PM]
E Values:
0.28 @ 125°
0.11 @ 34°
Sim K:
41.6D @ 125°
41.2D @ 34°
dk 0.4D
Pow : 41.2 D
Dis : 0.00 mm
Ang : 0 °
Norm.
Montana [Left 10/9/2002 3:45:32 PM] MINUS Montana [Left 7/10/2002 4:14:22 PM]
E Values:
0.28 @ 125°
0.11 @ 34°
Sim K:
41.6D @ 125°
41.2D @ 34°
dk 0.4D
Pow : -3.1 D
Dis : 0.00 mm
Ang : 0 °
Abs.
2 months in Custom BE Retainer
Note: 3:45pm

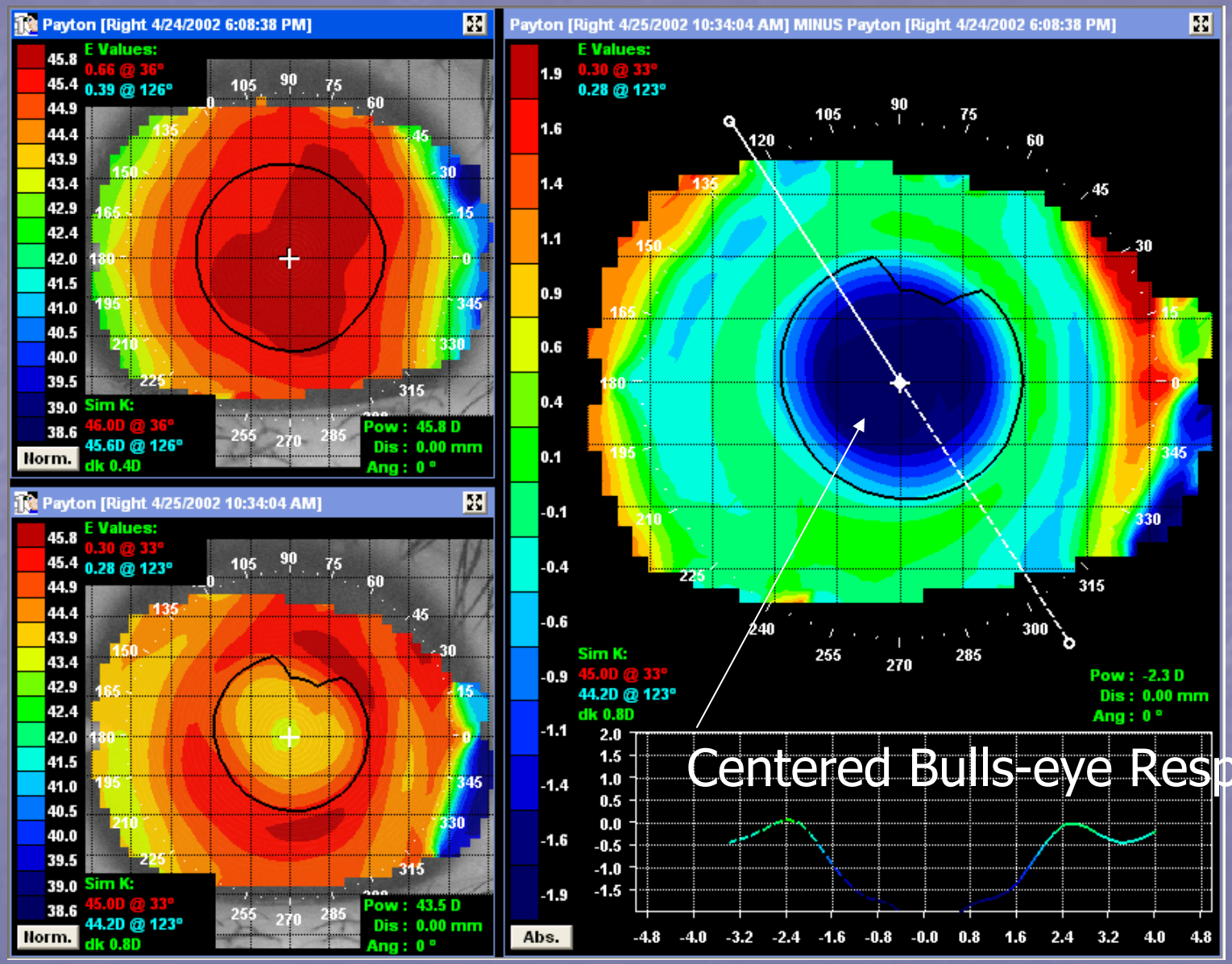
# Don’t Buy Till You Have a Bulls Eye!



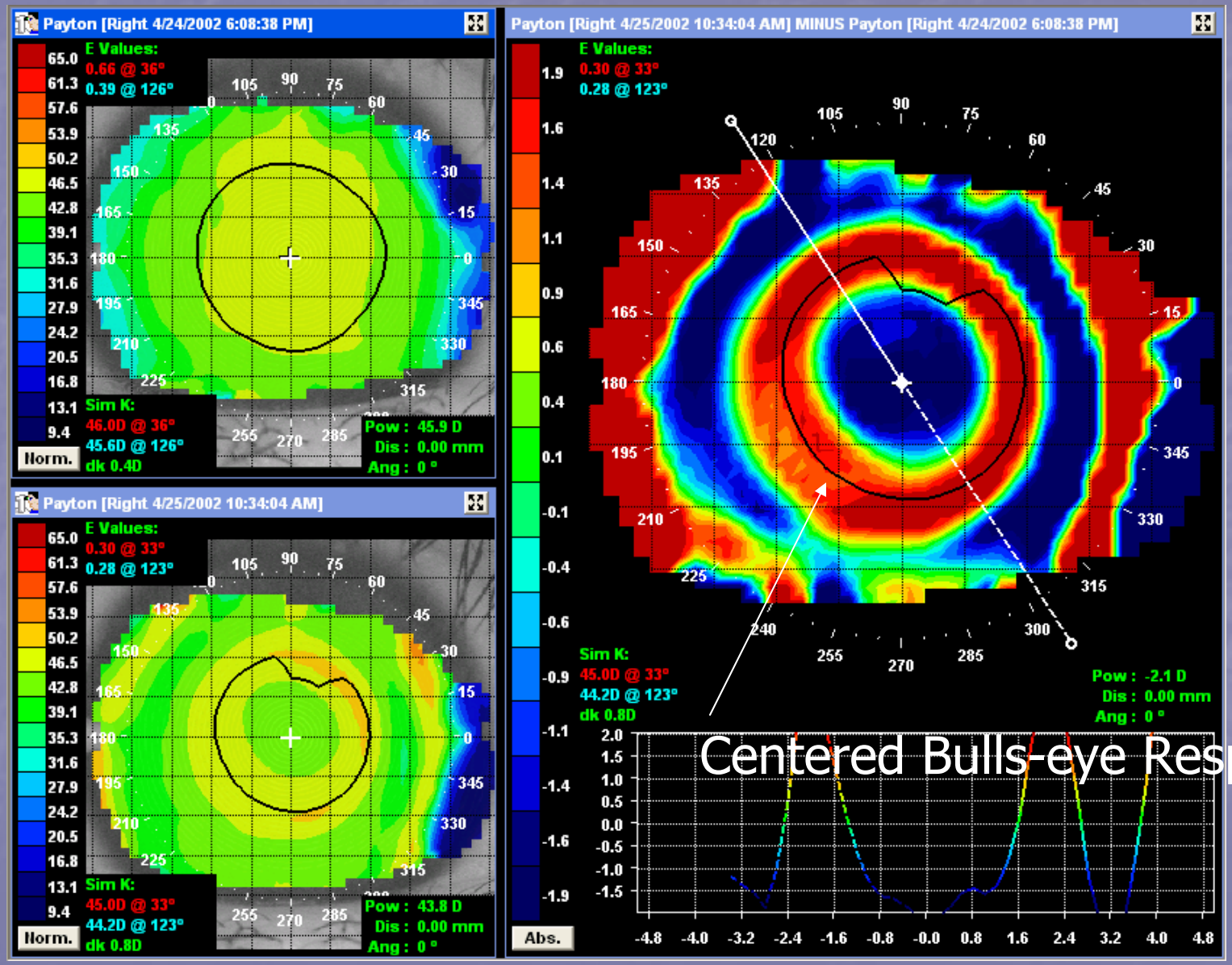
# The Key to the Successful practice of BE Retainer Optimal Orthokeratology

- Trial Fit until a bulls-eye topography results
- Calculate your custom order based on the ideal topographical response following trial: a Bulls-eye!

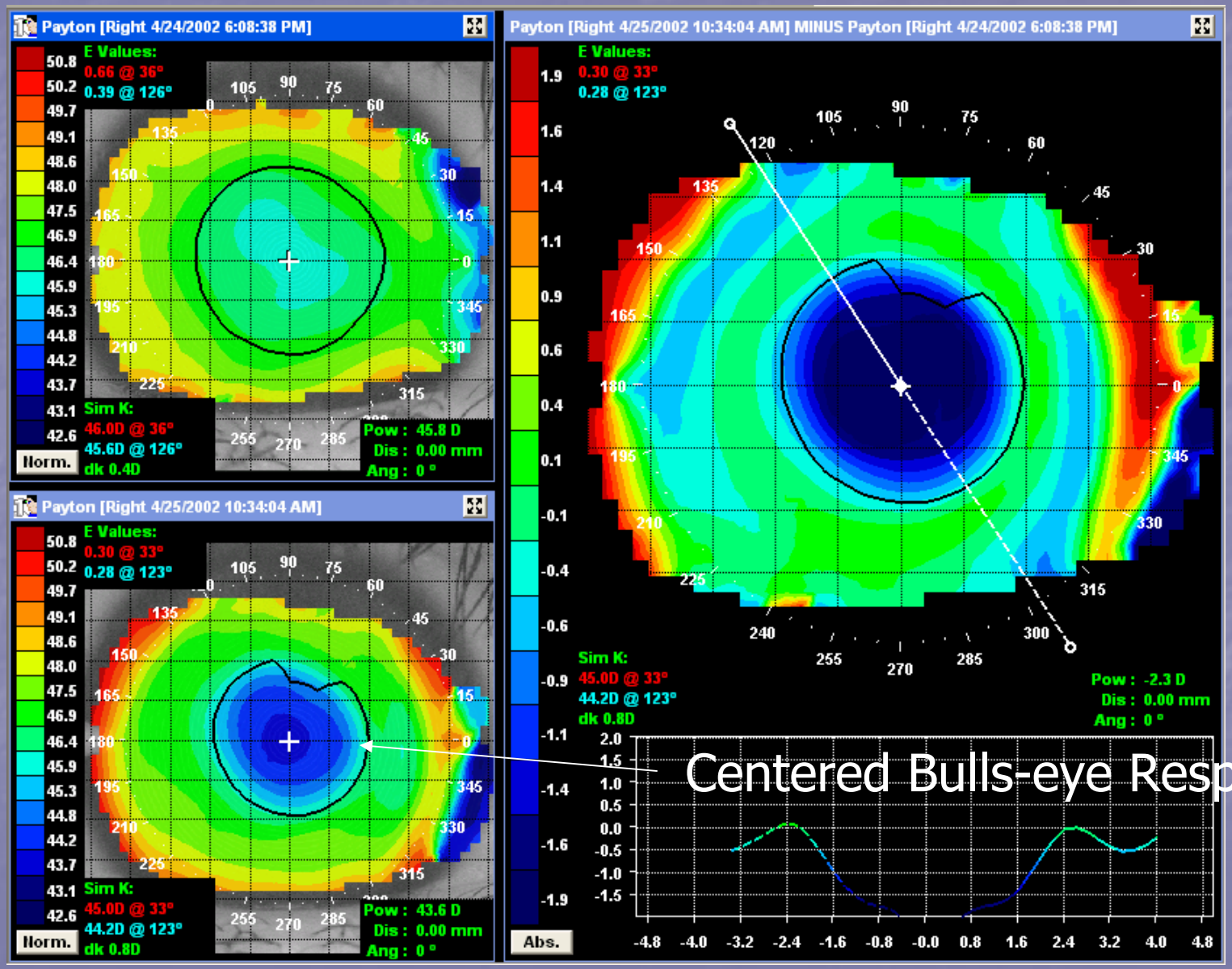
# 1 Day in Custom Order - Axial



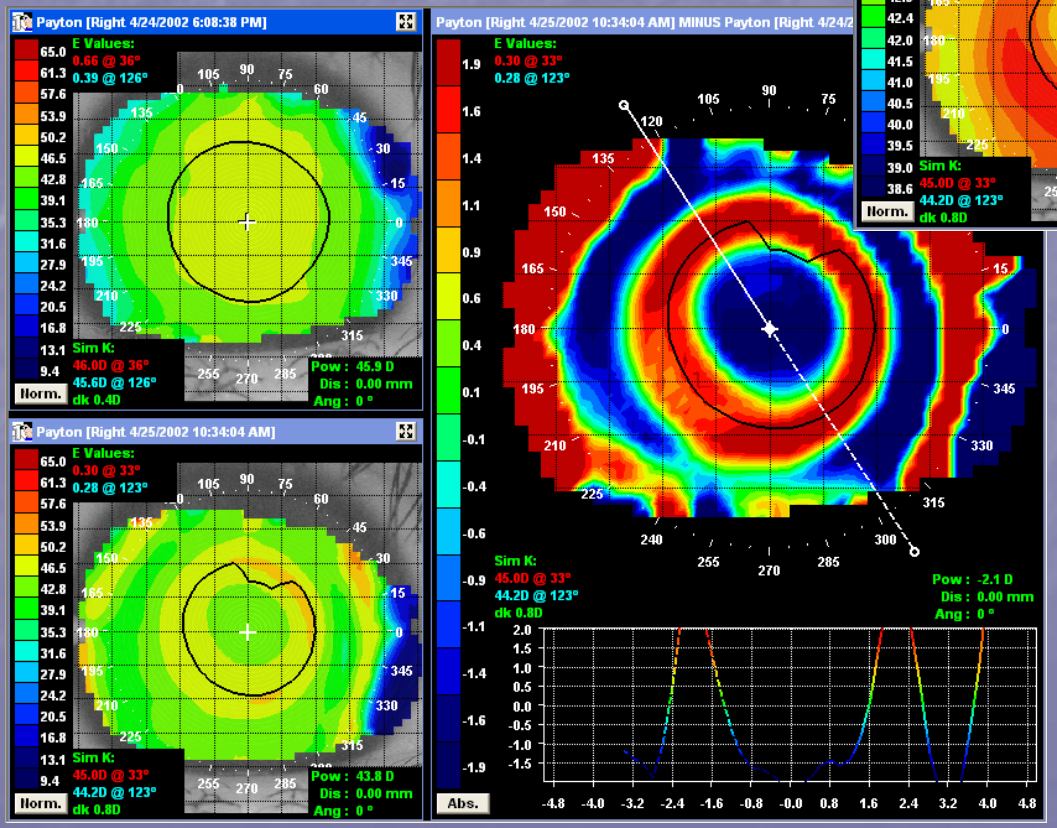
# 1 Day in Custom Order - Tangential

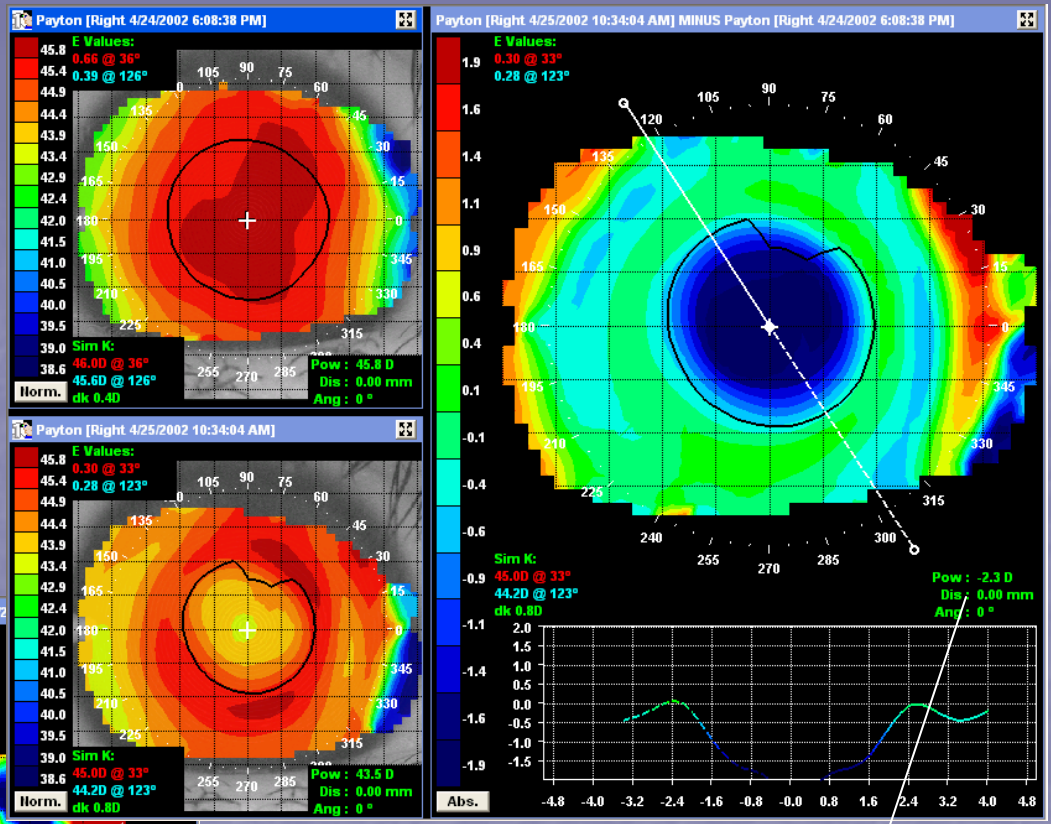


# 1 Day in Custom Order - Refractive



# 1 Day

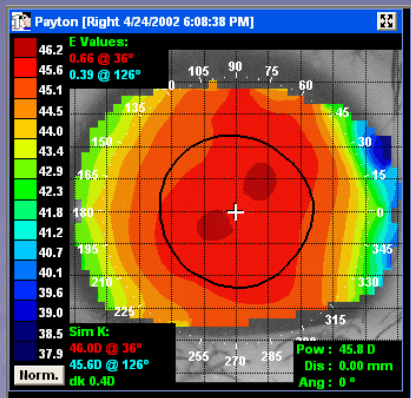


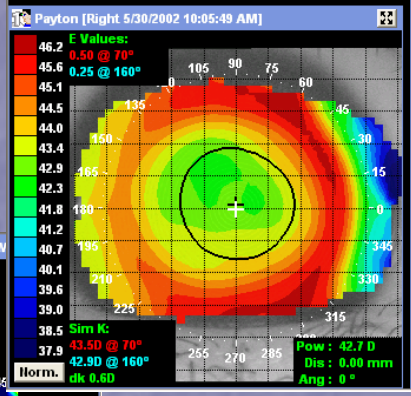



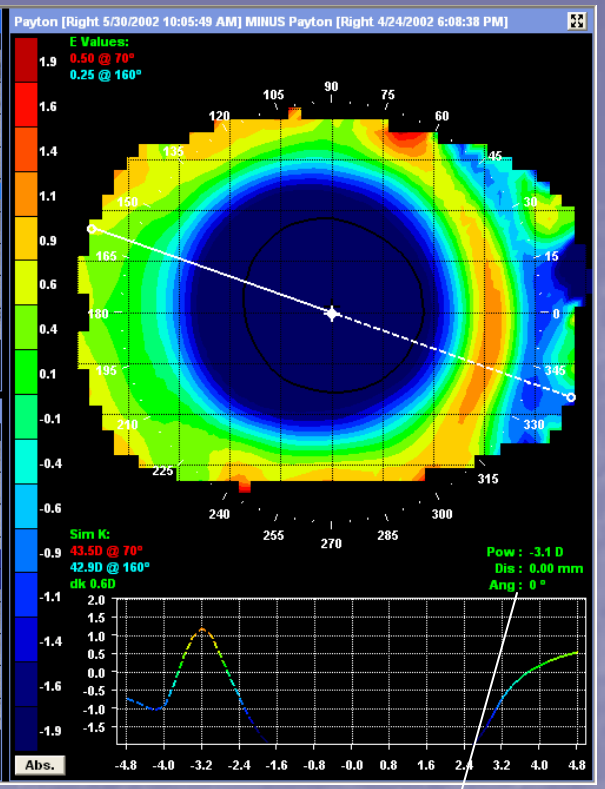

Pow : -2.3 D
Dis : 0.00 mm
Ang : 0 °

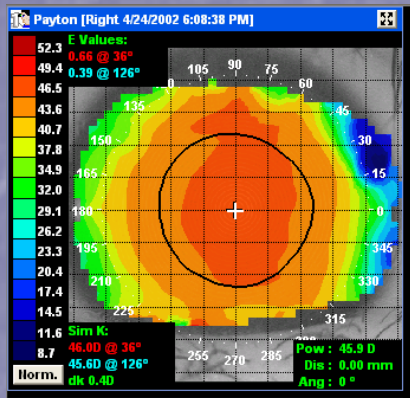
The Axial Power Subtractive displays the apical corneal refractive change. There is a 1:1 relationship between the apical change and the refractive change.

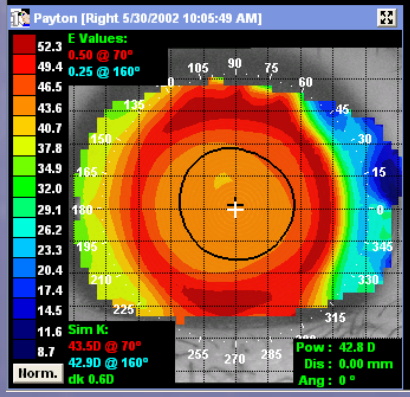
# 1 Month

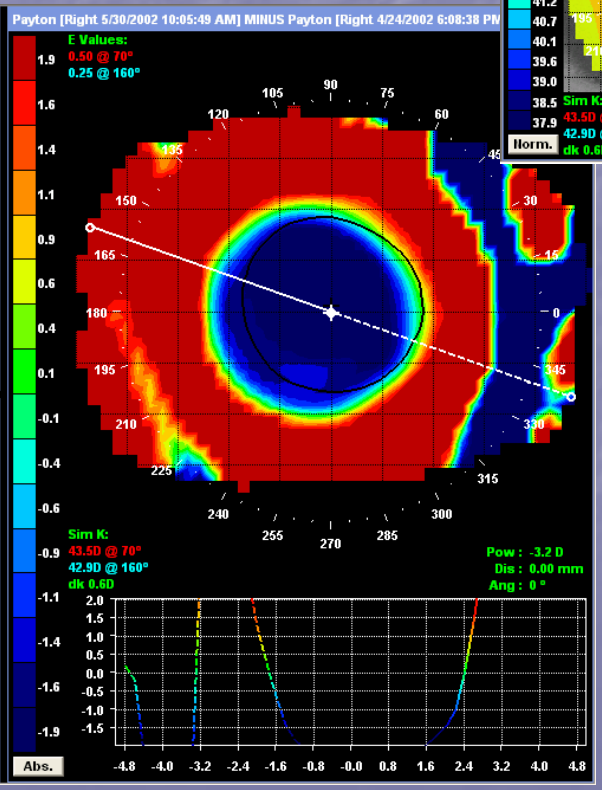

Payton [Right 4/24/2002 6:08:38 PM]
E Values:
0.66 @ 36°
0.39 @ 126°
Sim K:
46.0D @ 36°
45.6D @ 126°
dk 0.4D
Pow : 45.8 D
Dis : 0.00 mm
Ang : 0 °
Norm.


Payton [Right 5/30/2002 10:05:49 AM]
E Values:
0.50 @ 70°
0.25 @ 160°
Sim K:
43.5D @ 70°
42.9D @ 160°
dk 0.6D
Pow : 42.7 D
Dis : 0.00 mm
Ang : 0 °
Norm.


Payton [Right 5/30/2002 10:05:49 AM] MINUS Payton [Right 4/24/2002 6:08:38 PM]
E Values:
0.50 @ 70°
0.25 @ 160°
Sim K:
43.5D @ 70°
42.9D @ 160°
dk 0.6D
Pow : -3.1 D
Dis : 0.00 mm
Ang : 0 °
Abs.

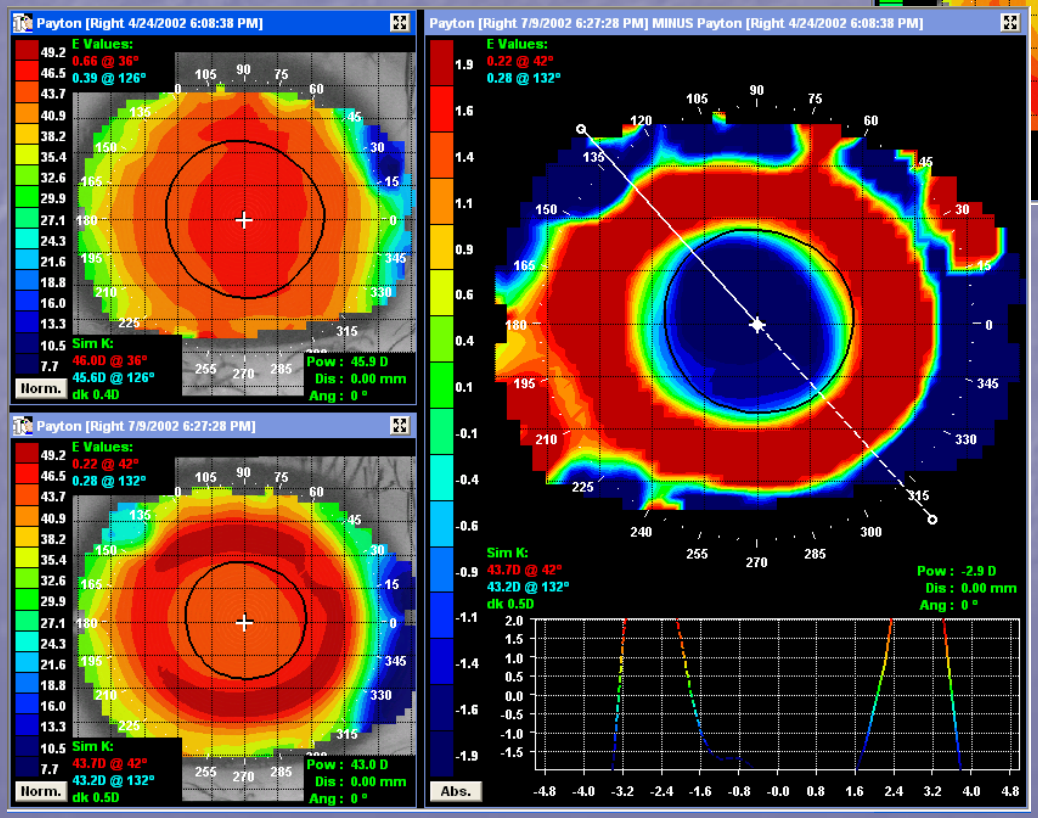

Payton [Right 4/24/2002 6:08:38 PM]
E Values:
0.66 @ 36°
0.39 @ 126°
Sim K:
46.0D @ 36°
45.6D @ 126°
dk 0.4D
Pow : 45.9 D
Dis : 0.00 mm
Ang : 0 °
Norm.


Payton [Right 5/30/2002 10:05:49 AM]
E Values:
0.50 @ 70°
0.25 @ 160°
Sim K:
43.5D @ 70°
42.9D @ 160°
dk 0.6D
Pow : 42.8 D
Dis : 0.00 mm
Ang : 0 °
Norm.


Payton [Right 5/30/2002 10:05:49 AM] MINUS Payton [Right 4/24/2002 6:08:38 PM]
E Values:
0.50 @ 70°
0.25 @ 160°
Sim K:
43.5D @ 70°
42.9D @ 160°
dk 0.6D
Pow : -3.2 D
Dis : 0.00 mm
Ang : 0 °
Abs.

Pow : -3.1 D
Dis : 0.00 mm
Ang : 0 °

# 2 Months +




Pow : -2.9 D
Dis : 0.00 mm
Ang : 0 °

6:27pm in the Evening!!!

# BE Retainer
# Optimal Orthokeratology

## Therapy Schedule

# *The BE Retainer:* Therapy Schedule

- 1st Visit - Work-up 1 hour
  - Case History
  - Corneal Health Evaluation
  - Topography
  - Trial Lens Determination
  - Insertion & Removal Training (if necessary)
  - Dispense Trials (patient to return to office with lenses in situ)

# *The BE Retainer:* Therapy Schedule (Cont.)

- 2nd Visit – 1st AM Visit – evaluation
  30 minutes
- Schedule additional days (in the same trial Retainer) if the topography is inconclusive
- Retrial if an obvious Smiley Face, Central Island or Frowney Face results
- Order Custom BE Retainers if a bulls-eye results

# *The BE Retainer:* Therapy Schedule (Cont.)

- 3rd Visit – 1st AM in Custom Order – AM evaluation
  Lenses in-situ 20 minutes

  70% effect in 1 day

  100% effect in 7-10 days (Swarbrick)

  Provide disposables if VA is not acceptable for driving/school/visual requirements

- 4th Visit – 1 week – PM evaluation
  20 minutes

# *The BE Retainer:* Therapy Schedule (Cont.)

- 5th Visit – 1 month - PM evaluation — 20 minutes
  - Review VA and wear schedule
  - Order Back-up pair of BE Retainers
  - Discuss Refund Policy if the patient addresses concerns
- 6th Visit – 6 months – AM or PM — 20 minutes
- 7th Visit – 1 year – AM or PM — 20 minutes
  - Check Retainers for deposits
  - Clean if necessary
  - Replace if warped

# *BE Retainer:* Therapy Tips

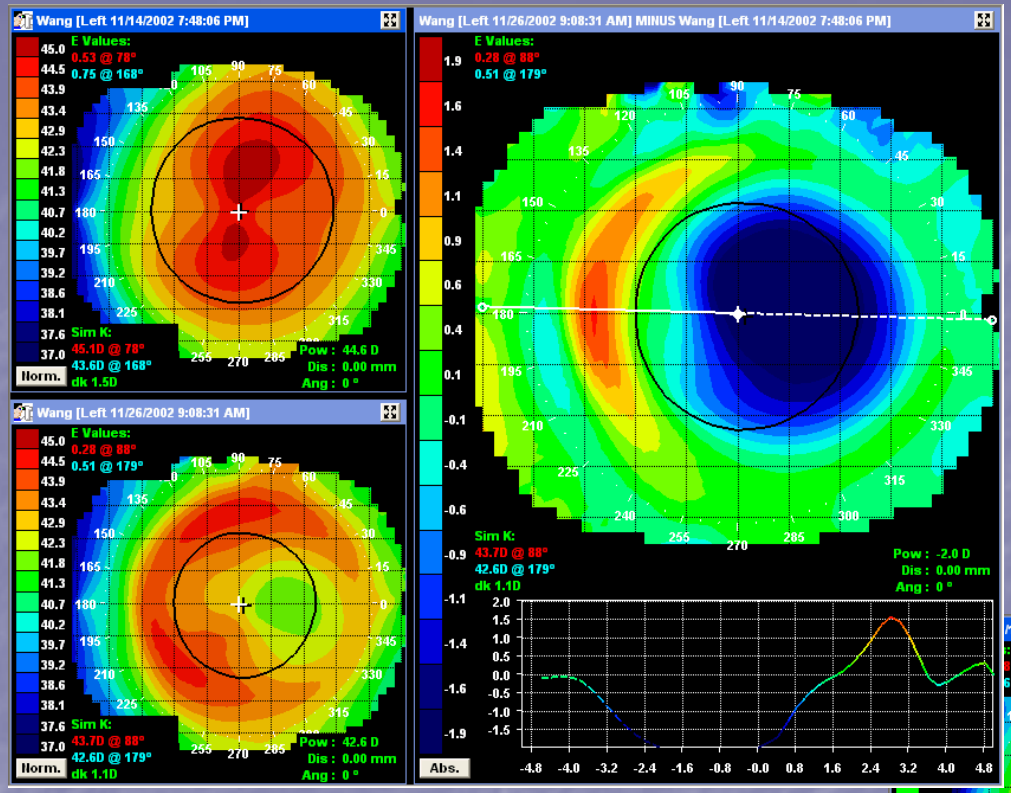
- Perform multiple day trials
  - Concludes topographical response
  - Proves out Rx change
- Trial until a Bulls-eye results
- Order the trial parameters as a CUSTOM ORDER IF the trial performs PERFECTLY! (order the appropriate color and power in such cases)

# *BE Retainer:* Therapy Tips (Cont.)

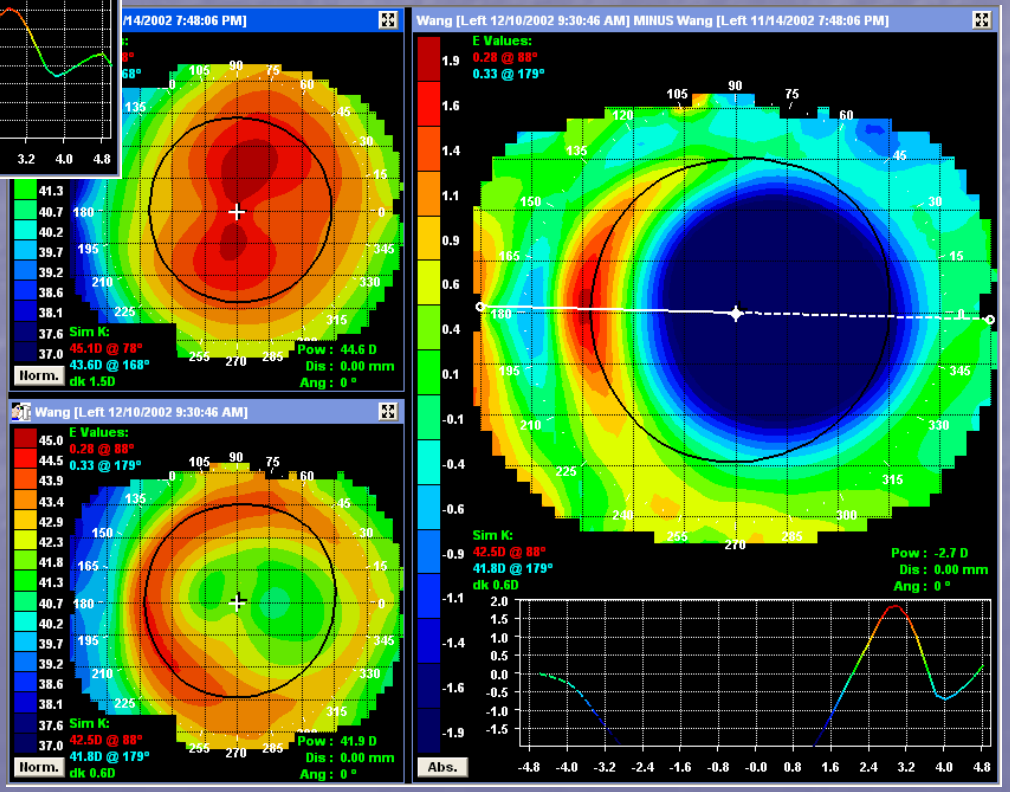
- Have patience in custom orders – full effect takes 7-10 days!
- Don’t panic flare & glare – Wait 1 month
- Order “B” Optic zone if flare/glare continues
- Provide back-up pair
  - Lost/broken
  - Build-up/warped

# Reduced Wear Schedule

- Follow-up visits
  - 1 month – PM visit to check VA and evaluate the possibility of reduced wear
  - 6 months – PM or 1-2 days off wear to evaluate VA
- Patients know their vision best!
- Following 1 month of wear:
  - Patients with the best chances of a reduced wear schedule are those with High Eccentricity and a Steep Apical Radius (Ro). Rx potential for reduced wear:
  - -1.00 3-5 days retention
  - -2.00 2-3 " "
  - -3.00 1-2 " "
  - -4.00 24-36 hours retention
  - -5.00 Forget it

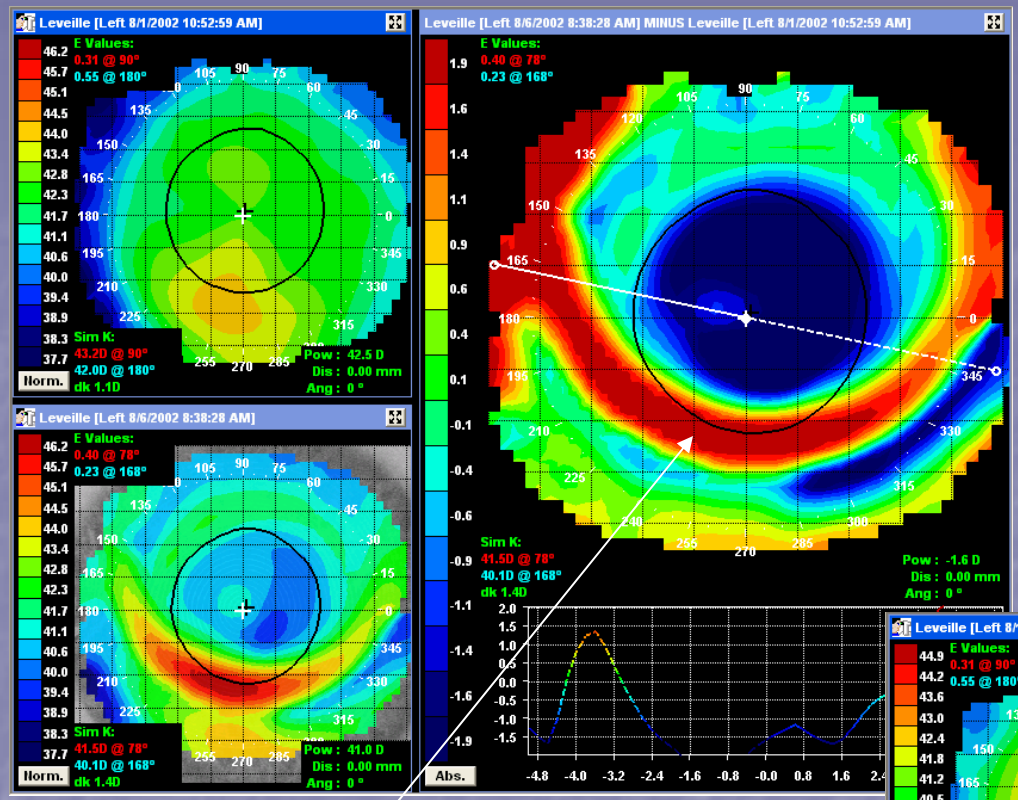



Trial




Custom Order

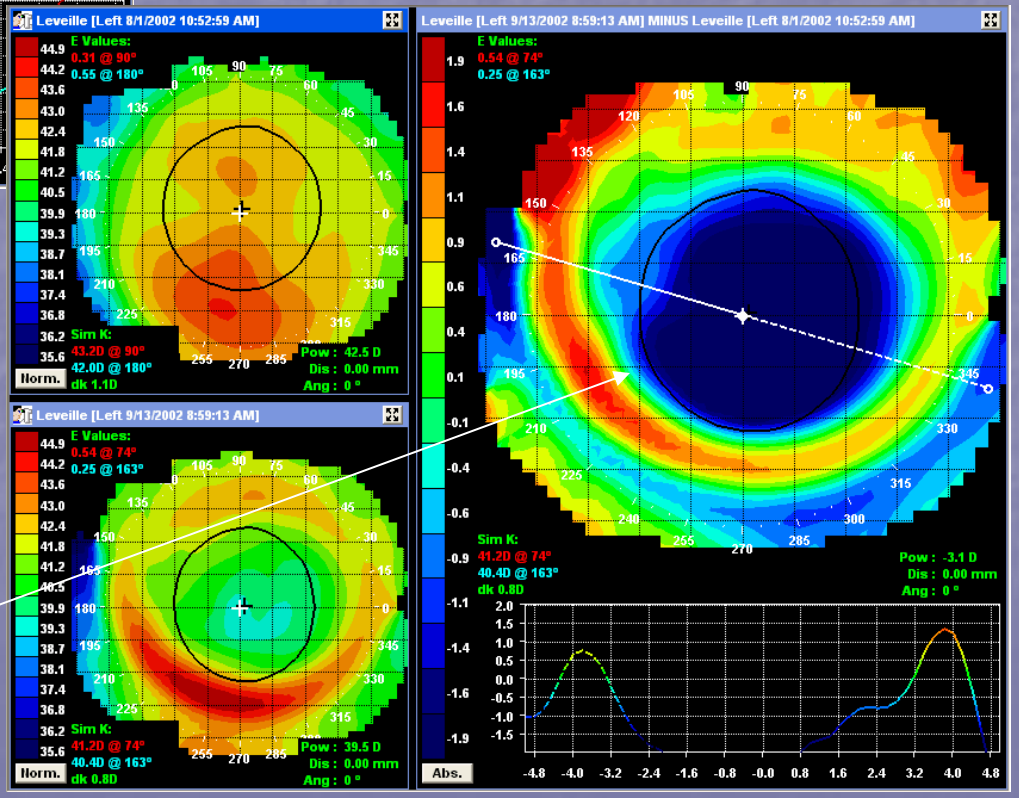
Decentration could result in poor VA and limited chances of reduced wear schedule

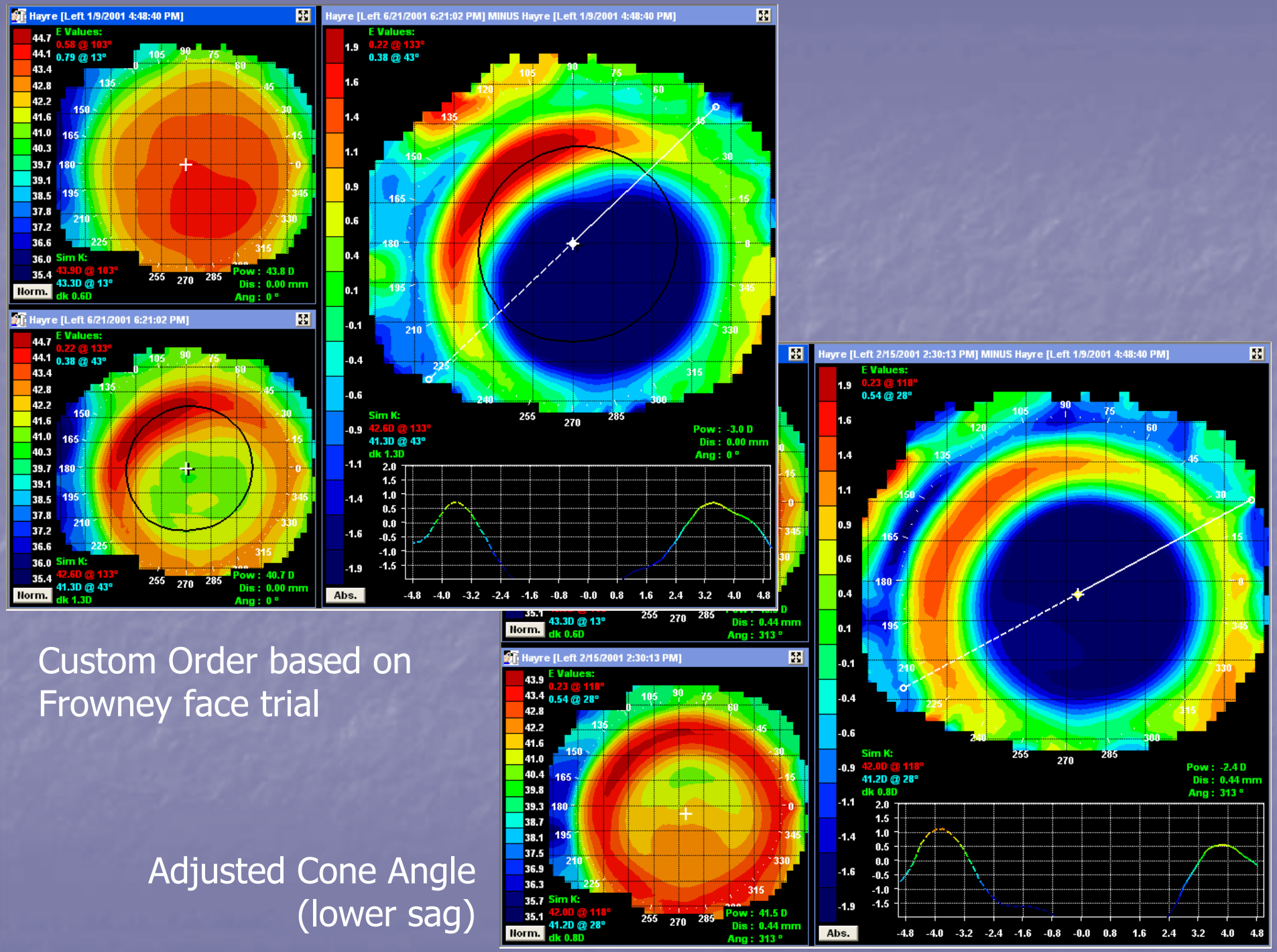



Center the effect for the best chances of a reduced wear schedule

Smiley Face

Bulls-eye






Custom Order based on Frowney face trial

Adjusted Cone Angle (lower sag)

# Marketing the BE Retainer in your office

# Preparing your Staff

- Educate your staff on Optimal Orthokeratology therapy
  - Science
  - Patient benefits
  - Procedure
  - Fees
- Present OOK at every opportunity
  - Brochures in the waiting area, video advertising, discuss following pre-test (if Rx is within range), should be discussed with all patients as an option to glasses, contacts or LASIK
- Topography user(s)
  - Training (Accurate topography is critical to the success of OOK.  Users should be comprehensively trained)

# Therapy Fees

- Optimal Orthokeratology Investment
  - Education
  - Equipment – Topographer (Medmont)
  - BE Retainer Fitting Set/Software
- OOK therapy should be considered a Specialty of contact lens practice
- Assume 7 visits per patient (initial year)
- Set your fees appropriately

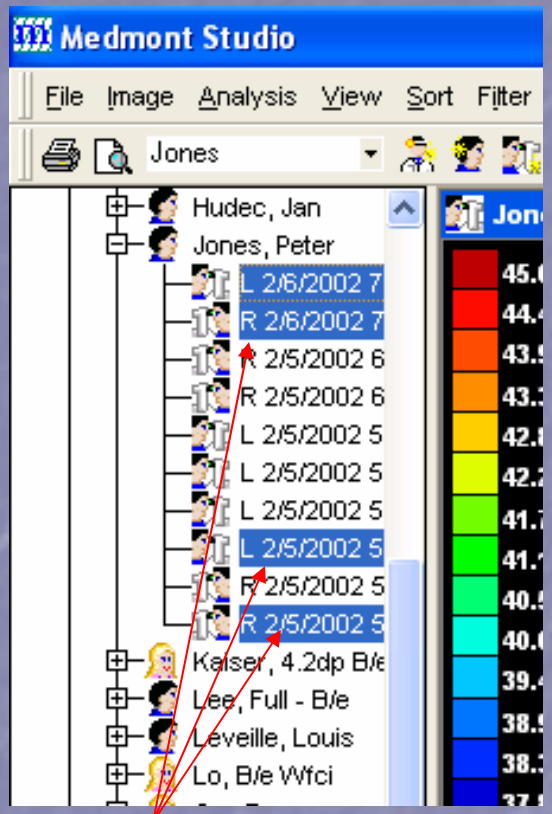
# Getting Started

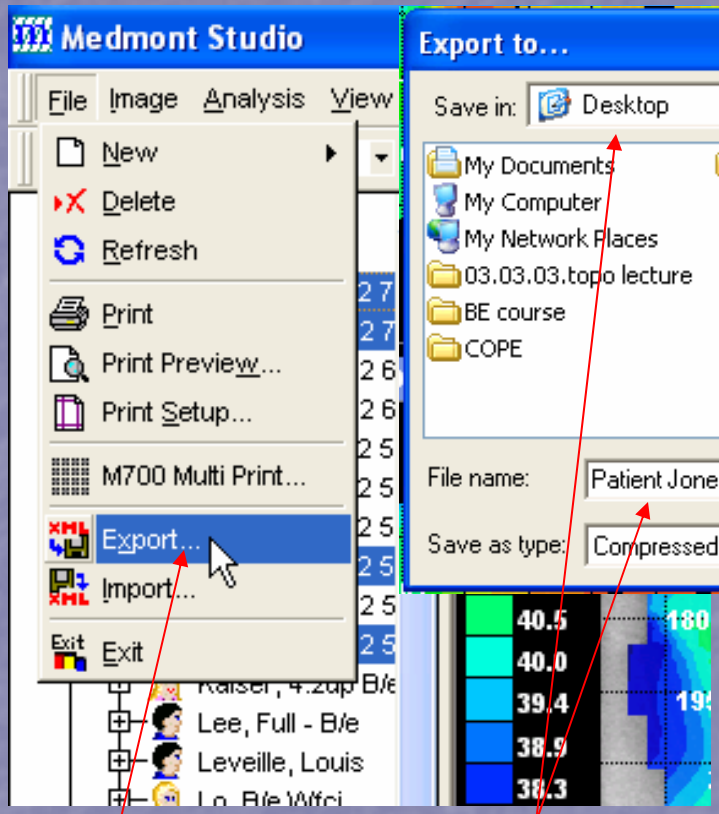
- Read the manual twice!
- Read the manual twice!
- Fit staff or family first
- Familiarize yourself with subtractive/difference maps (A, T, R)
- Choose low Rx's to start
- A record of 100% success speaks volumes
- Send ecstatic patients into the community

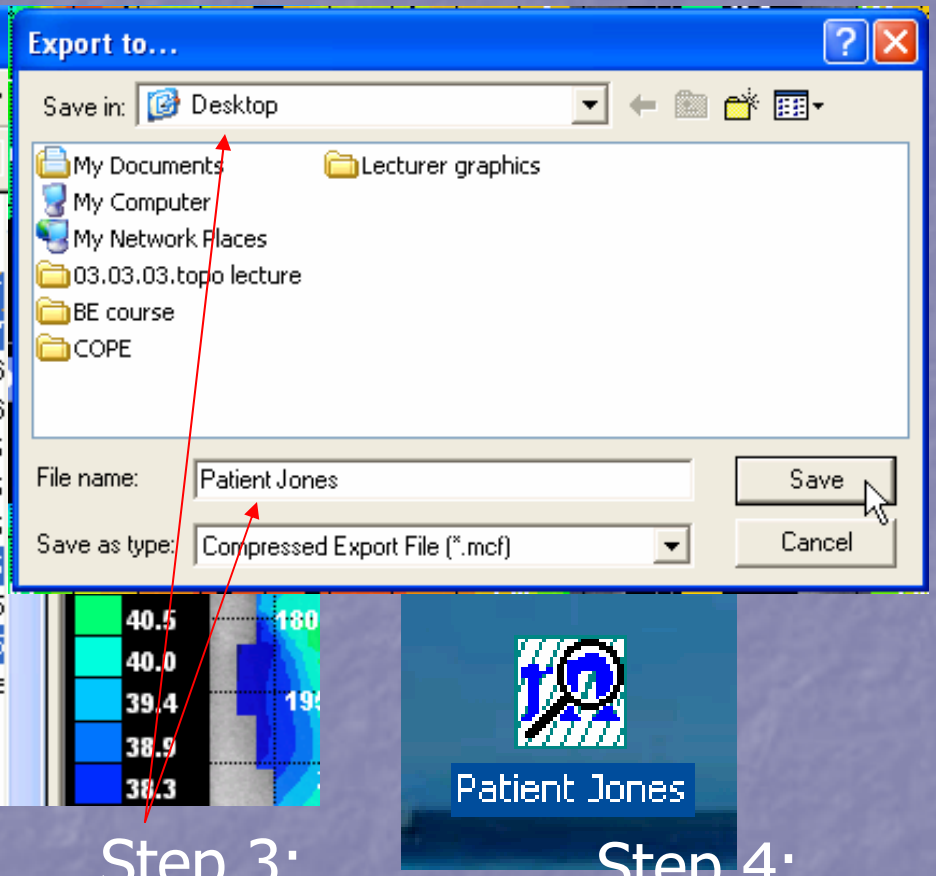
# Advertising

- Patients are your best advertising
- Pamphlets should be accessible
- Posters create interest
- Media is an excellent way to expose the office and build your OOK practice

# Acquiring Technical Support: Medmont Users




Step 1:
Select pre & post treatment maps OU

Step 2:
Select "File" & "Export"

Step 3:
Save to: desktop as "patient name"

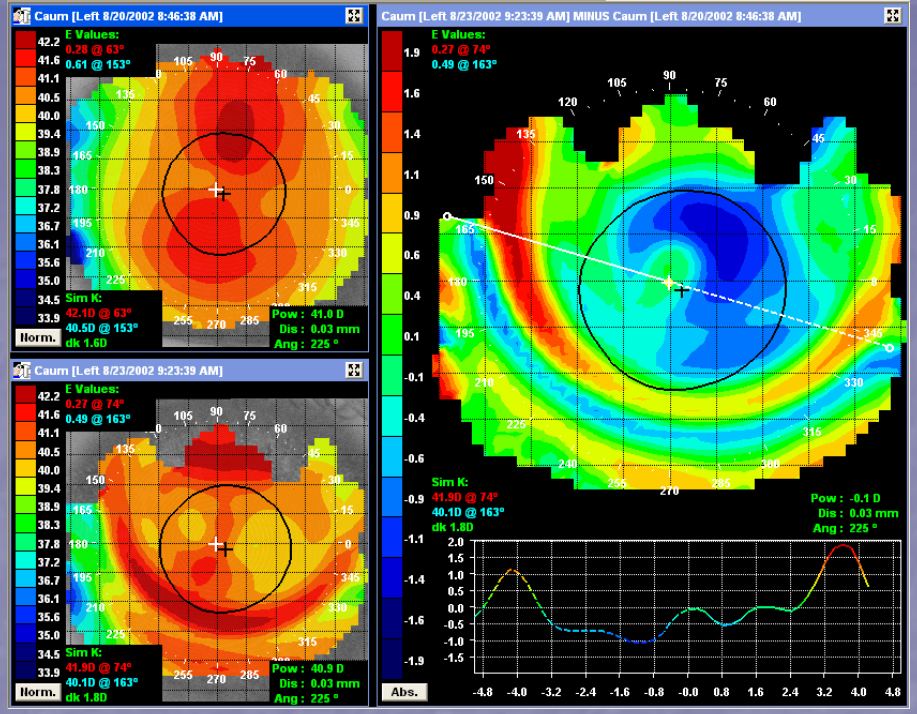
Step 4:
Email the Icon to your consultant

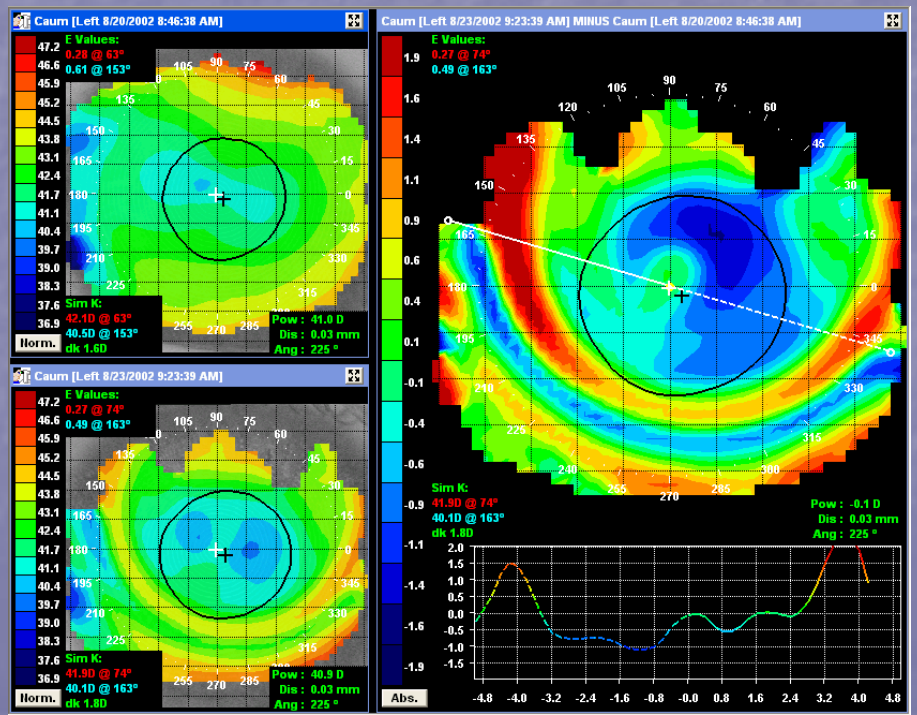
# Consultation

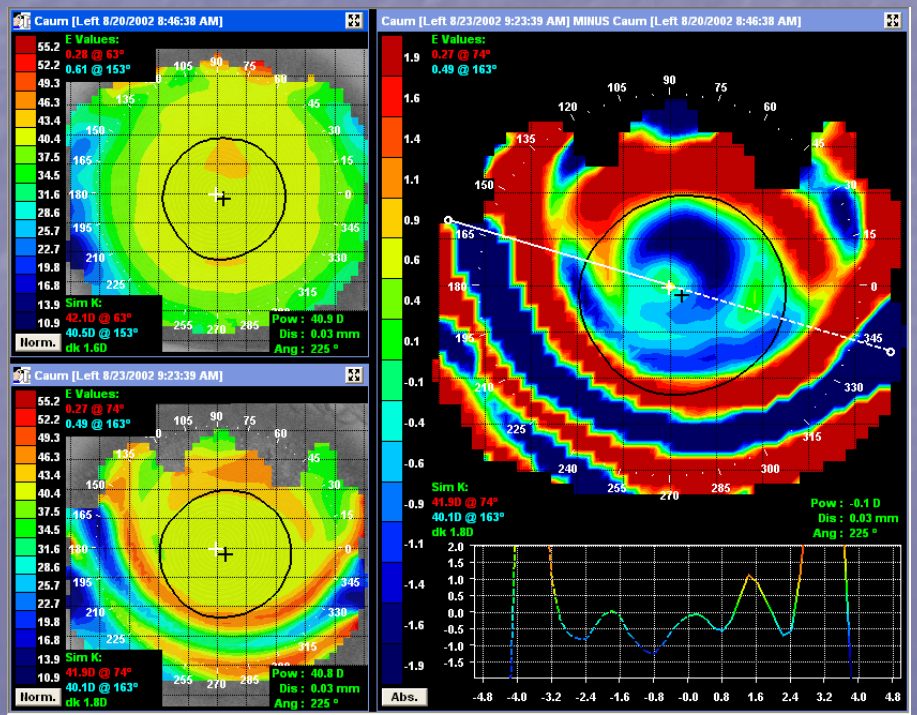
Don’t try to explain this by phone

Email the maps to your consultant for technical assistance

Allow your consultant to evaluate axial, tangential and refractive with you simultaneously



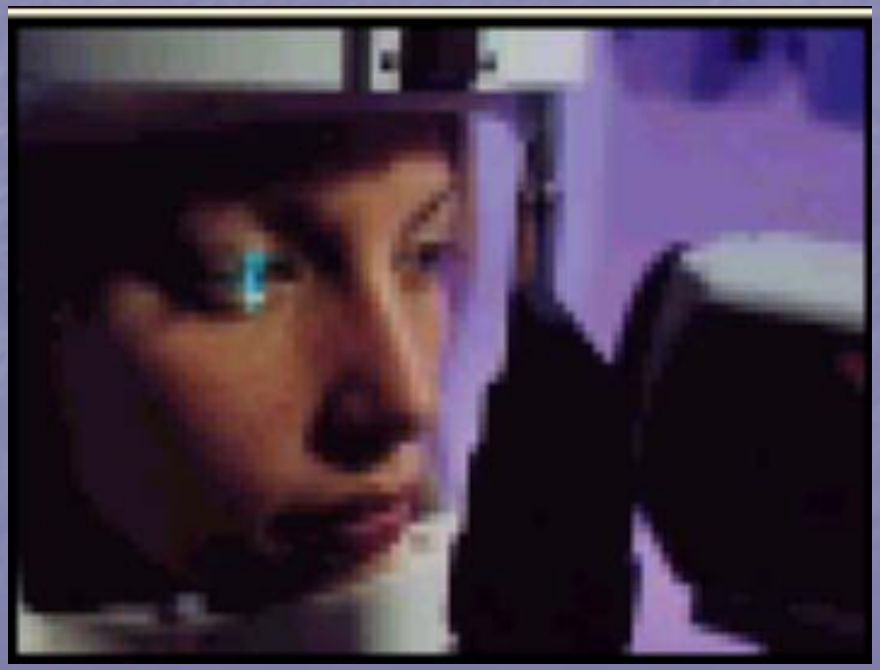
# Acquiring Technical Support: NON-Medmont Users

If you don’t own a Medmont topographer, download the following screen saver/capture program in order to email map responses:

Snag-it
www.techsmith.com

# Advanced BE Retainer Concepts

# The Trial:
# Slit Lamp Evaluation

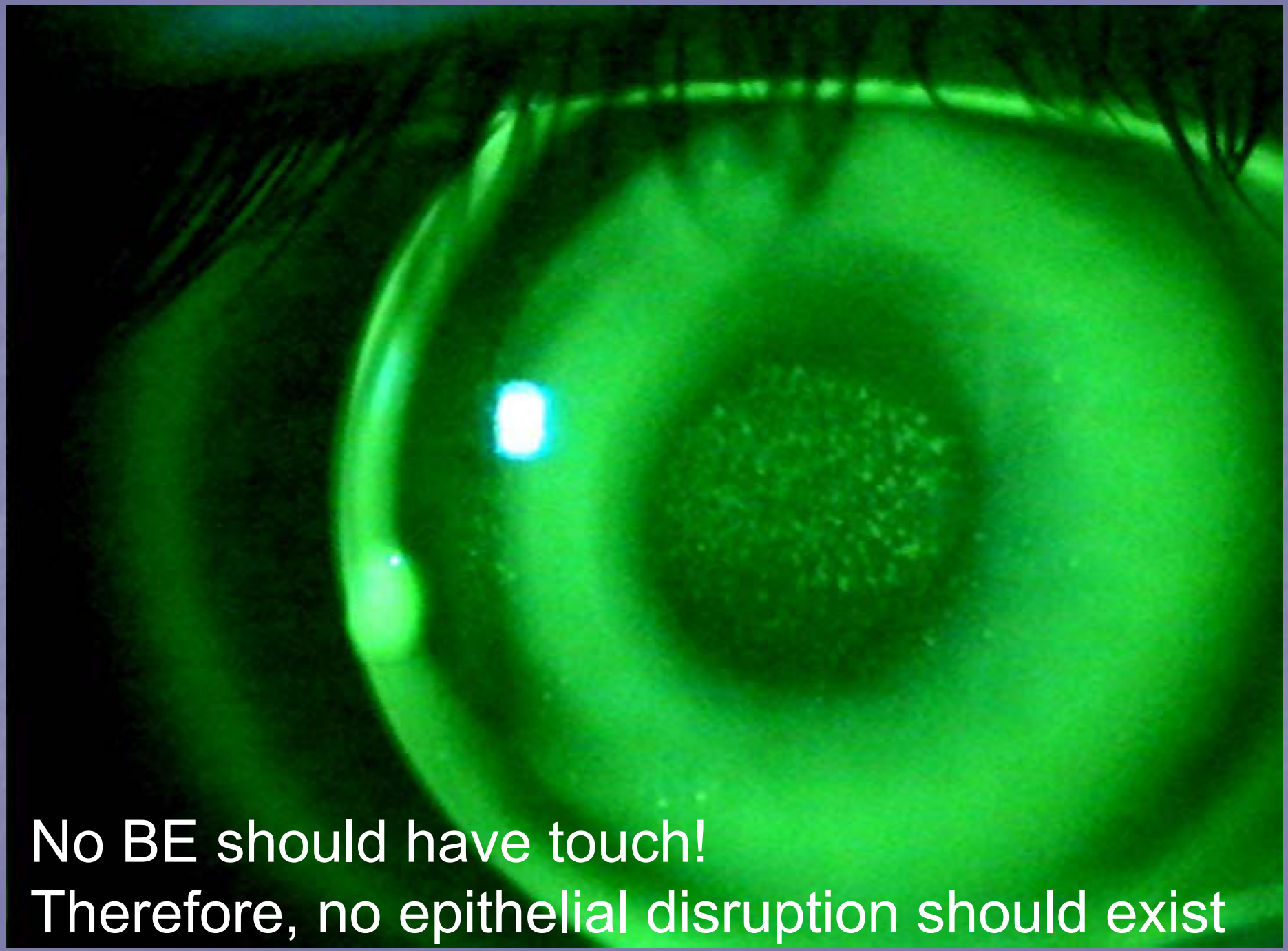


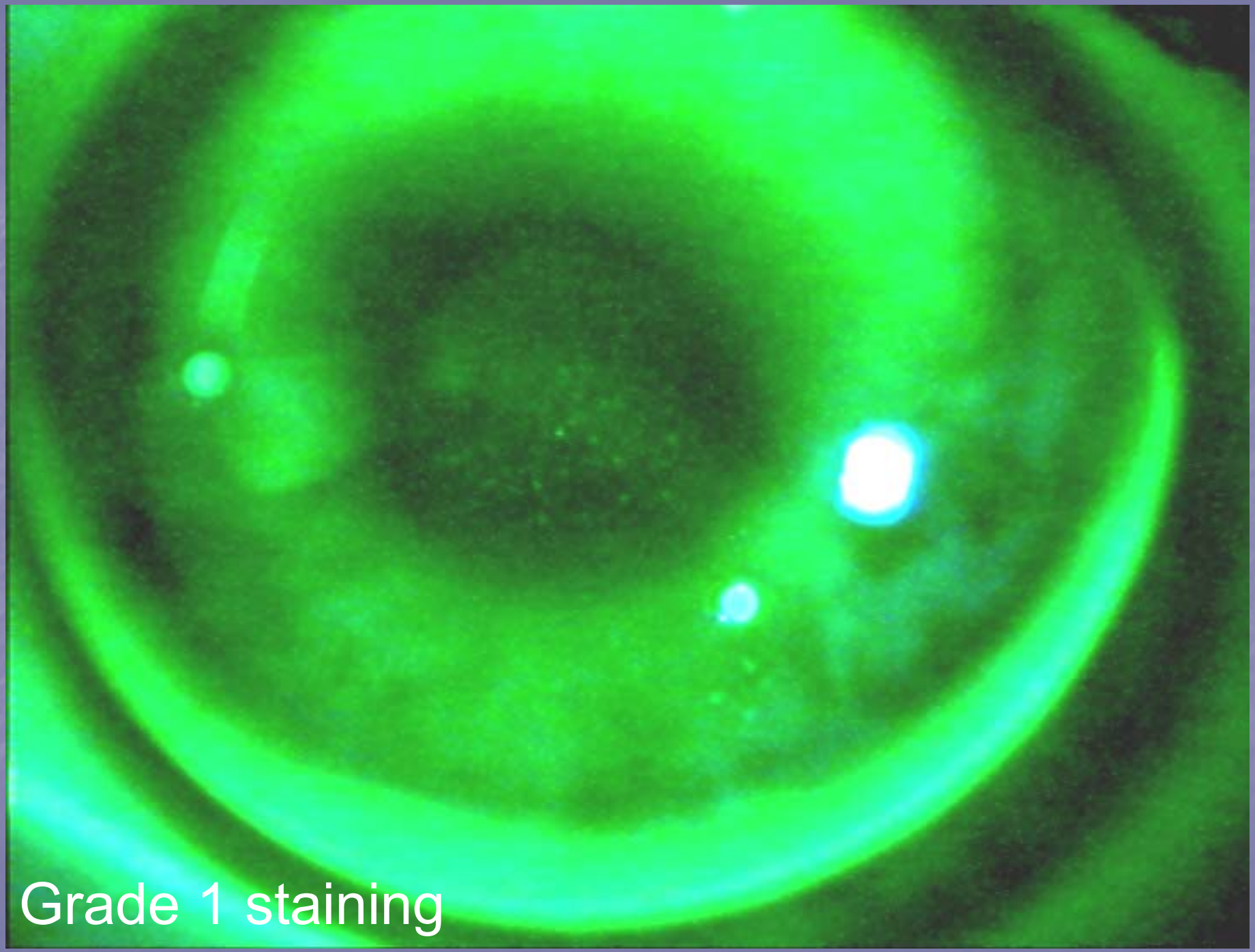
# The Trial:
# Post Treatment AM Visit

- See OOK patients early in the AM
  - Evaluate physiological response (slit lamp evaluation)
  - Show the patient the proper removal (especially bound Retainers)
  - Assure the most distinct topography response
- Toughest OOK experience – the 1st day in the trial
- Discontinue patients with comfort issues

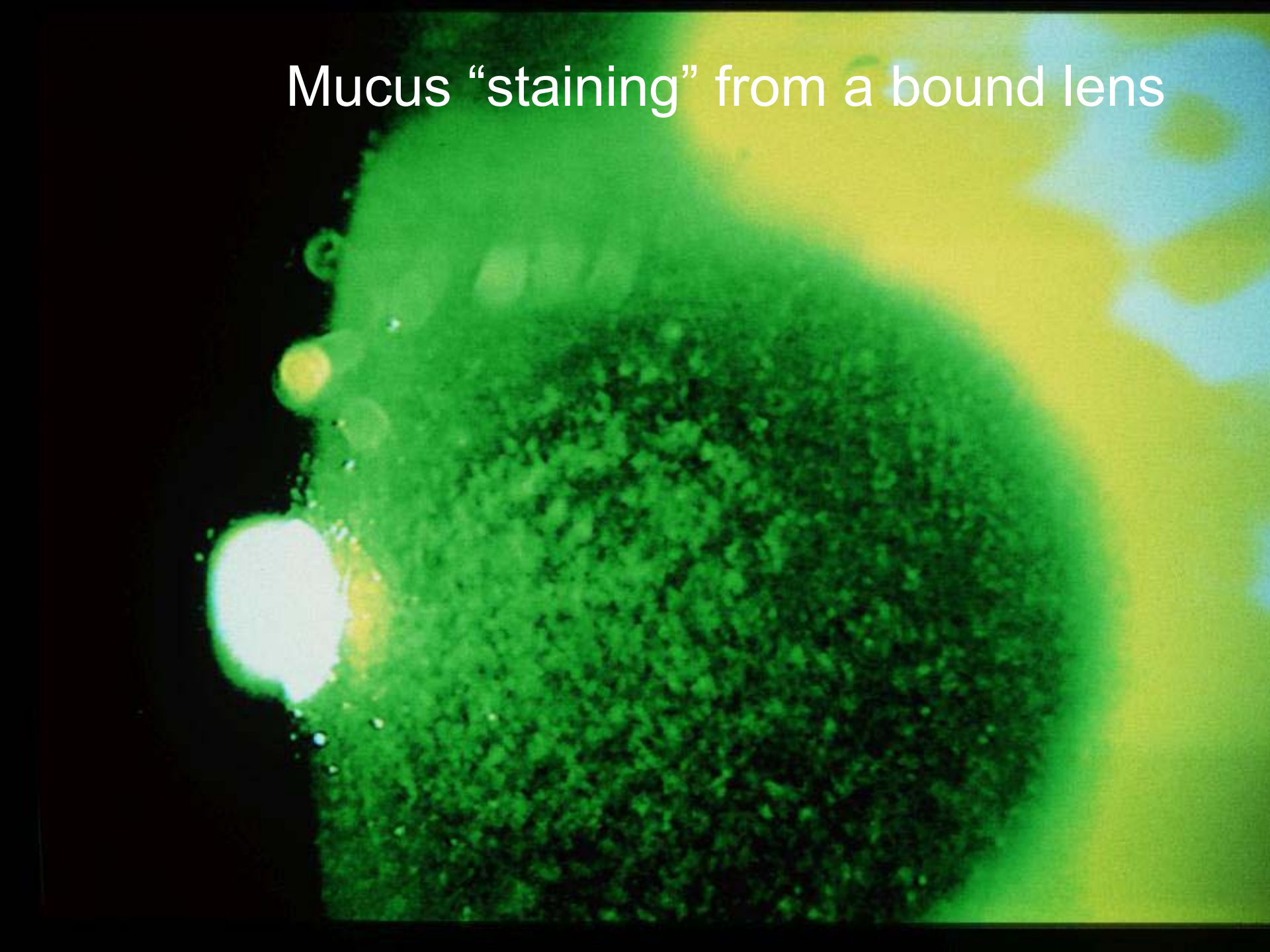
# Follow-up:
# Slit Lamp Evaluation

- Check for staining
- Check for binding/adherence
- Properly "release" and/or remove Retainers
- Grade Staining on the CCLRU scale
- Determine if "touch" exists
- Evaluate for contra-indicating physiological responses


No BE should have touch!
Therefore, no epithelial disruption should exist


Grade 1 staining

# Mucus “staining” from a bound lens

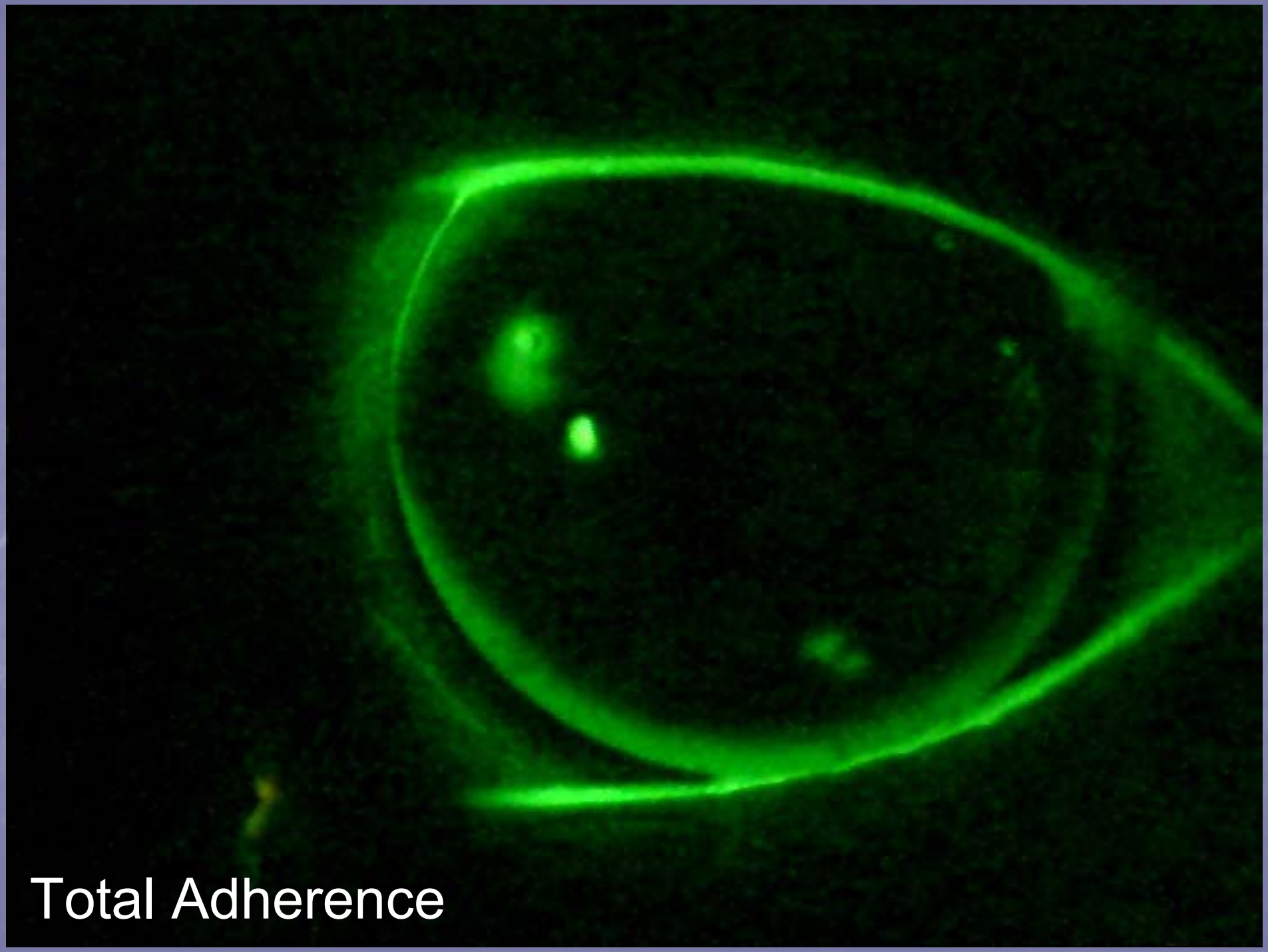


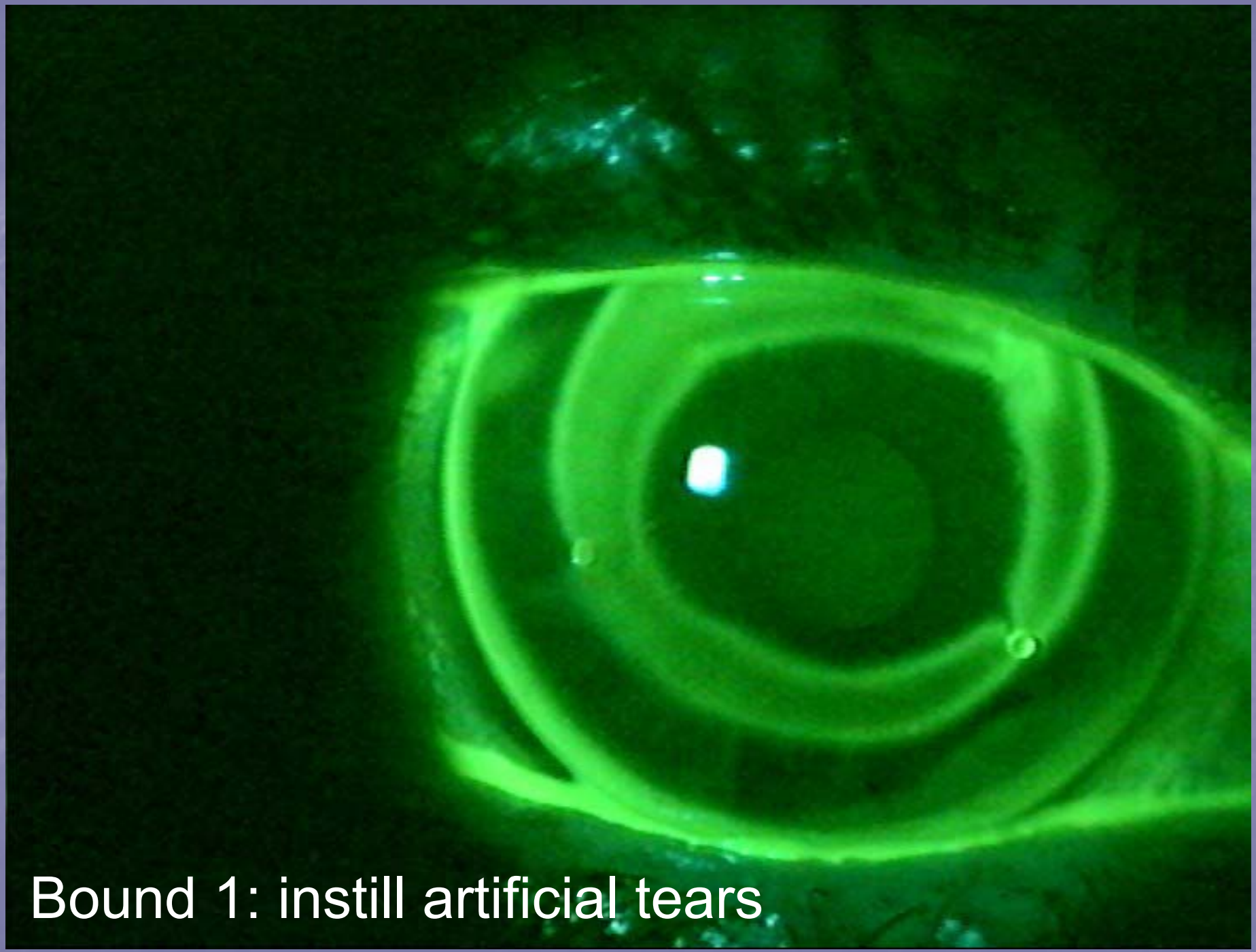
# True Staining?

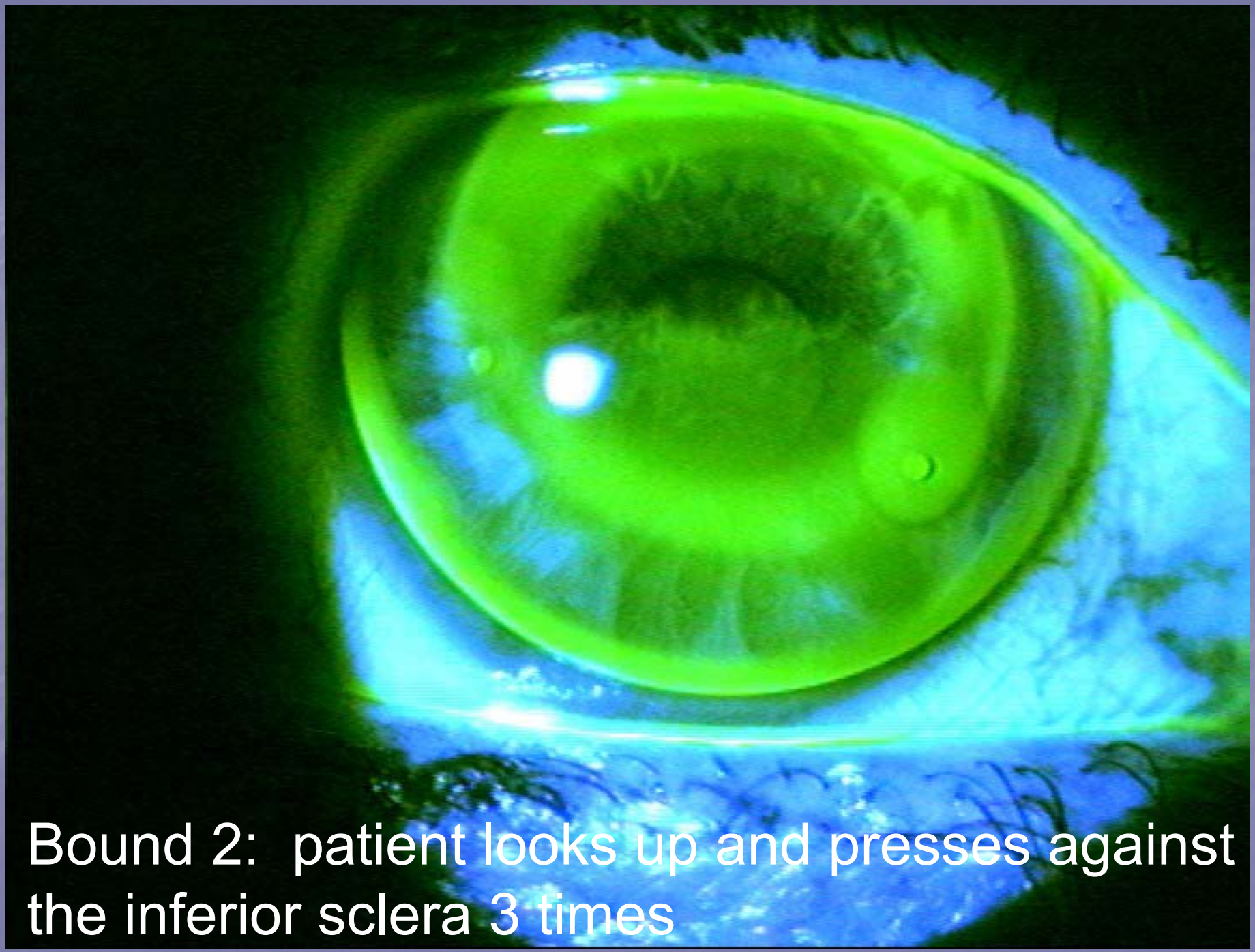
- True Staining
  - Grade on CCLRU Scale
  - Grade 1:
    - Response to RGP wear?  Evaluate in 20 min.
    - Evident after 20 min.: change trial
  - Grade 2:
    - Major concern
    - Change trial 2 steps (16um – microns)
- Mucus Staining
  - Instill artificial tears (Wait a few minutes)
  - Mucus disappears
  - True staining doesn’t

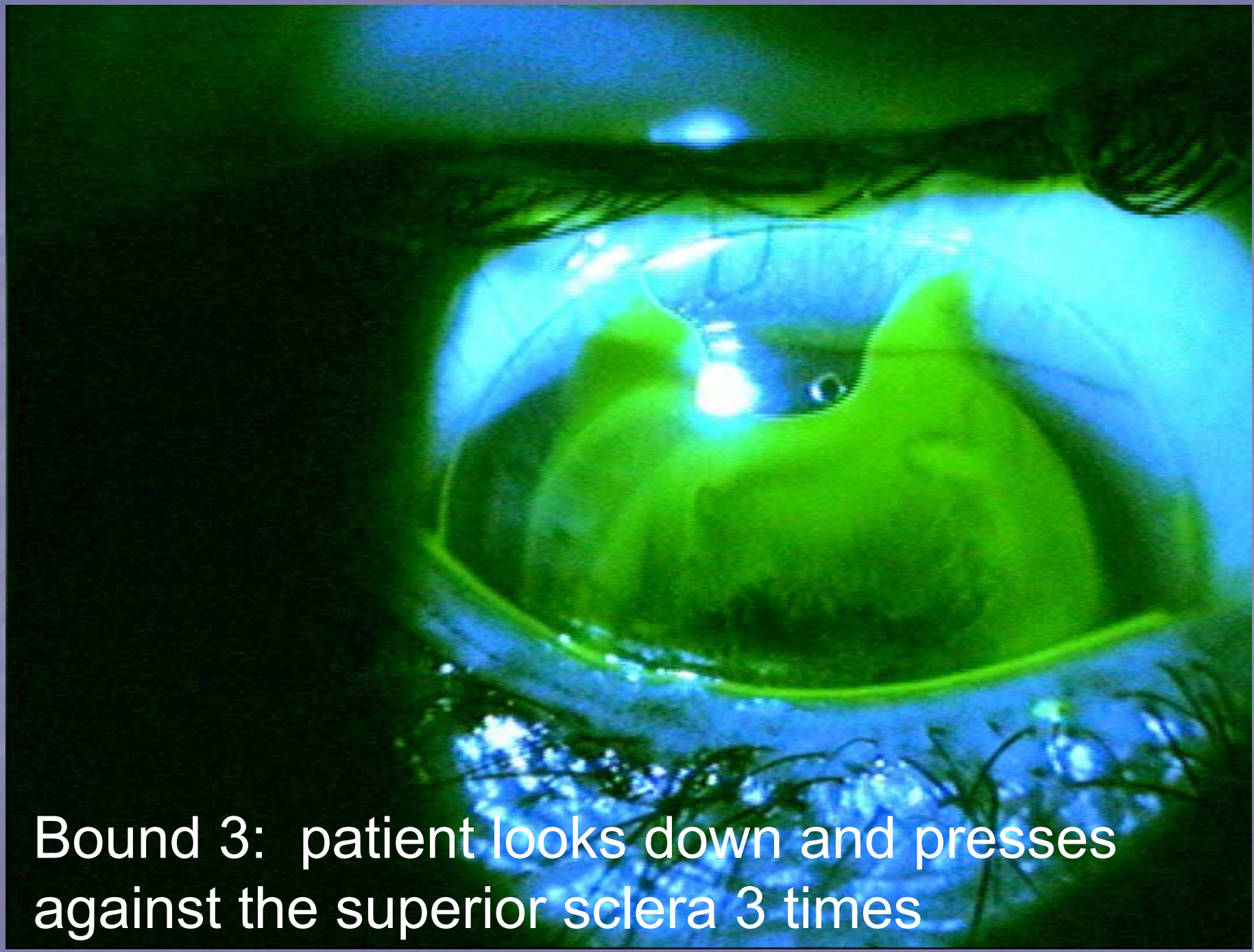
# Retainer Binding/Adherence

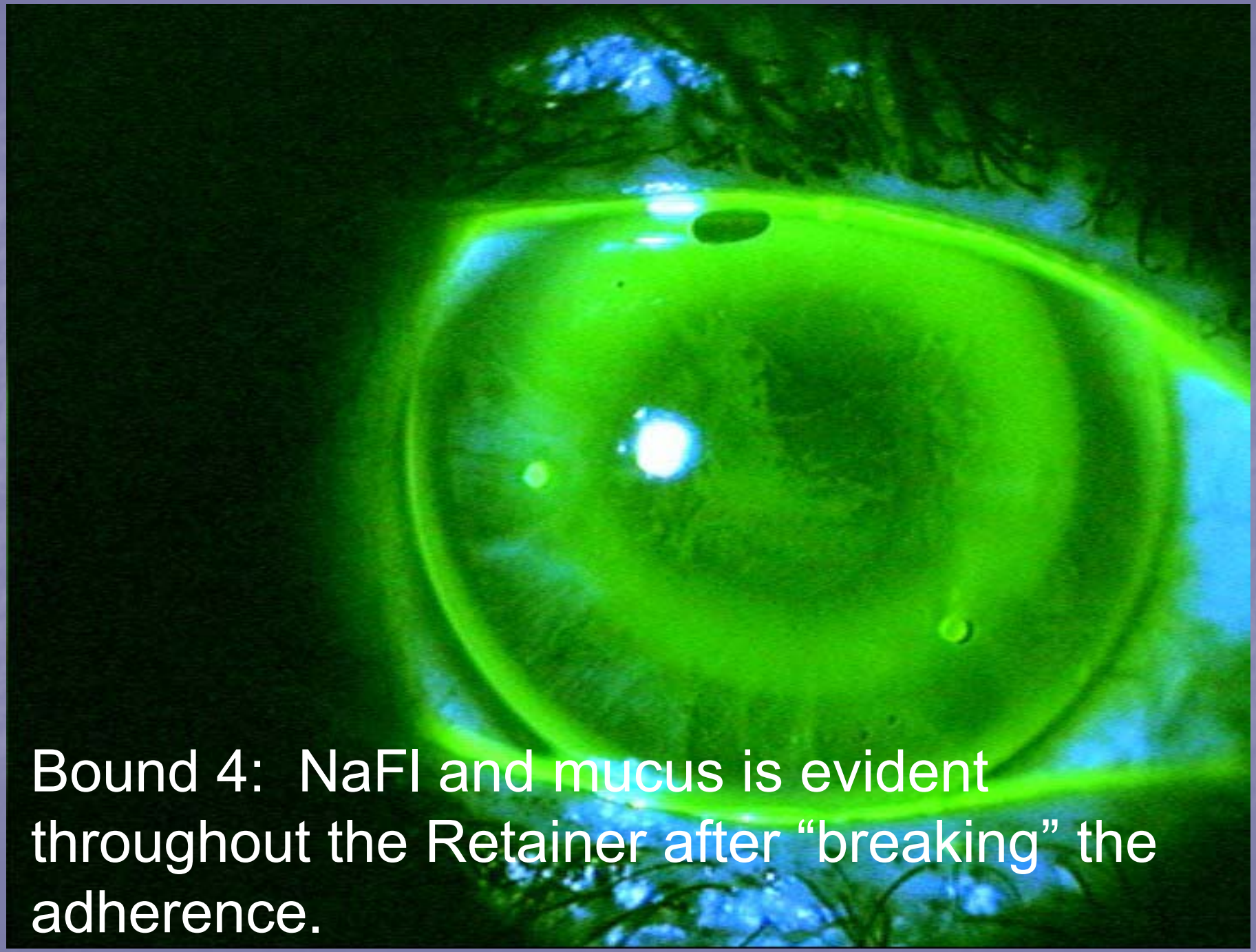
- Binding is a normal OOK occurrence (consistent or intermittent)
- Due to aqueous thinning and increased viscosity
- NOT due to retainer fit
- Cannot stop binding by changing retainer
- Patients MUST know how to recognize and free up a bound lens.


Total Adherence

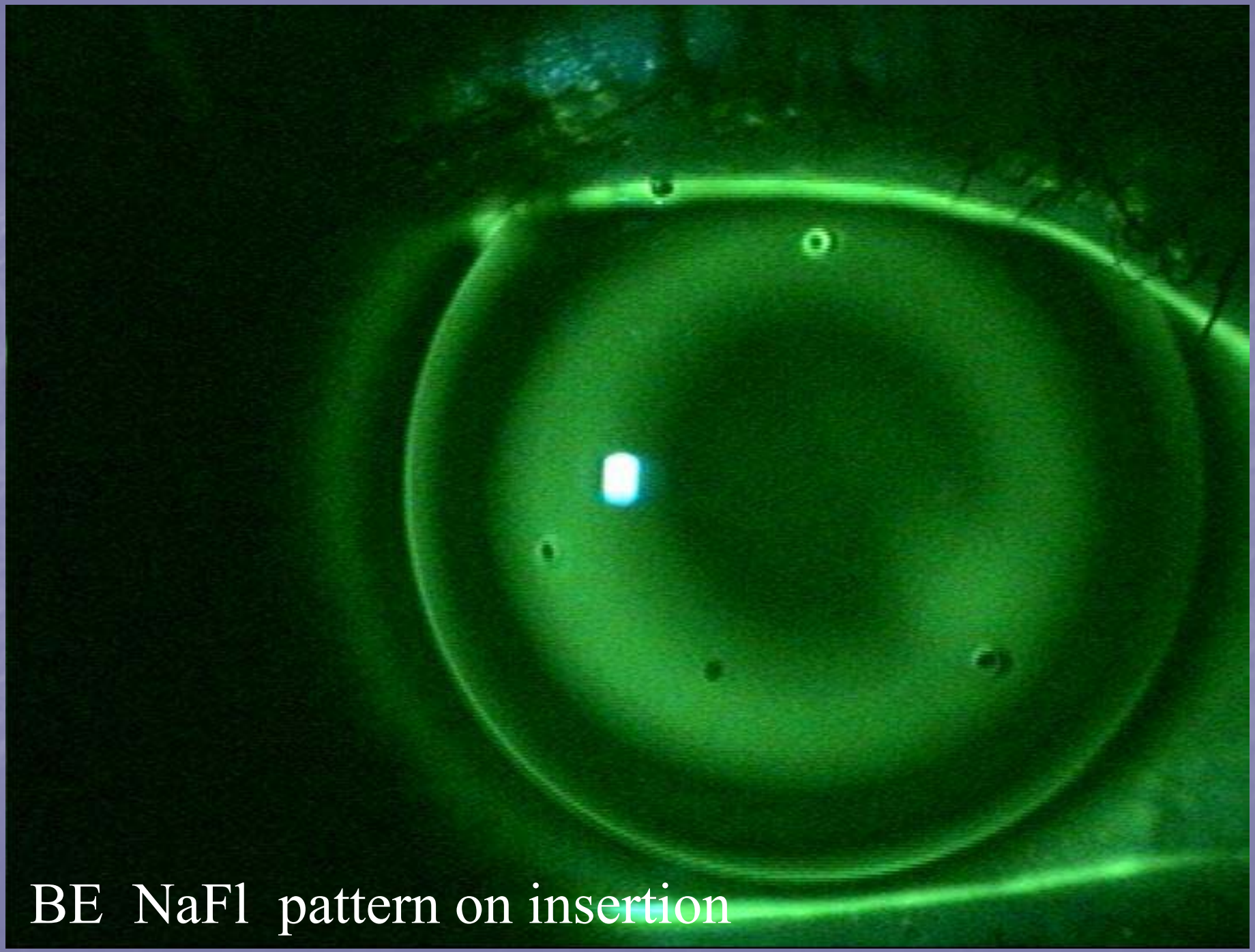

Bound 1: instill artificial tears

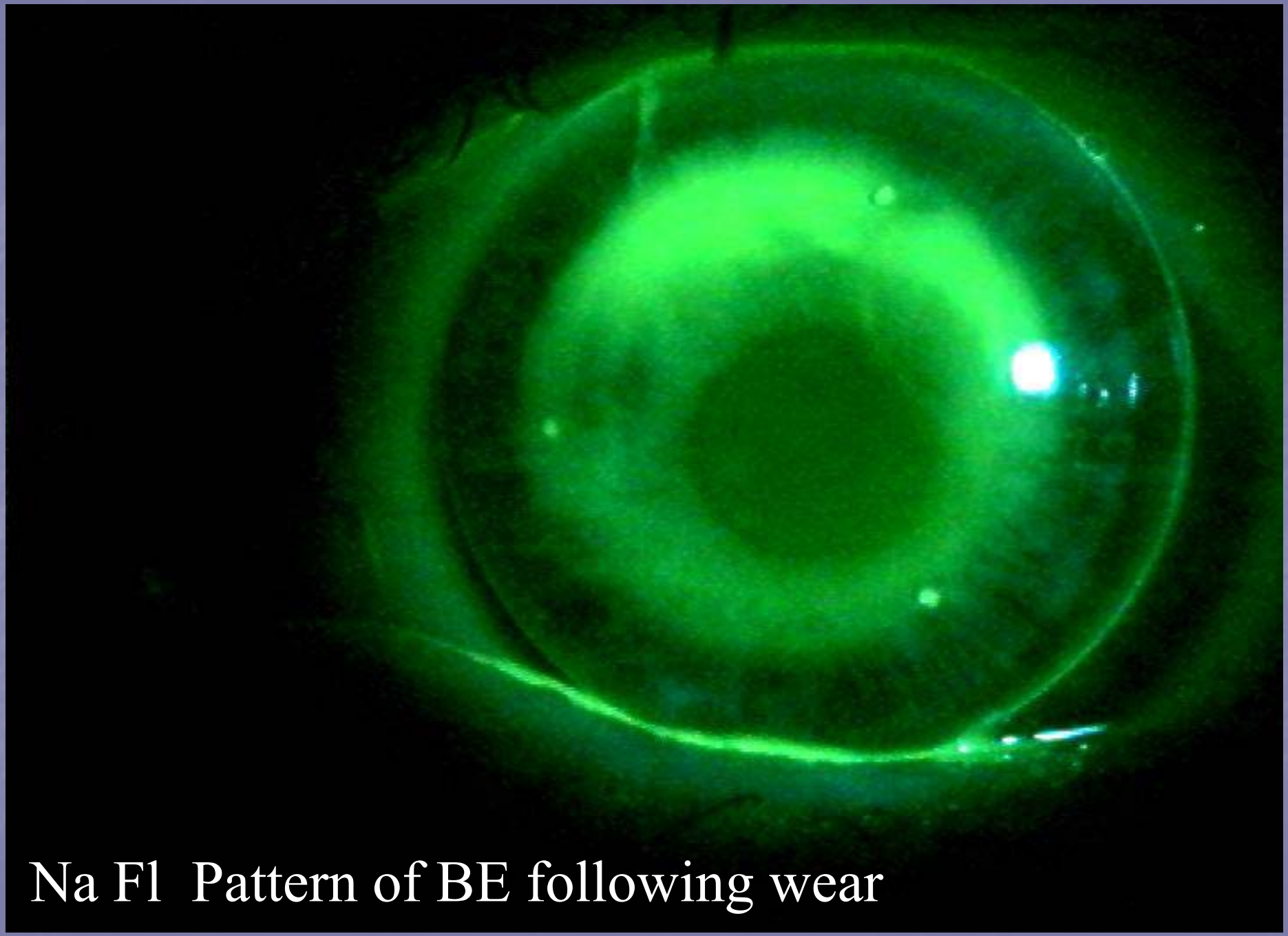

Bound 2:  patient looks up and presses against the inferior sclera 3 times


Bound 3:  patient looks down and presses against the superior sclera 3 times



Bound 4:  NaFl and mucus is evident throughout the Retainer after “breaking” the adherence.


BE NaFl pattern on insertion



Na Fl  Pattern of BE following wear

# Smiley Face Responses

- Cornea must normalize before retrial
- If the topography indicates SF but no staining:
  - Increase sag 8 microns (next steeper trial)
- If the topography indicates SF, SF with a false CI or Divot and there is G1 staining:
  - Increase sag 8 microns (next steeper trial)
- If the topography indicates SF, SF with a false CI or Divot and there is G2 staining:
  - Increase sag 16 microns (2 trial retainer steps steeper)
- Patient refractively responds well to SF's

# Central Island Responses

- Cornea must normalize before retrial
- If the topography indicates a CI and steepening of the corneal apex by <1.50:
  - Lower sag by 8 microns (next flatter trial)
- If the topography indicates a CI and steepening of the corneal apex by ≥1.50:
  - Lower sag by 16 microns (2 trial steps flatter)
- If the topography indicates a low centered B/E or FF:
  - Lower sag by 8 microns (next flatter trial)
- CI's can result when large lenses are used on small corneas (evaluate HVID if a CI results)
- CI responses often result in an increase in Rx astigmatism and poor corrected VA (vision normalizes in 3-4 hours)

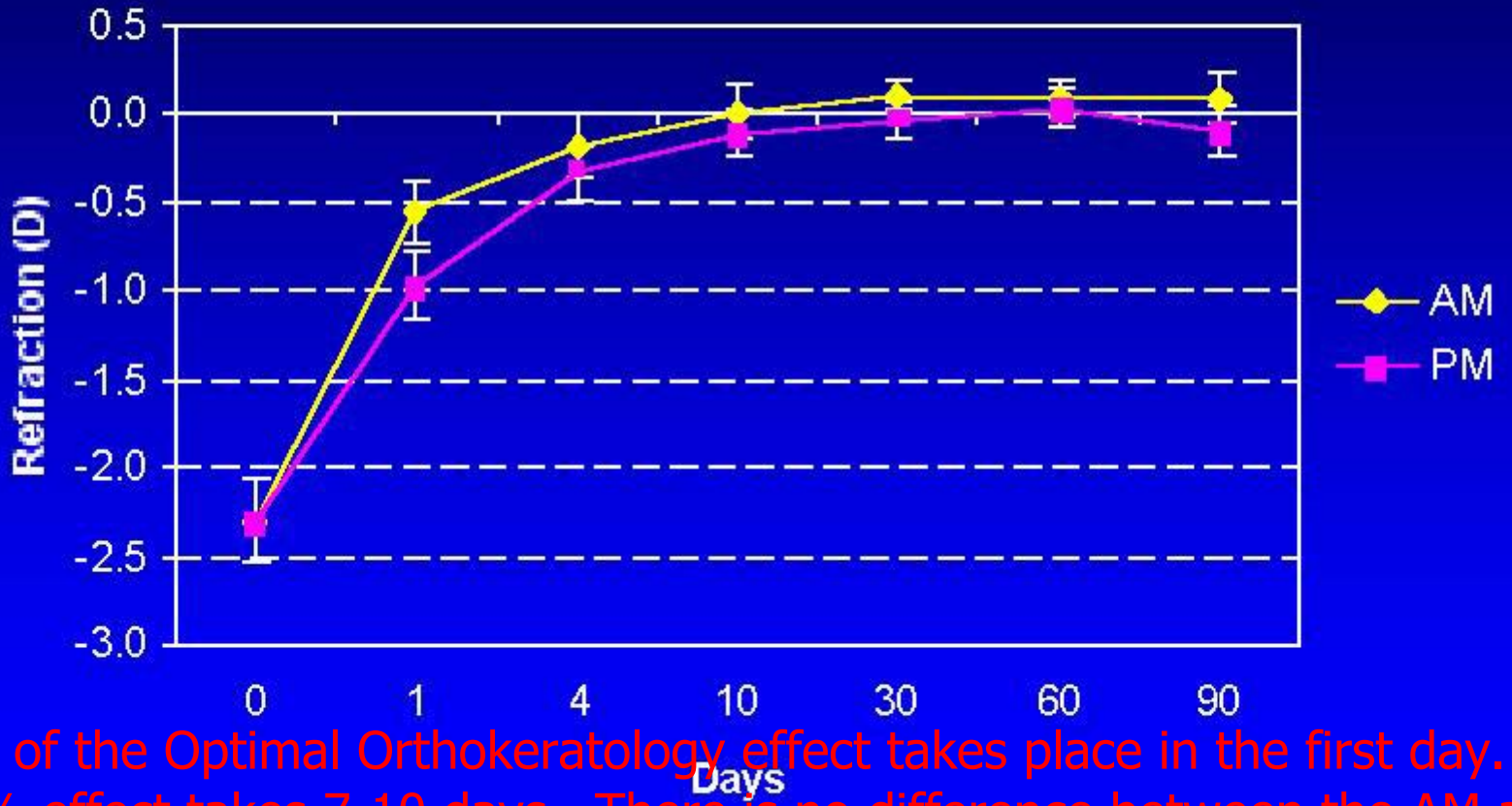
# ¼, 1/3, ½ Tangents?

- ¼ tangent: Standard on 95% of all BE Retainer custom orders
- 1/3 Tangent: Used to improve LATERAL centration
- ½ Tangent: Used on BE Retainer diameters smaller than 10.6
  - generally used with 10.2 diameters on extremely small corneas
- Advanced Fitting Tip: Use the BE calculated eccentricity to calculate tangents other than ¼ (discuss with you consultant)

# Bulls-Eye

- The BE Program assumes full effect
- Full Effect takes 7-10 consecutive days
- What if you do a 1-2 day trial?
- 70% Rx/topographical effect results in One night (Swarbrick)

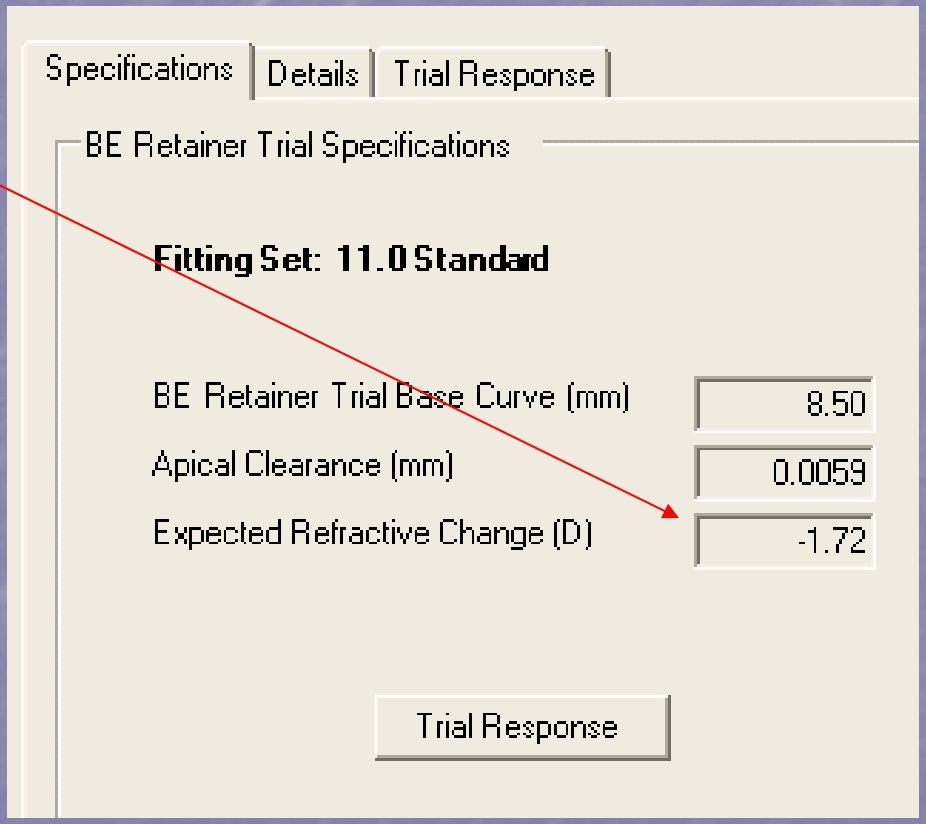
# Change in refraction



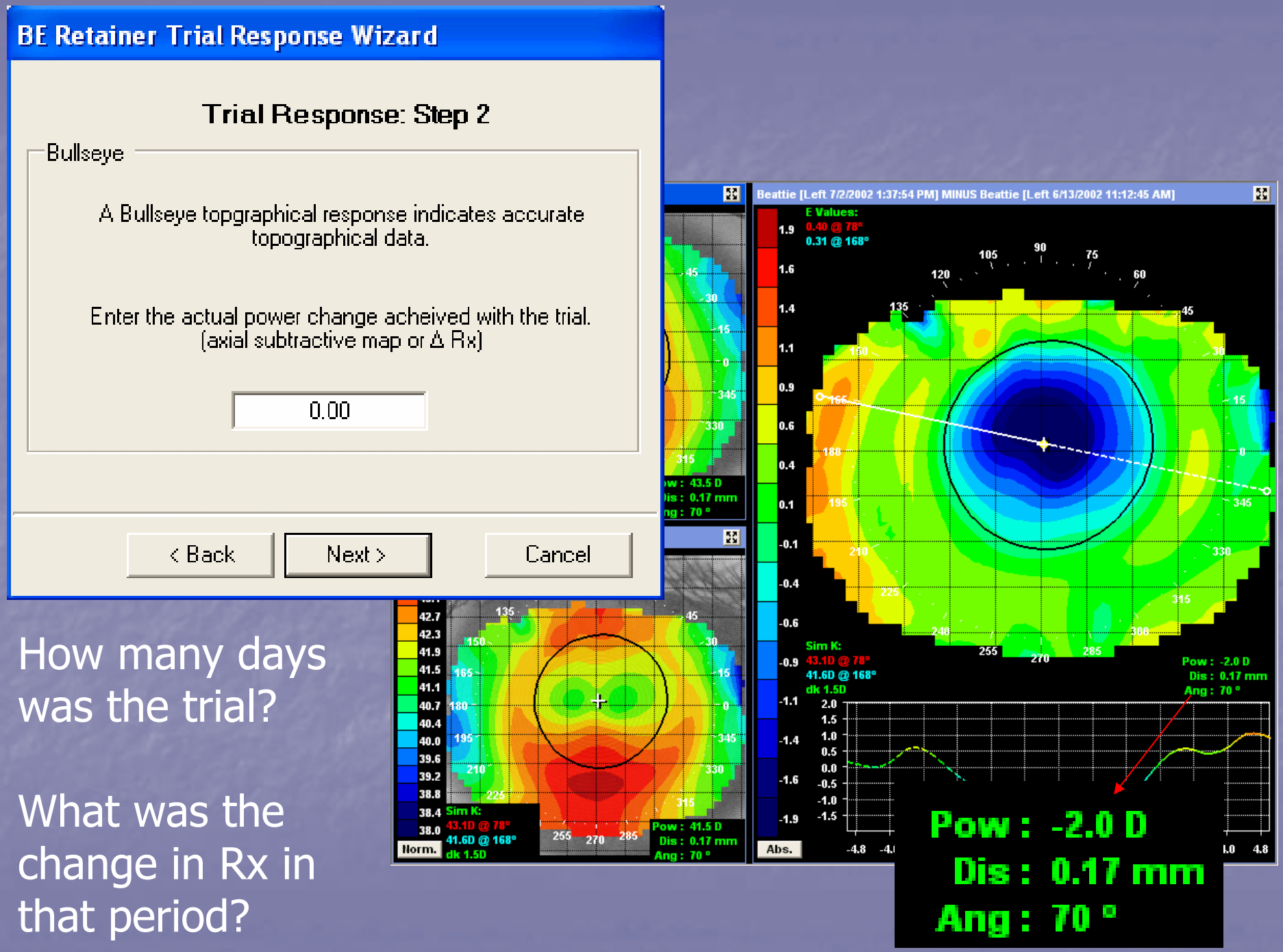

70% of the Optimal Orthokeratology effect takes place in the first day. 100% effect takes 7-10 days. There is no difference between the AM and PM vision after 10 days.

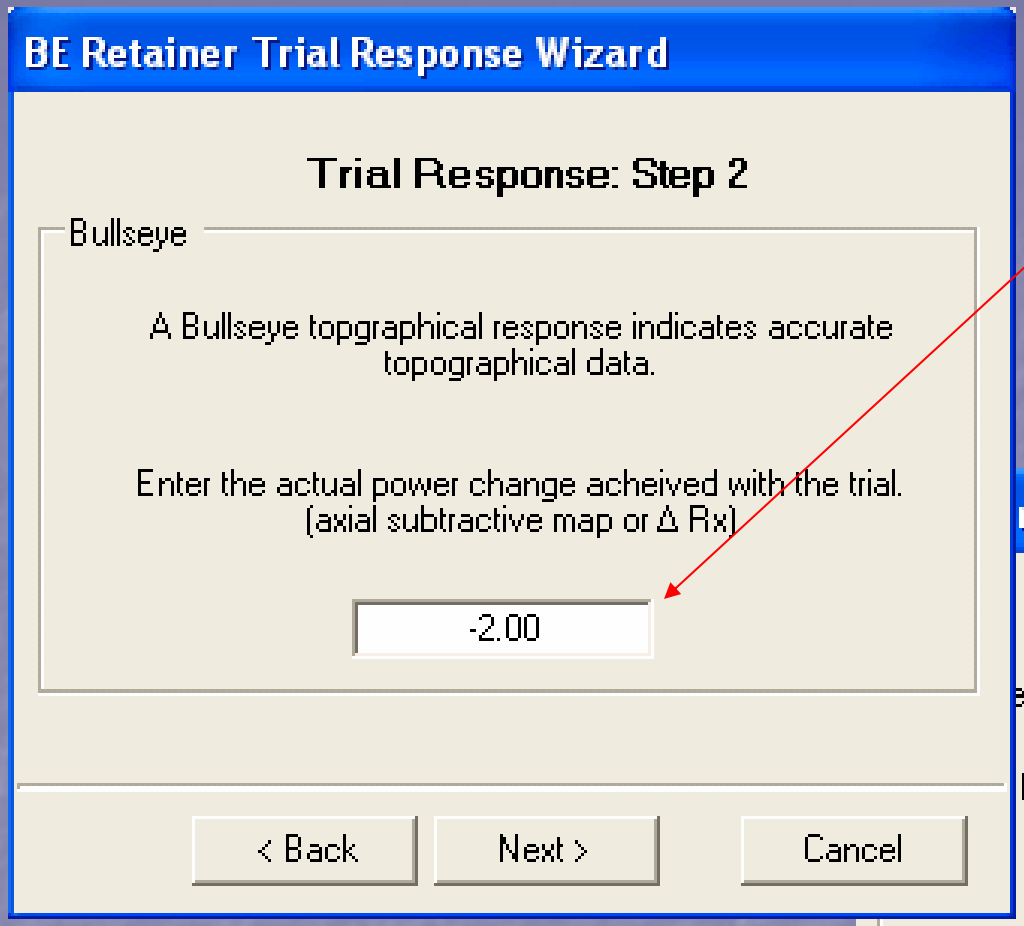
# Bulls-Eye Responses

- 1 day trials result in 70% effect
- BE Retainer software assumes full Rx effect
- Account for the additional effect if responding to the Rx change from a trial
- Ignoring the additional 30% effect could result in the custom order Retainer over-correcting

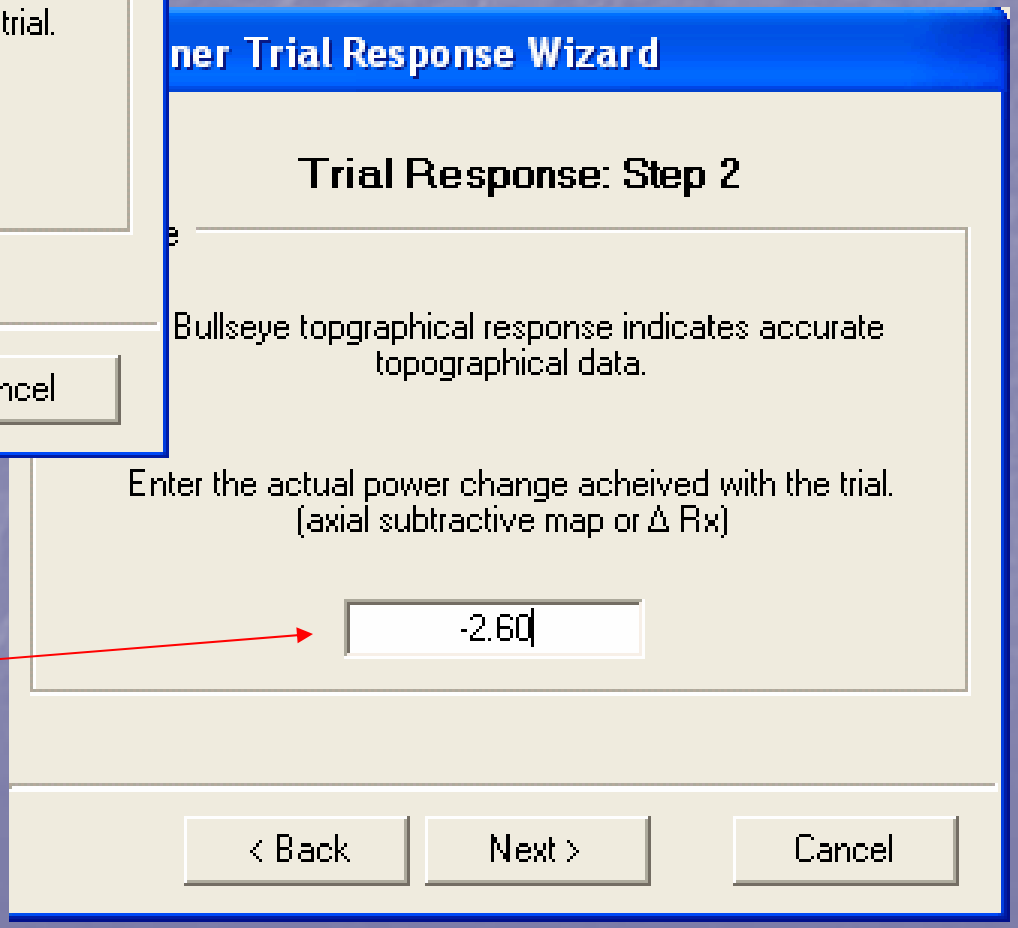


- If the patient responds with:
  - 1 Day then in 7-10 days
  - -1.00 -1.30
  - -2.00 -2.60
  - -3.00 -3.90
- Account for the additional Rx change that would result from more days in the trial
- Over-correction in teens could assist in a reduced wear schedule
- Over-correction in presbyopes could result in poor near VA


BE Retainer Trial Response Wizard
Trial Response: Step 2
Bullseye
A Bullseye topgraphical response indicates accurate topographical data.
Enter the actual power change acheived with the trial. (axial subtractive map or Δ Rx)
0.00
< Back
Next >
Cancel
How many days was the trial?
What was the change in Rx in that period?
Beattie [Left 7/2/2002 1:37:54 PM] MINUS Beattie [Left 6/13/2002 11:12:45 AM]
E Values:
0.40 @ 78°
0.31 @ 168°
Sim K:
43.1D @ 78°
41.6D @ 168°
dk 1.5D
Pow : -2.0 D
Dis : 0.17 mm
Ang : 70 °
Abs.
Norm.
Pow : 41.5 D
Dis : 0.17 mm
Ang : 70 °




1 day effect (70%)



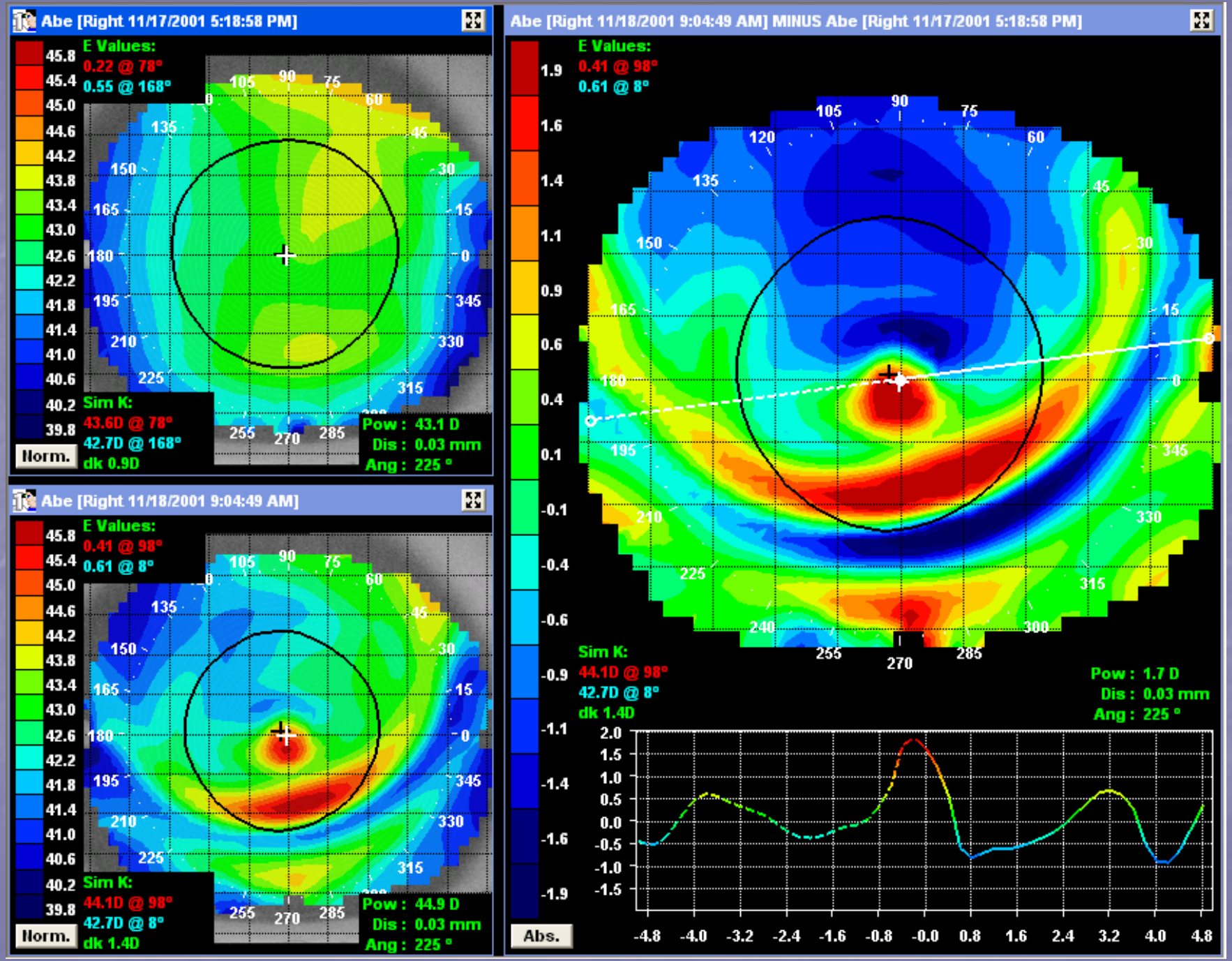

7-10 days effect (100%)

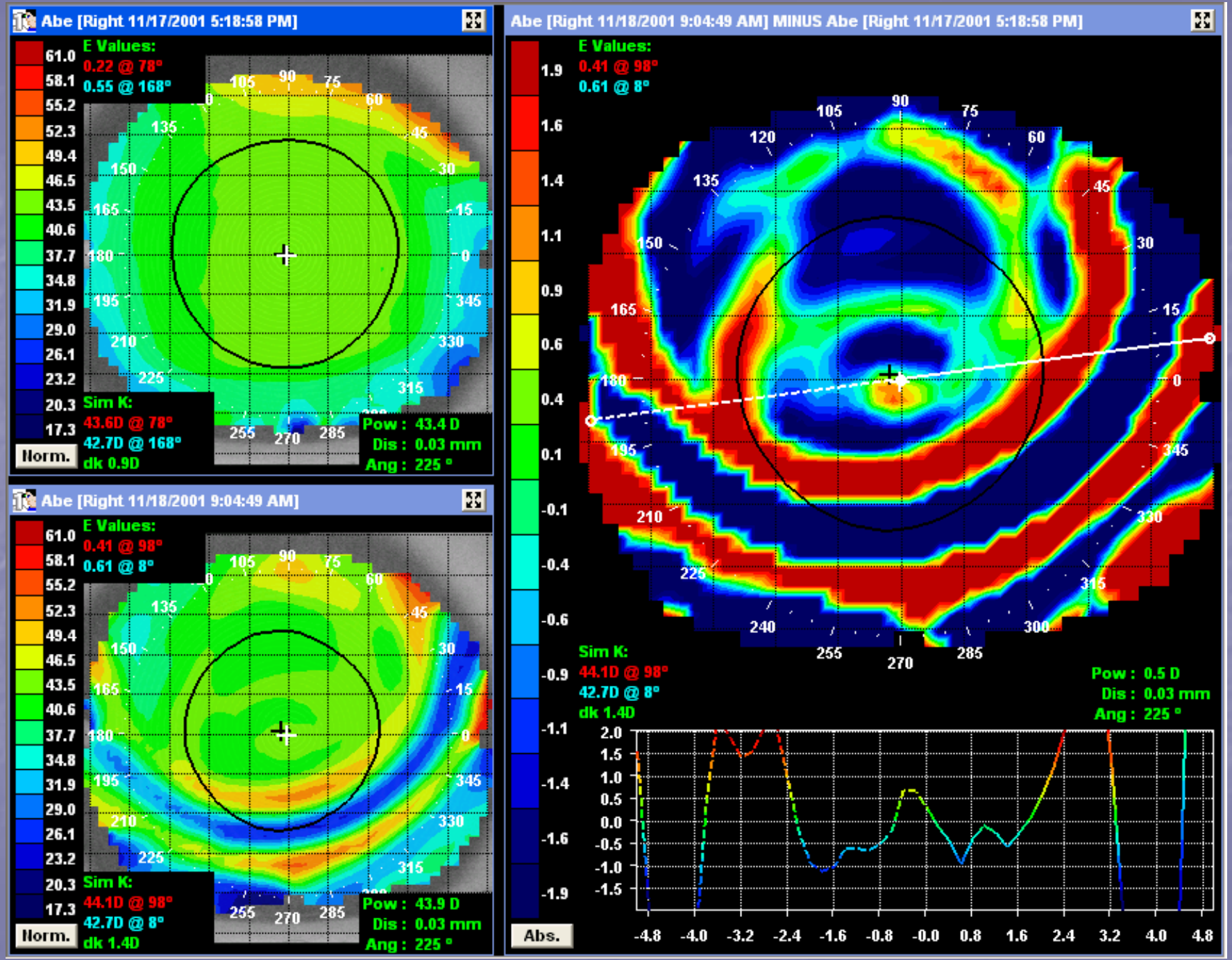
Performing multiple day trials is a more accurate way of calculating the “true” topographical and refractive response with a particular diagnostic.

It also provides more accurate data when “trial responding” and therefore results in more accurate custom orders

What is the topographical response?

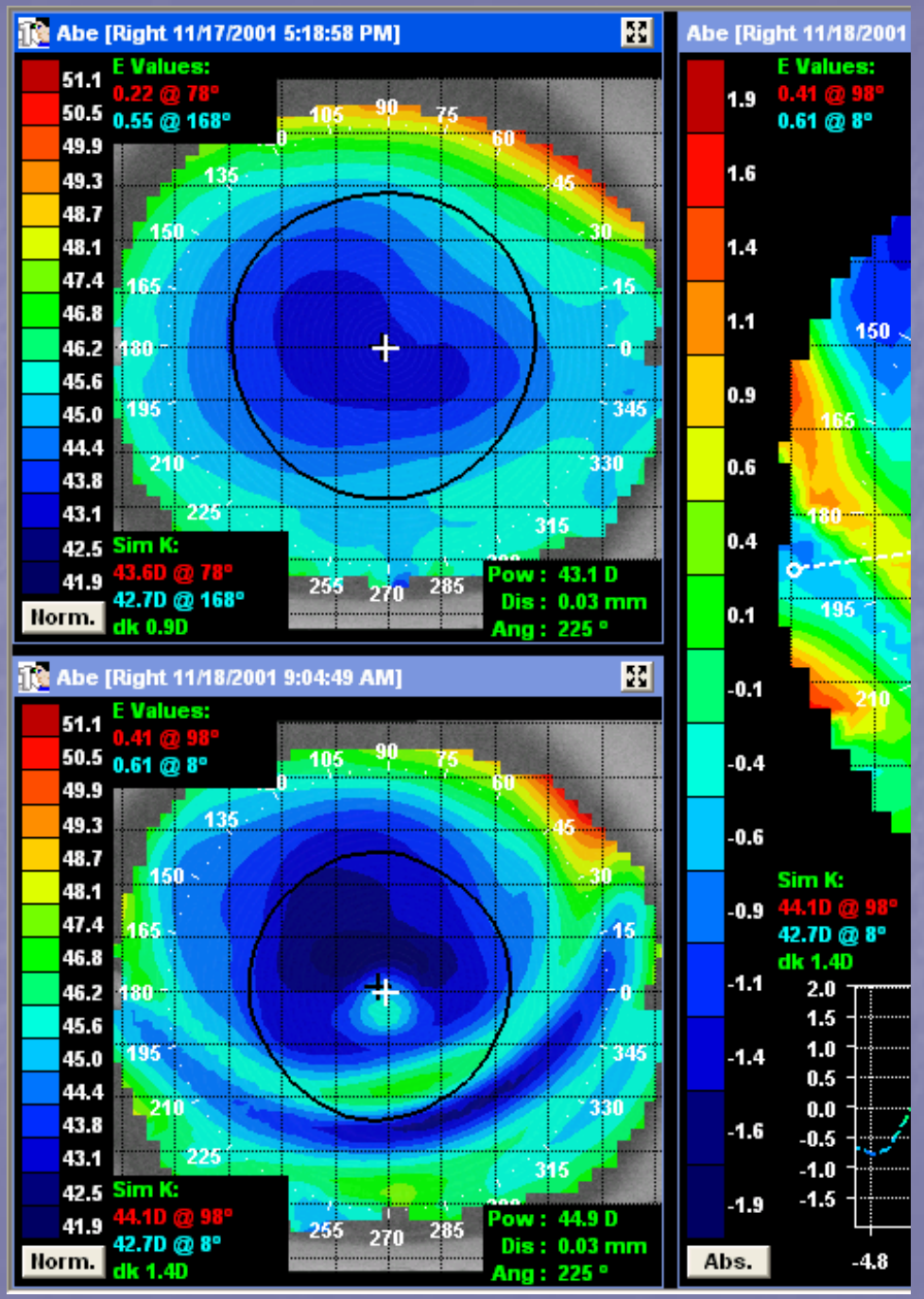
What do you do next?


Abe [Right 11/17/2001 5:18:58 PM]
E Values:
0.22 @ 78°
0.55 @ 168°
Sim K:
43.6D @ 78°
42.7D @ 168°
dk 0.9D
Pow : 43.1 D
Dis : 0.03 mm
Ang : 225 °
Norm.
Abe [Right 11/18/2001 9:04:49 AM]
E Values:
0.41 @ 98°
0.61 @ 8°
Sim K:
44.1D @ 98°
42.7D @ 8°
dk 1.4D
Pow : 44.9 D
Dis : 0.03 mm
Ang : 225 °
Norm.
Abe [Right 11/18/2001 9:04:49 AM] MINUS Abe [Right 11/17/2001 5:18:58 PM]
E Values:
0.41 @ 98°
0.61 @ 8°
Sim K:
44.1D @ 98°
42.7D @ 8°
dk 1.4D
Pow : 1.7 D
Dis : 0.03 mm
Ang : 225 °
Abs.


Abe [Right 11/17/2001 5:18:58 PM]
E Values:
0.22 @ 78°
0.55 @ 168°
Sim K:
43.6D @ 78°
42.7D @ 168°
dk 0.9D
Pow : 43.4 D
Dis : 0.03 mm
Ang : 225 °
Norm.
Abe [Right 11/18/2001 9:04:49 AM]
E Values:
0.41 @ 98°
0.61 @ 8°
Sim K:
44.1D @ 98°
42.7D @ 8°
dk 1.4D
Pow : 43.9 D
Dis : 0.03 mm
Ang : 225 °
Norm.
Abe [Right 11/18/2001 9:04:49 AM] MINUS Abe [Right 11/17/2001 5:18:58 PM]
E Values:
0.41 @ 98°
0.61 @ 8°
Sim K:
44.1D @ 98°
42.7D @ 8°
dk 1.4D
Pow : 0.5 D
Dis : 0.03 mm
Ang : 225 °
Abs.

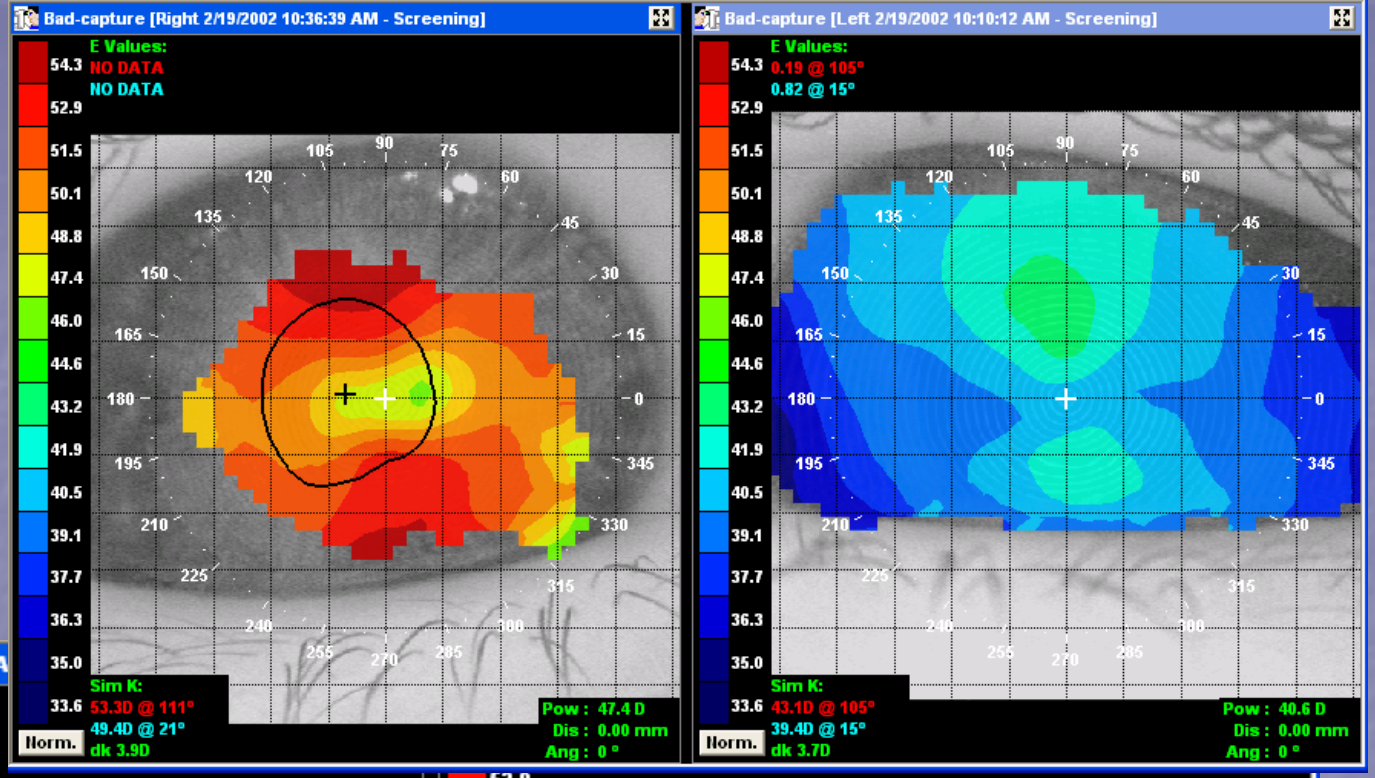
# Smiley Face with a False CI

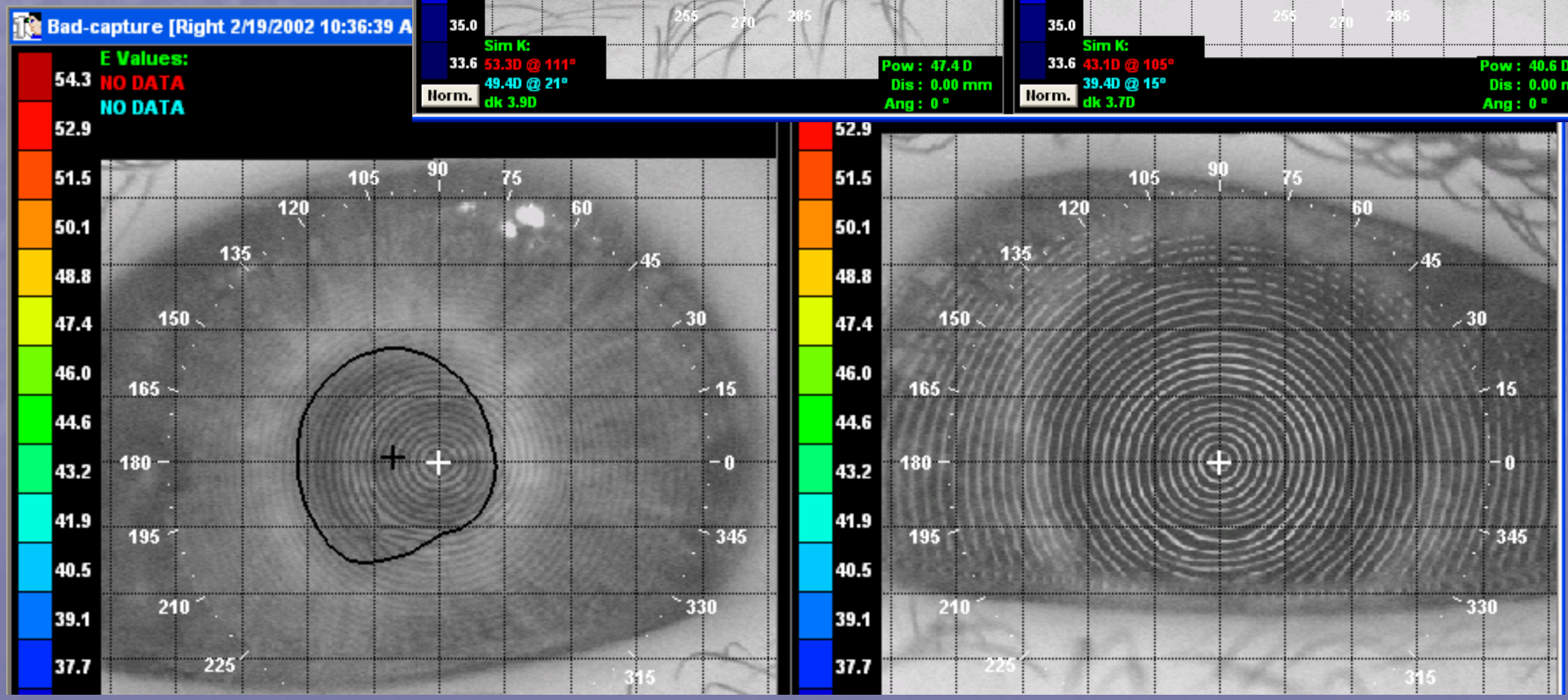
- All maps indicate superior decentration
- False island due to epithelial disruption and topography error
- Grade 1 staining: 8 um higher in sag (next steeper trial)
- Grade 2 staining: 16 um higher in sag (2 trial steps steeper)

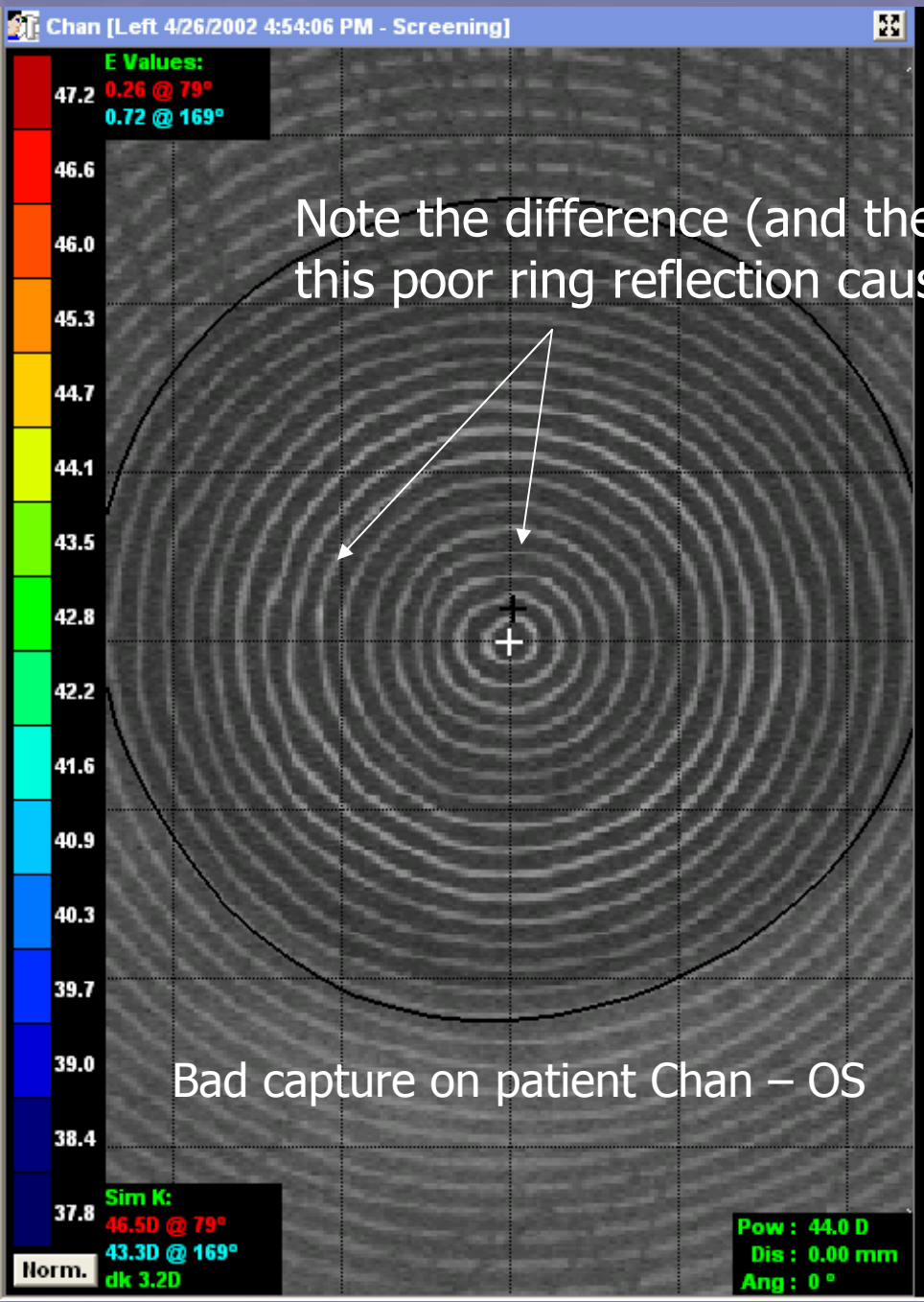


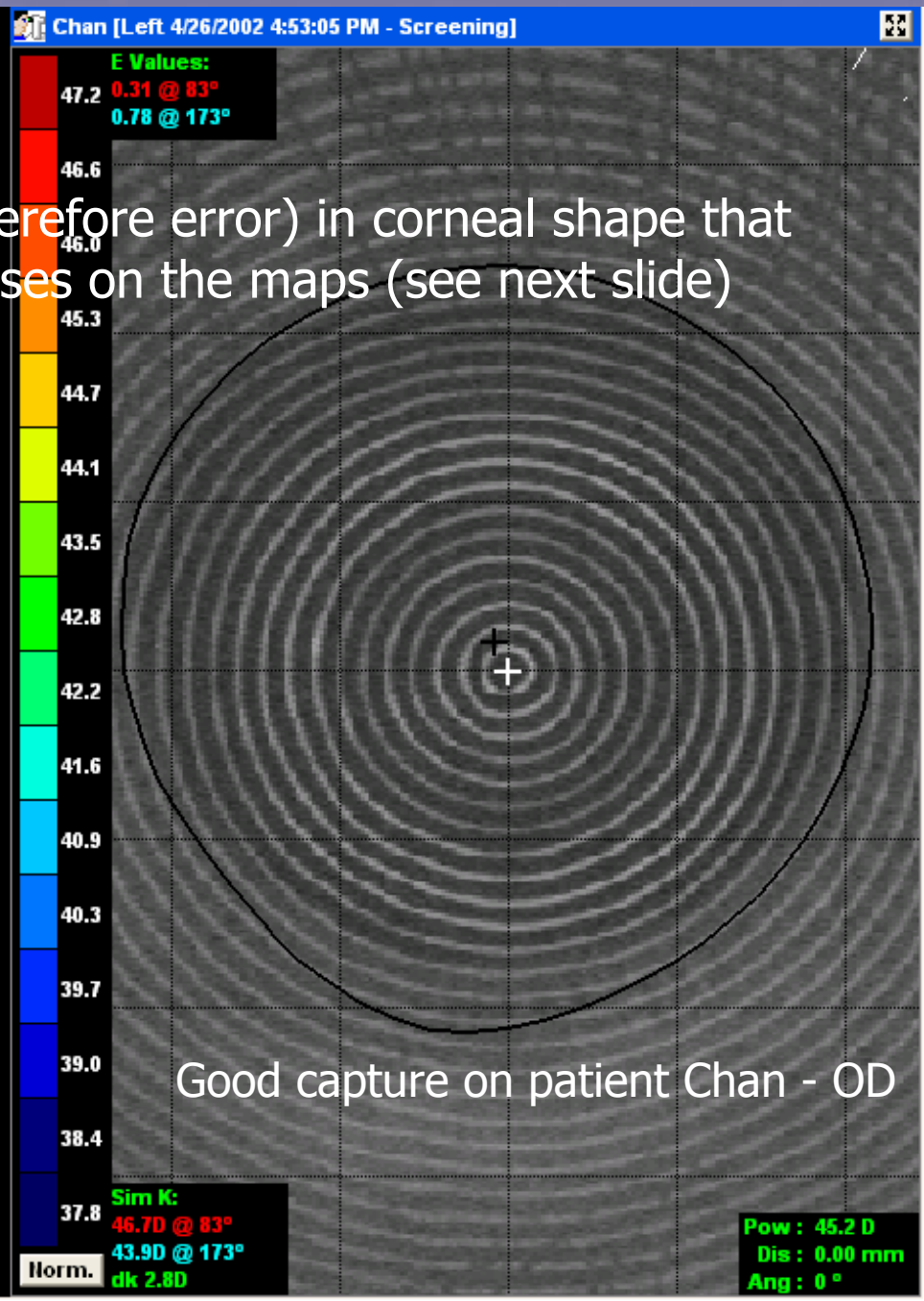
# Good versus Bad Topography captures

Poor captures – ring distortion, small fissures, poor ring reflection, etc.



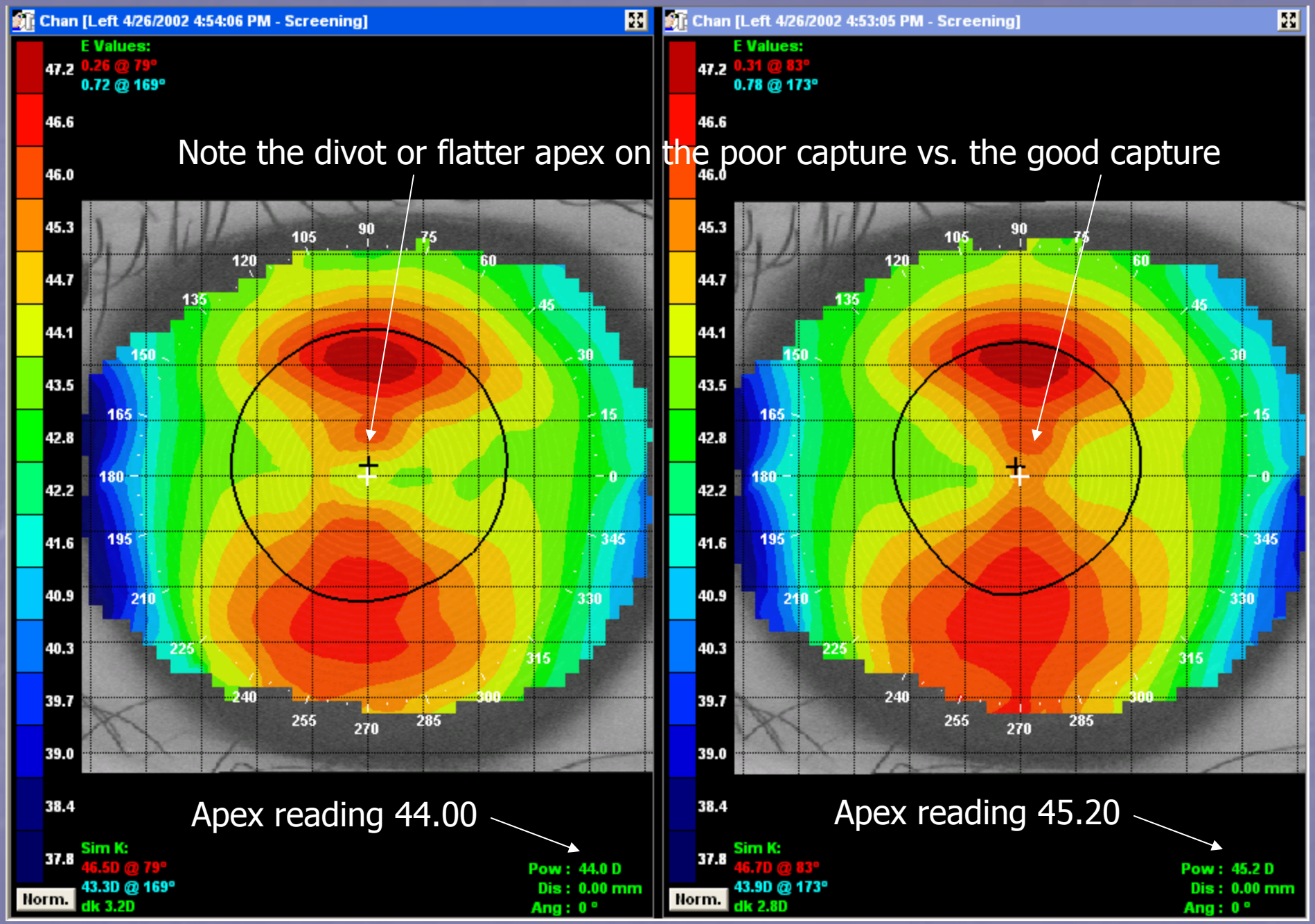


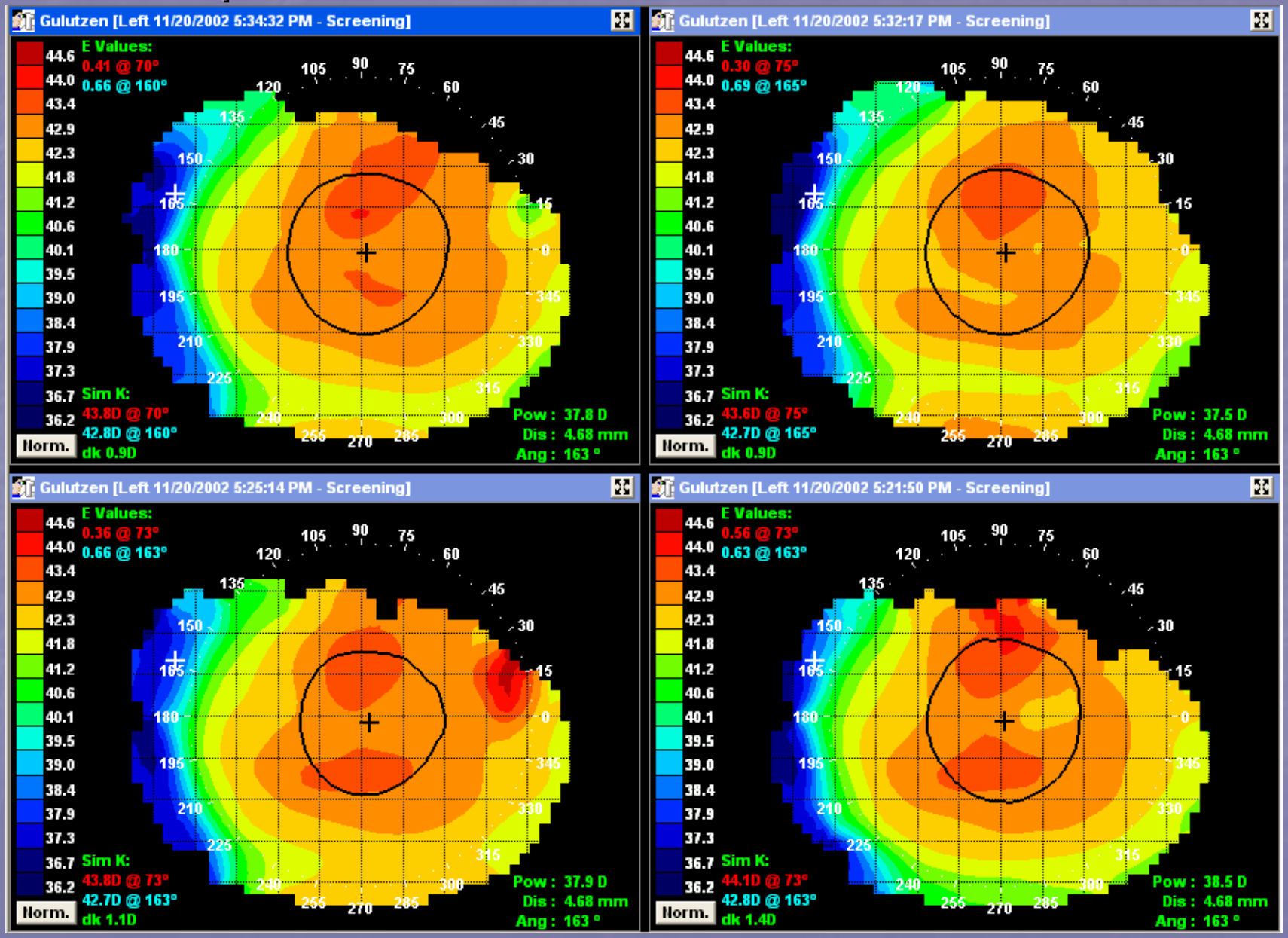

Note the difference (and therefore error) in corneal shape that this poor ring reflection causes on the maps (see next slide)

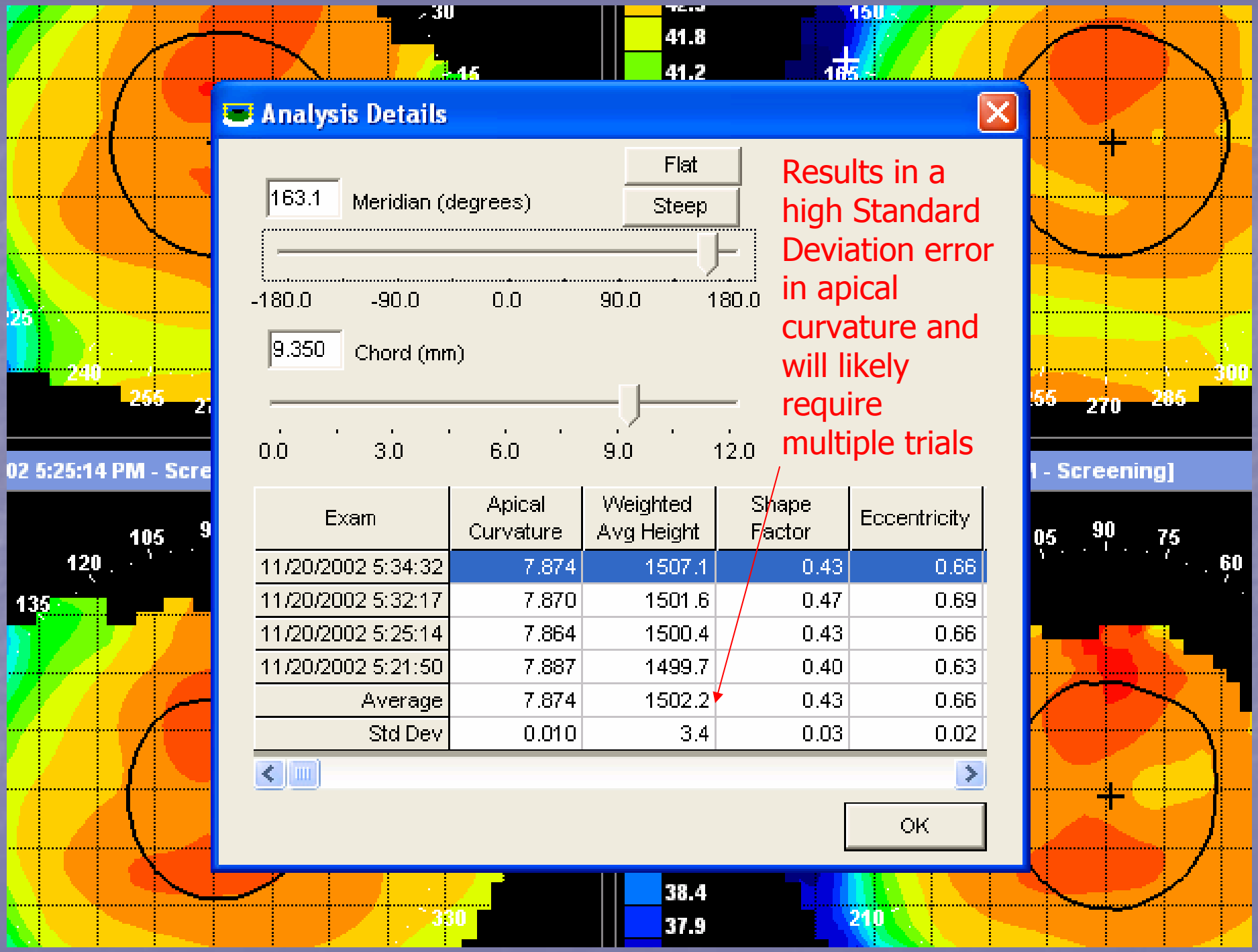
Bad capture on patient Chan – OS

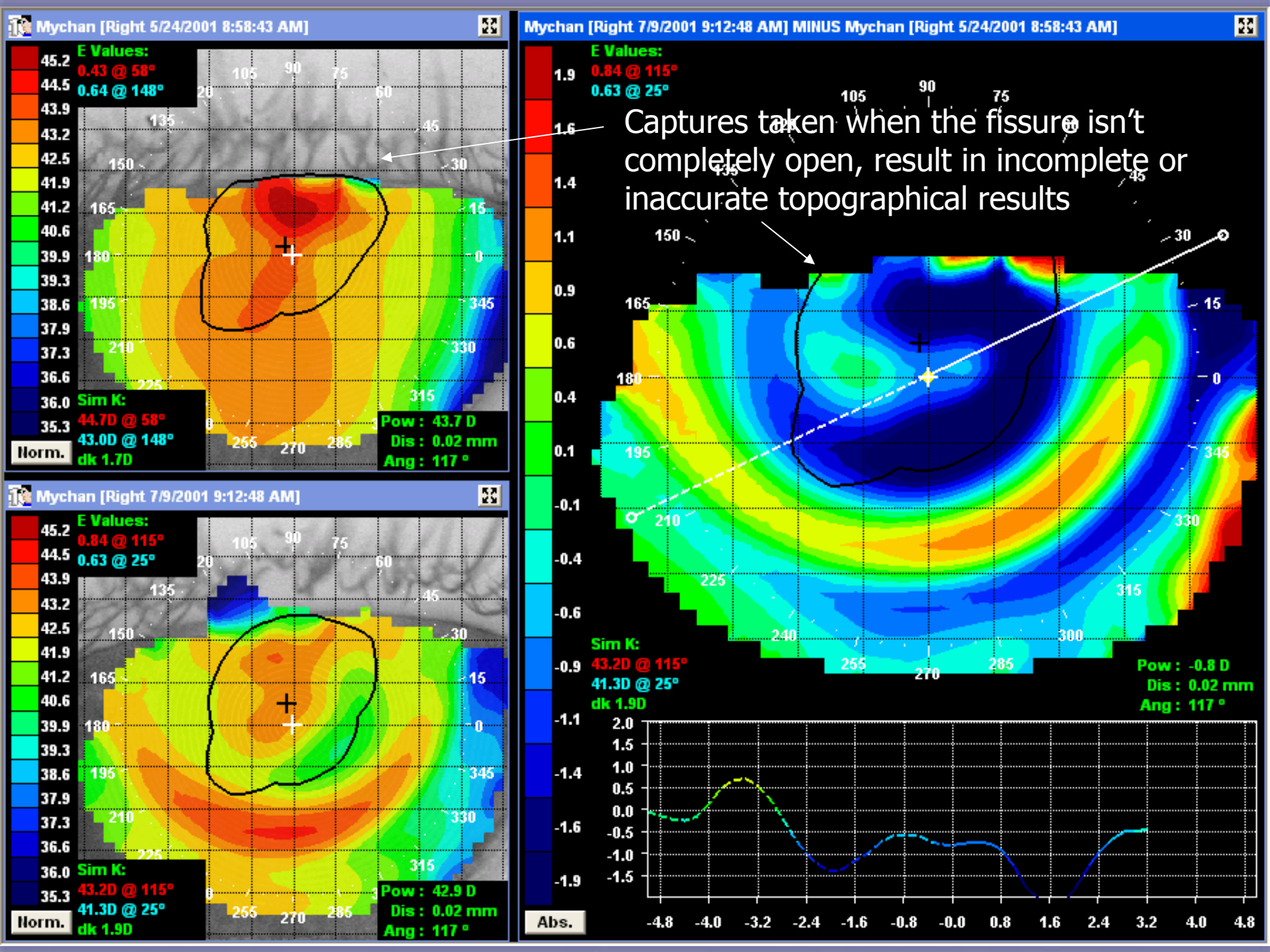
Good capture on patient Chan - OD

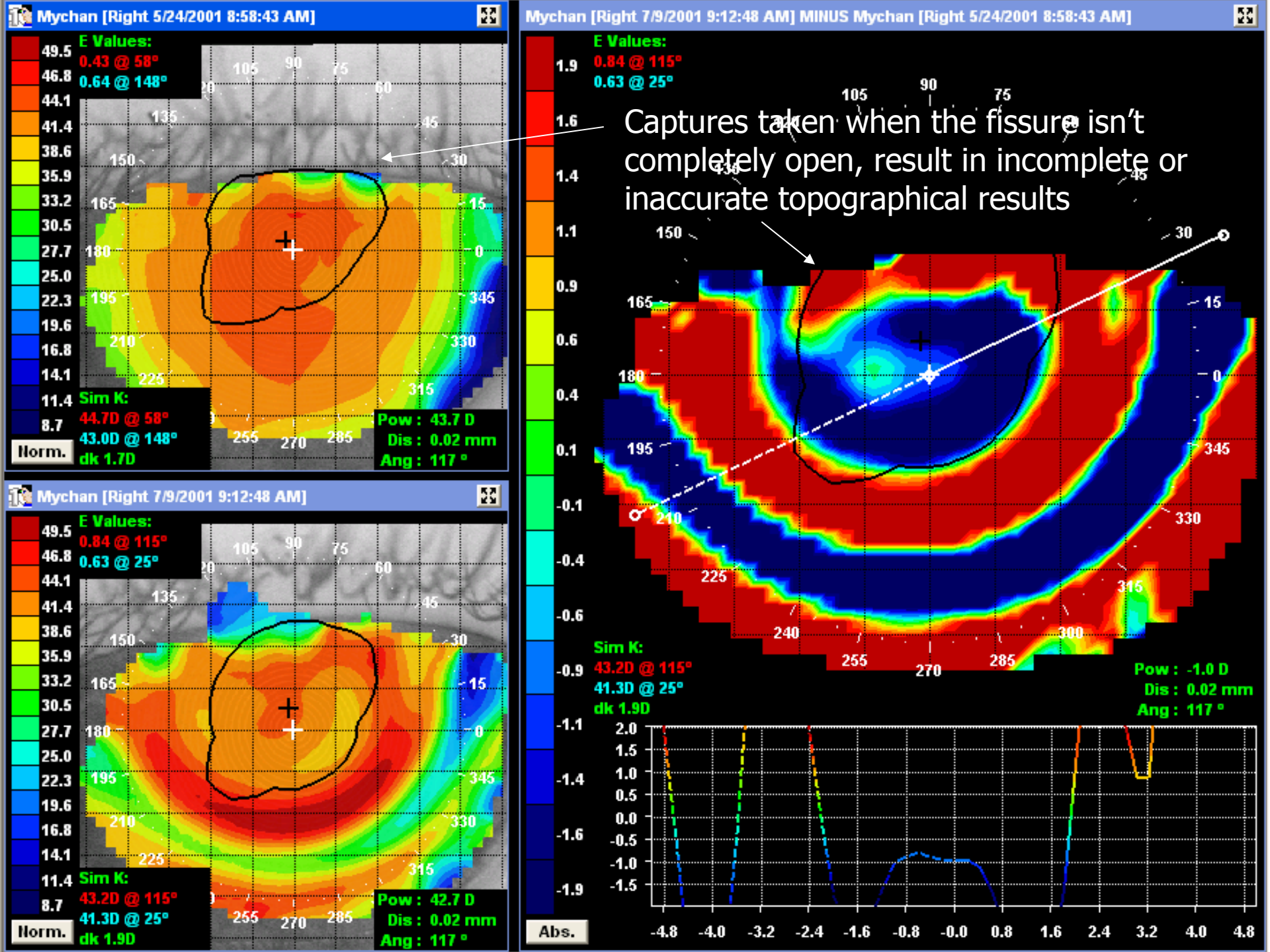

Chan [Left 4/26/2002 4:54:06 PM - Screening]
E Values:
0.26 @ 79°
0.72 @ 169°
47.2
46.6
46.0
45.3
44.7
44.1
43.5
42.8
42.2
41.6
40.9
40.3
39.7
39.0
38.4
37.8
Sim K:
46.5D @ 79°
43.3D @ 169°
dk 3.2D
Norm.
Pow : 44.0 D
Dis : 0.00 mm
Ang : 0 °
Chan [Left 4/26/2002 4:53:05 PM - Screening]
E Values:
0.31 @ 83°
0.78 @ 173°
Sim K:
46.7D @ 83°
43.9D @ 173°
dk 2.8D
Norm.
Pow : 45.2 D
Dis : 0.00 mm
Ang : 0 °
Note the divot or flatter apex on the poor capture vs. the good capture
Apex reading 44.00
Apex reading 45.20

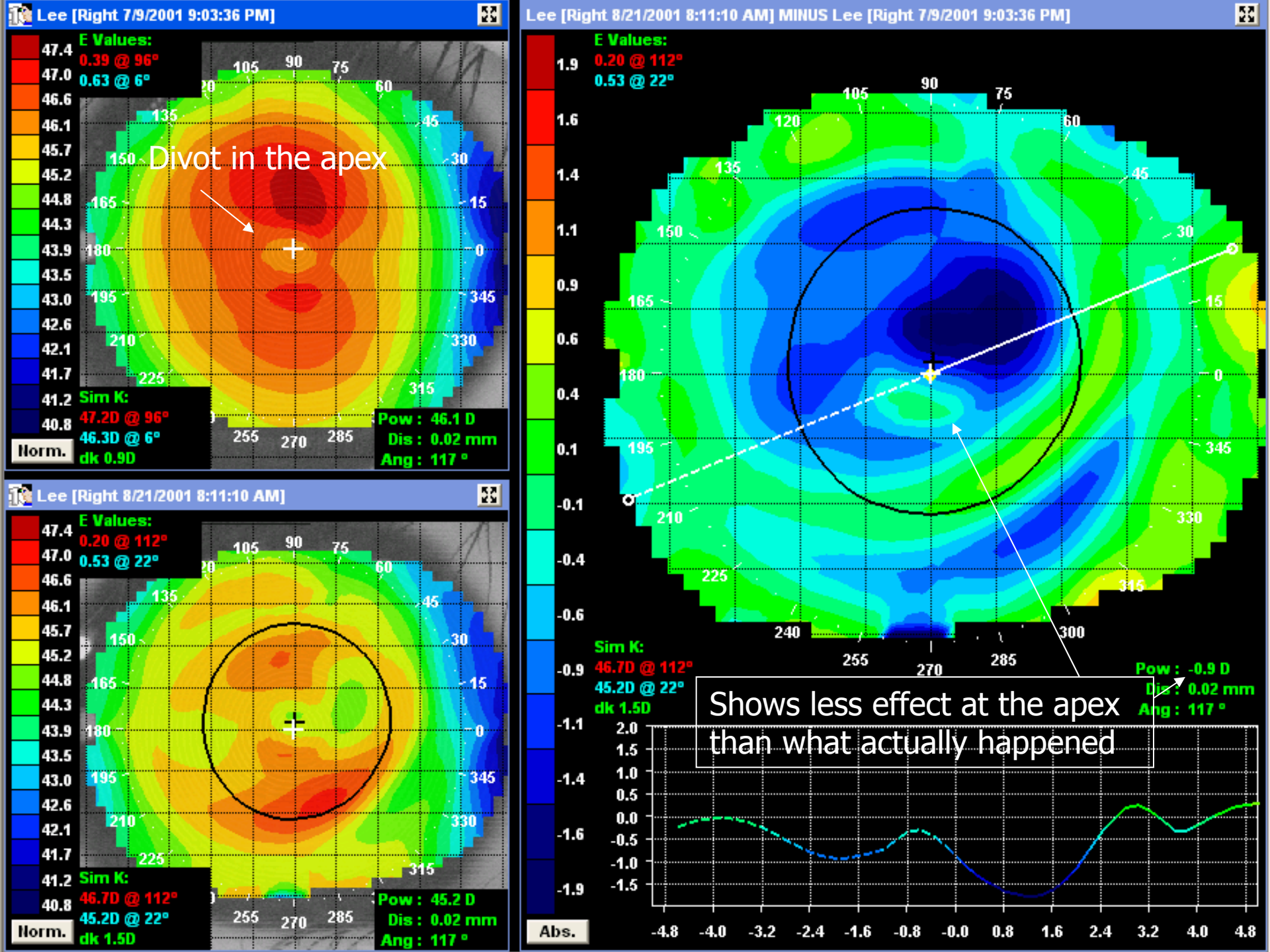
# Asymmetrical readings on the same cornea – each capture looks different from the others




Analysis Details
Flat
Steep
163.1
Meridian (degrees)
-180.0
-90.0
0.0
90.0
180.0
9.350
Chord (mm)
0.0
3.0
6.0
9.0
12.0
Results in a high Standard Deviation error in apical curvature and will likely require multiple trials
Exam
Apical Curvature
Weighted Avg Height
Shape Factor
Eccentricity
11/20/2002 5:34:32 7.874 1507.1 0.43 0.66
11/20/2002 5:32:17 7.870 1501.6 0.47 0.69
11/20/2002 5:25:14 7.864 1500.4 0.43 0.66
11/20/2002 5:21:50 7.887 1499.7 0.40 0.63
Average 7.874 1502.2 0.43 0.66
Std Dev 0.010 3.4 0.03 0.02
OK


Mychan [Right 5/24/2001 8:58:43 AM]
E Values:
0.43 @ 58°
0.64 @ 148°
Sim K:
44.7D @ 58°
43.0D @ 148°
dk 1.7D
Pow : 43.7 D
Dis : 0.02 mm
Ang : 117 °
Norm.
Mychan [Right 7/9/2001 9:12:48 AM]
E Values:
0.84 @ 115°
0.63 @ 25°
Sim K:
43.2D @ 115°
41.3D @ 25°
dk 1.9D
Pow : 42.9 D
Dis : 0.02 mm
Ang : 117 °
Norm.
Mychan [Right 7/9/2001 9:12:48 AM] MINUS Mychan [Right 5/24/2001 8:58:43 AM]
E Values:
0.84 @ 115°
0.63 @ 25°
Captures taken when the fissure isn't completely open, result in incomplete or inaccurate topographical results
Sim K:
43.2D @ 115°
41.3D @ 25°
dk 1.9D
Pow : -0.8 D
Dis : 0.02 mm
Ang : 117 °
Abs.

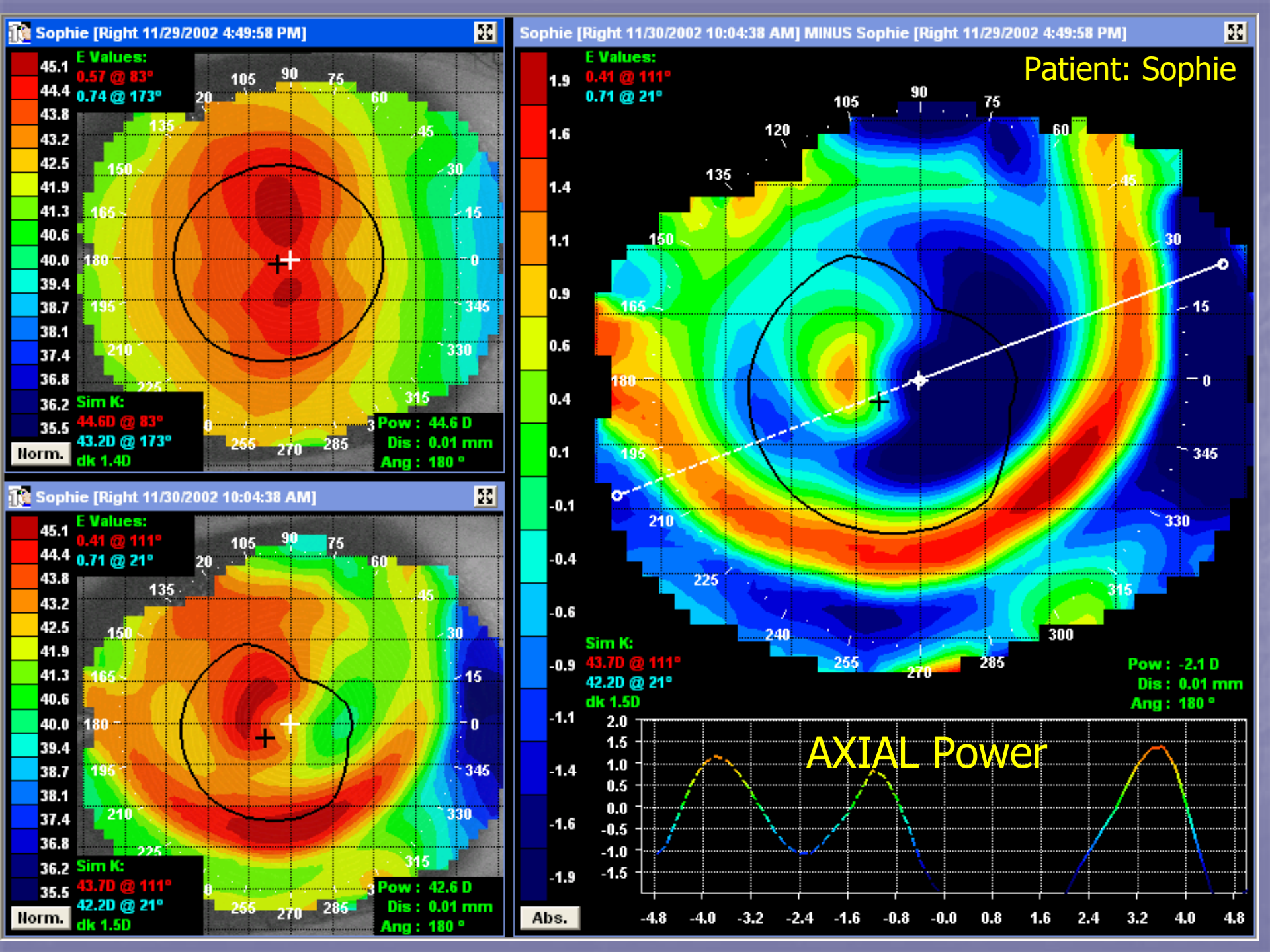

Mychan [Right 5/24/2001 8:58:43 AM]
E Values:
0.43 @ 58°
0.64 @ 148°
Sim K:
44.7D @ 58°
43.0D @ 148°
dk 1.7D
Pow : 43.7 D
Dis : 0.02 mm
Ang : 117 °
Norm.
Mychan [Right 7/9/2001 9:12:48 AM]
E Values:
0.84 @ 115°
0.63 @ 25°
Sim K:
43.2D @ 115°
41.3D @ 25°
dk 1.9D
Pow : 42.7 D
Dis : 0.02 mm
Ang : 117 °
Norm.
Mychan [Right 7/9/2001 9:12:48 AM] MINUS Mychan [Right 5/24/2001 8:58:43 AM]
E Values:
0.84 @ 115°
0.63 @ 25°
Captures taken when the fissure isn't completely open, result in incomplete or inaccurate topographical results
Sim K:
43.2D @ 115°
41.3D @ 25°
dk 1.9D
Pow : -1.0 D
Dis : 0.02 mm
Ang : 117 °
Abs.

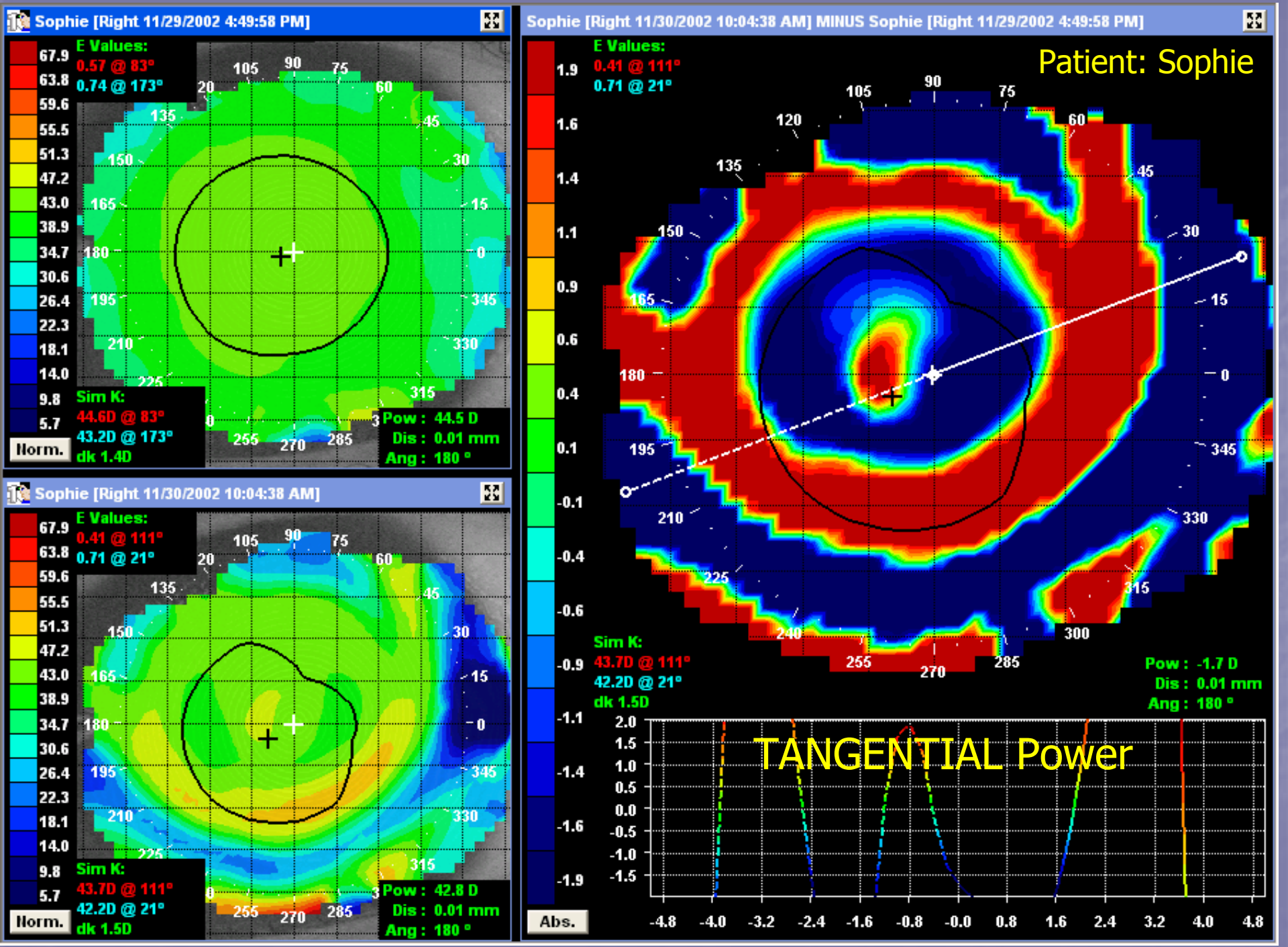

Lee [Right 7/9/2001 9:03:36 PM]
E Values:
0.39 @ 96°
0.63 @ 6°
Divot in the apex
Sim K:
47.2D @ 96°
46.3D @ 6°
dk 0.9D
Pow : 46.1 D
Dis : 0.02 mm
Ang : 117 °
Norm.
Lee [Right 8/21/2001 8:11:10 AM]
E Values:
0.20 @ 112°
0.53 @ 22°
Sim K:
46.7D @ 112°
45.2D @ 22°
dk 1.5D
Pow : 45.2 D
Dis : 0.02 mm
Ang : 117 °
Norm.
Lee [Right 8/21/2001 8:11:10 AM] MINUS Lee [Right 7/9/2001 9:03:36 PM]
E Values:
0.20 @ 112°
0.53 @ 22°
Sim K:
46.7D @ 112°
45.2D @ 22°
dk 1.5D
Pow : -0.9 D
Dis : 0.02 mm
Ang : 117 °
Shows less effect at the apex
than what actually happened
Abs.

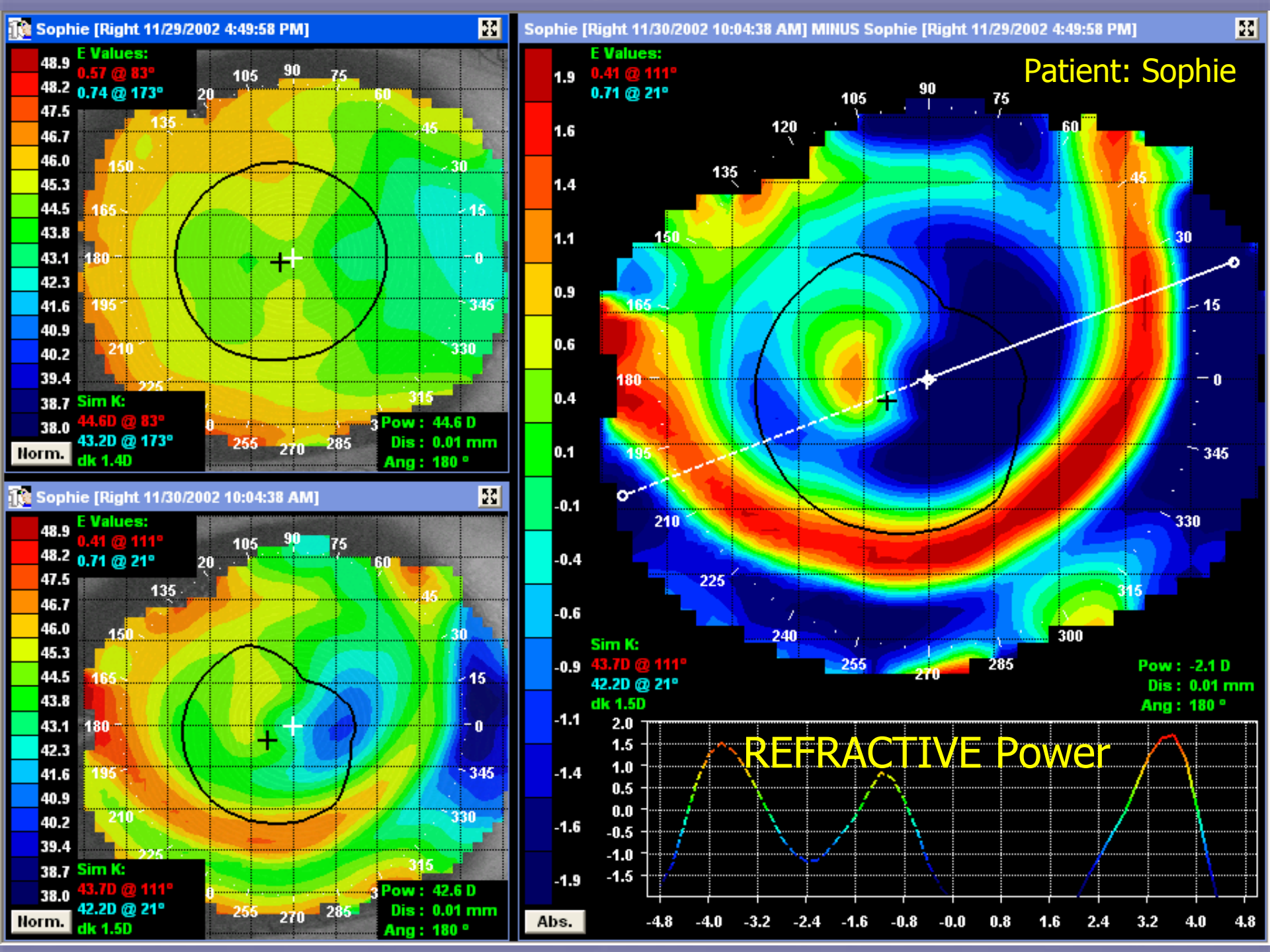
# The Capture Process is Critical

- Consistent tear film is important
  - (a topographer reflects off the tear film not the corneal surface)
- Avoid capturing during ring jam, distortion or inconsistency
- Capture with the largest fissure possible
- Minimize Topography Error
  - Improves first fit success – Bulls-eye!
  - Improves diagnosis of response – Rx Change
- Retake maps if the standard deviation is high
  - Target Apical Radius (Ro) SD: <0.02mm
  - Target Sagittal Height SD: <2 microns (0.002mm)

What's happening here?


Sophie [Right 11/29/2002 4:49:58 PM]
E Values:
0.57 @ 83°
0.74 @ 173°
Sim K:
44.6D @ 83°
43.2D @ 173°
dk 1.4D
Pow : 44.6 D
Dis : 0.01 mm
Ang : 180 °
Norm.
Sophie [Right 11/30/2002 10:04:38 AM]
E Values:
0.41 @ 111°
0.71 @ 21°
Sim K:
43.7D @ 111°
42.2D @ 21°
dk 1.5D
Pow : 42.6 D
Dis : 0.01 mm
Ang : 180 °
Norm.
Sophie [Right 11/30/2002 10:04:38 AM] MINUS Sophie [Right 11/29/2002 4:49:58 PM]
Patient: Sophie
E Values:
0.41 @ 111°
0.71 @ 21°
Sim K:
43.7D @ 111°
42.2D @ 21°
dk 1.5D
Pow : -2.1 D
Dis : 0.01 mm
Ang : 180 °
AXIAL Power
Abs.


Sophie [Right 11/29/2002 4:49:58 PM]
E Values:
0.57 @ 83°
0.74 @ 173°
Sim K:
44.6D @ 83°
43.2D @ 173°
dk 1.4D
Pow : 44.5 D
Dis : 0.01 mm
Ang : 180 °
Norm.
Sophie [Right 11/30/2002 10:04:38 AM]
E Values:
0.41 @ 111°
0.71 @ 21°
Sim K:
43.7D @ 111°
42.2D @ 21°
dk 1.5D
Pow : 42.8 D
Dis : 0.01 mm
Ang : 180 °
Norm.
Sophie [Right 11/30/2002 10:04:38 AM] MINUS Sophie [Right 11/29/2002 4:49:58 PM]
Patient: Sophie
E Values:
0.41 @ 111°
0.71 @ 21°
Sim K:
43.7D @ 111°
42.2D @ 21°
dk 1.5D
Pow : -1.7 D
Dis : 0.01 mm
Ang : 180 °
TANGENTIAL Power
Abs.


Sophie [Right 11/29/2002 4:49:58 PM]
E Values:
0.57 @ 83°
0.74 @ 173°
Sim K:
44.6D @ 83°
43.2D @ 173°
dk 1.4D
Pow : 44.6 D
Dis : 0.01 mm
Ang : 180 °
Norm.
Sophie [Right 11/30/2002 10:04:38 AM]
E Values:
0.41 @ 111°
0.71 @ 21°
Sim K:
43.7D @ 111°
42.2D @ 21°
dk 1.5D
Pow : 42.6 D
Dis : 0.01 mm
Ang : 180 °
Norm.
Sophie [Right 11/30/2002 10:04:38 AM] MINUS Sophie [Right 11/29/2002 4:49:58 PM]
Patient: Sophie
E Values:
0.41 @ 111°
0.71 @ 21°
Sim K:
43.7D @ 111°
42.2D @ 21°
dk 1.5D
Pow : -2.1 D
Dis : 0.01 mm
Ang : 180 °
REFRACTIVE Power
Abs.

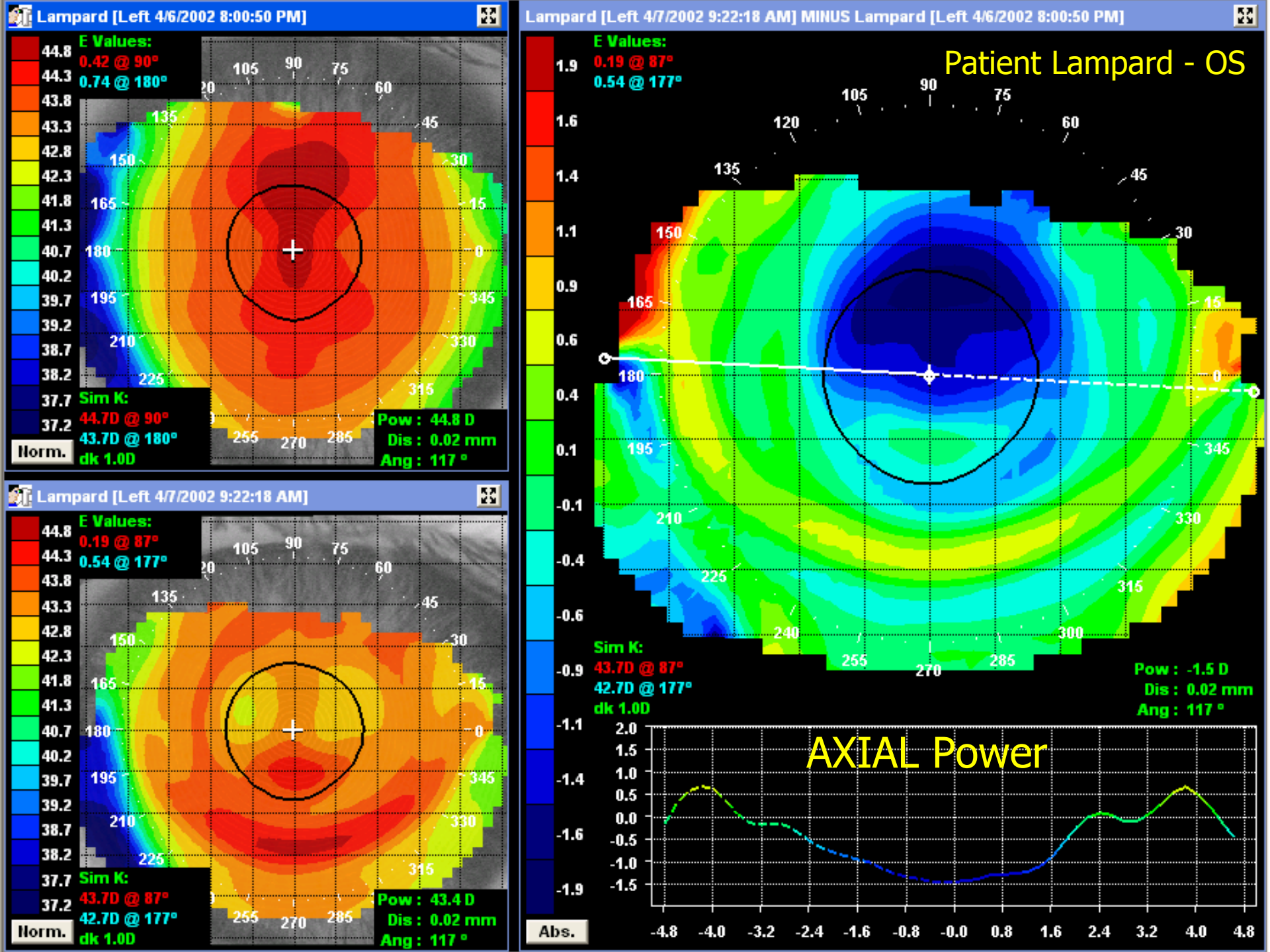
Sophie [Right 11/30/2002 10:04:38 AM]
E Values:
0.41 @ 111°
0.71 @ 21°
48.9
48.2
47.5
46.7
46.0
45.3
44.5
43.8
43.1
42.3
41.6
40.9
40.2
39.4
38.7
38.0
Sim K:
43.7D @ 111°
42.2D @ 21°
dk 1.5D
Norm.
Patient: Sophie
Ring distortion due to epithelial disruption (staining)
Pow : 42.6 D
Dis : 0.01 mm
Ang : 180 °

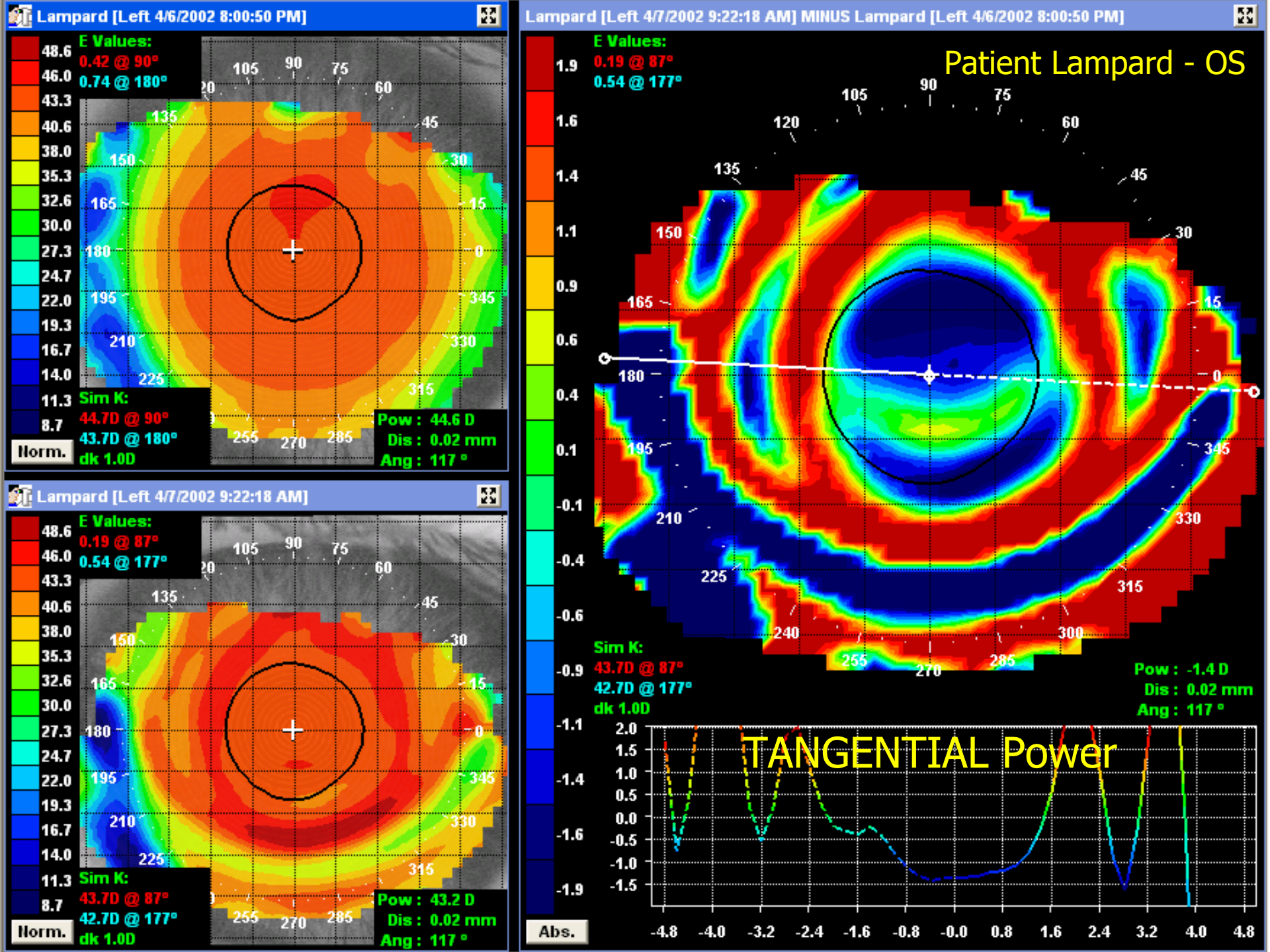
# Smiley Face with a False CI

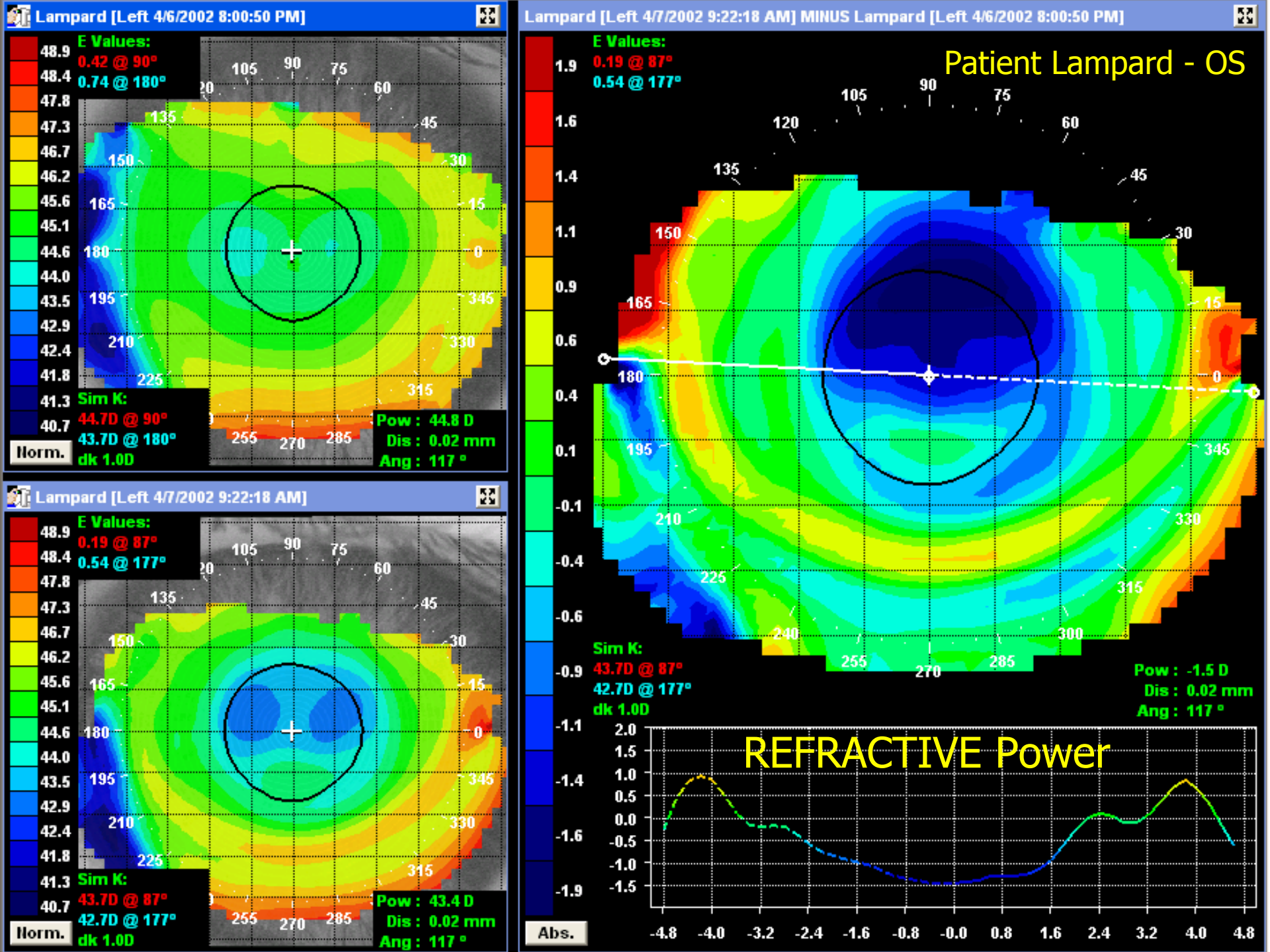
- False Islands are caused by:
  - topography error due to epithelial disruption (staining causing by ring jam)
  - Topography error due to inconsistent tear (ring jam)
- Treat the "Smiley Face with a false CI" the same as regular SF's
- No Staining: 8um higher in sag (retrial in next steeper trial)
- Staining:
  - Grade 1: 8um higher in sag (retrial in next steeper trial)
  - Grade 2: 16um higher in sag (retrial 2 steps steeper)

This is a 1 day trial –

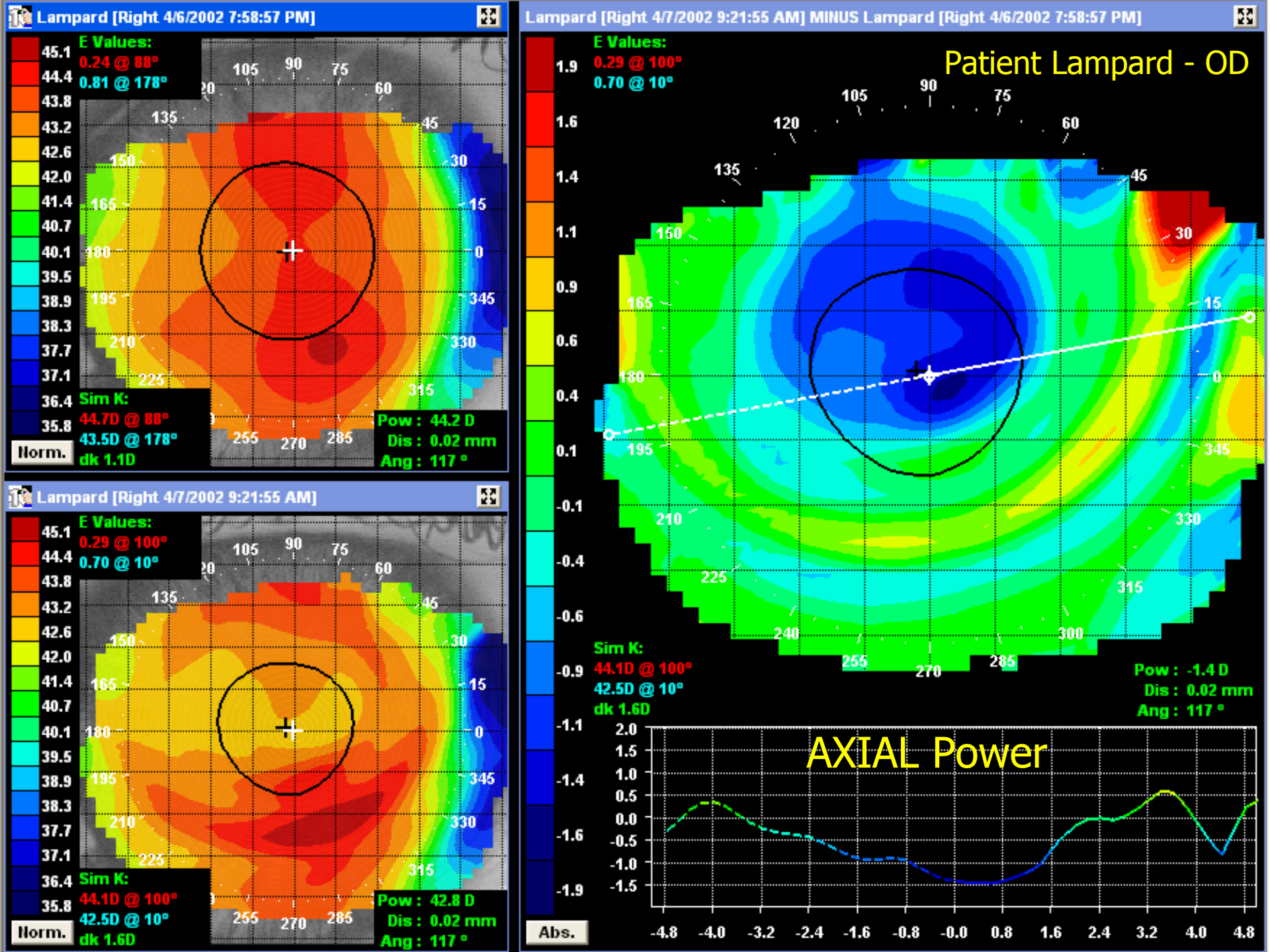
Is it Bulls-eye, Central Island or Smiley Face?

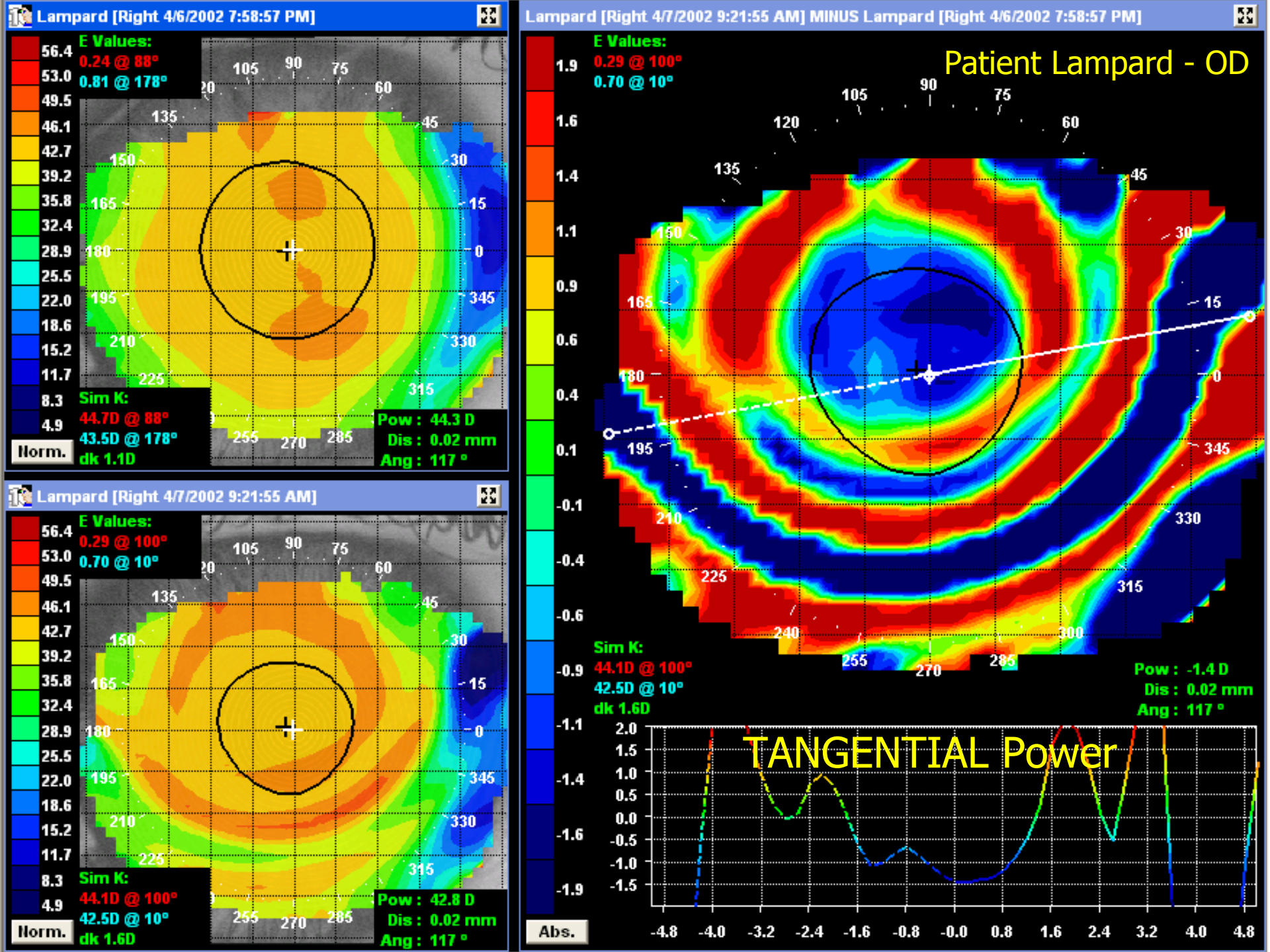

Lampard [Left 4/6/2002 8:00:50 PM]
E Values:
0.42 @ 90°
0.74 @ 180°
Sim K:
44.7D @ 90°
43.7D @ 180°
dk 1.0D
Pow : 44.8 D
Dis : 0.02 mm
Ang : 117 °
Norm.
Lampard [Left 4/7/2002 9:22:18 AM]
E Values:
0.19 @ 87°
0.54 @ 177°
Sim K:
43.7D @ 87°
42.7D @ 177°
dk 1.0D
Pow : 43.4 D
Dis : 0.02 mm
Ang : 117 °
Norm.
Lampard [Left 4/7/2002 9:22:18 AM] MINUS Lampard [Left 4/6/2002 8:00:50 PM]
Patient Lampard - OS
E Values:
0.19 @ 87°
0.54 @ 177°
Sim K:
43.7D @ 87°
42.7D @ 177°
dk 1.0D
Pow : -1.5 D
Dis : 0.02 mm
Ang : 117 °
AXIAL Power
Abs.

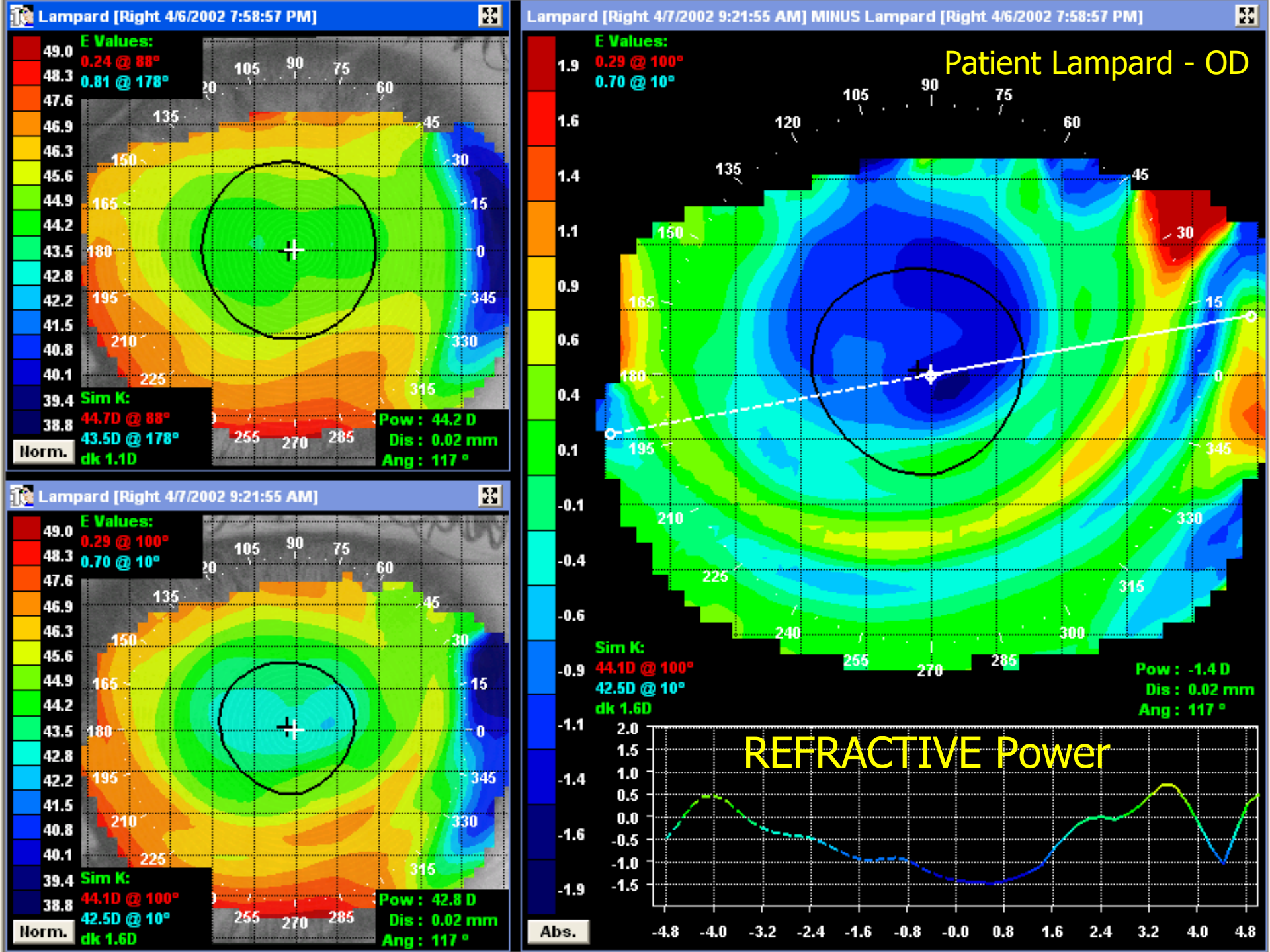

Lampard [Left 4/6/2002 8:00:50 PM]
E Values:
0.42 @ 90°
0.74 @ 180°
Sim K:
44.7D @ 90°
43.7D @ 180°
dk 1.0D
Pow : 44.6 D
Dis : 0.02 mm
Ang : 117 °
Norm.
Lampard [Left 4/7/2002 9:22:18 AM]
E Values:
0.19 @ 87°
0.54 @ 177°
Sim K:
43.7D @ 87°
42.7D @ 177°
dk 1.0D
Pow : 43.2 D
Dis : 0.02 mm
Ang : 117 °
Norm.
Lampard [Left 4/7/2002 9:22:18 AM] MINUS Lampard [Left 4/6/2002 8:00:50 PM]
Patient Lampard - OS
E Values:
0.19 @ 87°
0.54 @ 177°
Sim K:
43.7D @ 87°
42.7D @ 177°
dk 1.0D
Pow : -1.4 D
Dis : 0.02 mm
Ang : 117 °
TANGENTIAL Power
Abs.


Lampard [Left 4/6/2002 8:00:50 PM]
E Values:
0.42 @ 90°
0.74 @ 180°
Sim K:
44.7D @ 90°
43.7D @ 180°
dk 1.0D
Pow : 44.8 D
Dis : 0.02 mm
Ang : 117 °
Norm.
Lampard [Left 4/7/2002 9:22:18 AM]
E Values:
0.19 @ 87°
0.54 @ 177°
Sim K:
43.7D @ 87°
42.7D @ 177°
dk 1.0D
Pow : 43.4 D
Dis : 0.02 mm
Ang : 117 °
Norm.
Lampard [Left 4/7/2002 9:22:18 AM] MINUS Lampard [Left 4/6/2002 8:00:50 PM]
Patient Lampard - OS
E Values:
0.19 @ 87°
0.54 @ 177°
Sim K:
43.7D @ 87°
42.7D @ 177°
dk 1.0D
Pow : -1.5 D
Dis : 0.02 mm
Ang : 117 °
REFRACTIVE Power
Abs.

# Same question on the OS?


Lampard [Right 4/6/2002 7:58:57 PM]
E Values:
0.24 @ 88°
0.81 @ 178°
Sim K:
44.7D @ 88°
43.5D @ 178°
dk 1.1D
Pow : 44.2 D
Dis : 0.02 mm
Ang : 117 °
Norm.
Lampard [Right 4/7/2002 9:21:55 AM]
E Values:
0.29 @ 100°
0.70 @ 10°
Sim K:
44.1D @ 100°
42.5D @ 10°
dk 1.6D
Pow : 42.8 D
Dis : 0.02 mm
Ang : 117 °
Norm.
Lampard [Right 4/7/2002 9:21:55 AM] MINUS Lampard [Right 4/6/2002 7:58:57 PM]
Patient Lampard - OD
E Values:
0.29 @ 100°
0.70 @ 10°
Sim K:
44.1D @ 100°
42.5D @ 10°
dk 1.6D
Pow : -1.4 D
Dis : 0.02 mm
Ang : 117 °
AXIAL Power
Abs.


Lampard [Right 4/6/2002 7:58:57 PM]
E Values:
0.24 @ 88°
0.81 @ 178°
Sim K:
44.7D @ 88°
43.5D @ 178°
dk 1.1D
Pow : 44.3 D
Dis : 0.02 mm
Ang : 117 °
Norm.
Lampard [Right 4/7/2002 9:21:55 AM]
E Values:
0.29 @ 100°
0.70 @ 10°
Sim K:
44.1D @ 100°
42.5D @ 10°
dk 1.6D
Pow : 42.8 D
Dis : 0.02 mm
Ang : 117 °
Norm.
Lampard [Right 4/7/2002 9:21:55 AM] MINUS Lampard [Right 4/6/2002 7:58:57 PM]
Patient Lampard - OD
E Values:
0.29 @ 100°
0.70 @ 10°
Sim K:
44.1D @ 100°
42.5D @ 10°
dk 1.6D
Pow : -1.4 D
Dis : 0.02 mm
Ang : 117 °
TANGENTIAL Power
Abs.

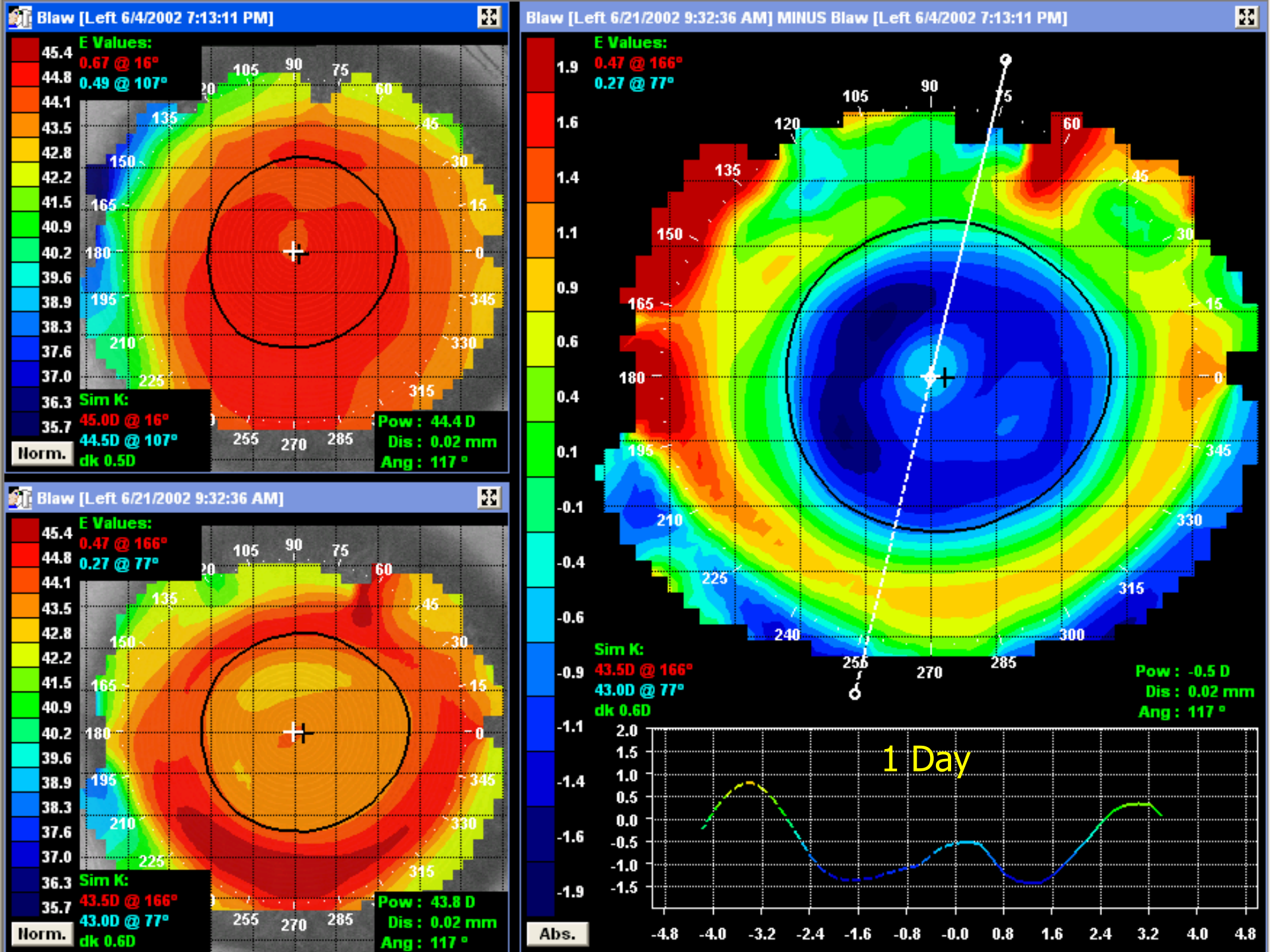

Lampard [Right 4/6/2002 7:58:57 PM]
E Values:
0.24 @ 88°
0.81 @ 178°
Sim K:
44.7D @ 88°
43.5D @ 178°
dk 1.1D
Pow : 44.2 D
Dis : 0.02 mm
Ang : 117 °
Norm.
Lampard [Right 4/7/2002 9:21:55 AM]
E Values:
0.29 @ 100°
0.70 @ 10°
Sim K:
44.1D @ 100°
42.5D @ 10°
dk 1.6D
Pow : 42.8 D
Dis : 0.02 mm
Ang : 117 °
Norm.
Lampard [Right 4/7/2002 9:21:55 AM] MINUS Lampard [Right 4/6/2002 7:58:57 PM]
Patient Lampard - OD
E Values:
0.29 @ 100°
0.70 @ 10°
Sim K:
44.1D @ 100°
42.5D @ 10°
dk 1.6D
Pow : -1.4 D
Dis : 0.02 mm
Ang : 117 °
REFRACTIVE Power
Abs.

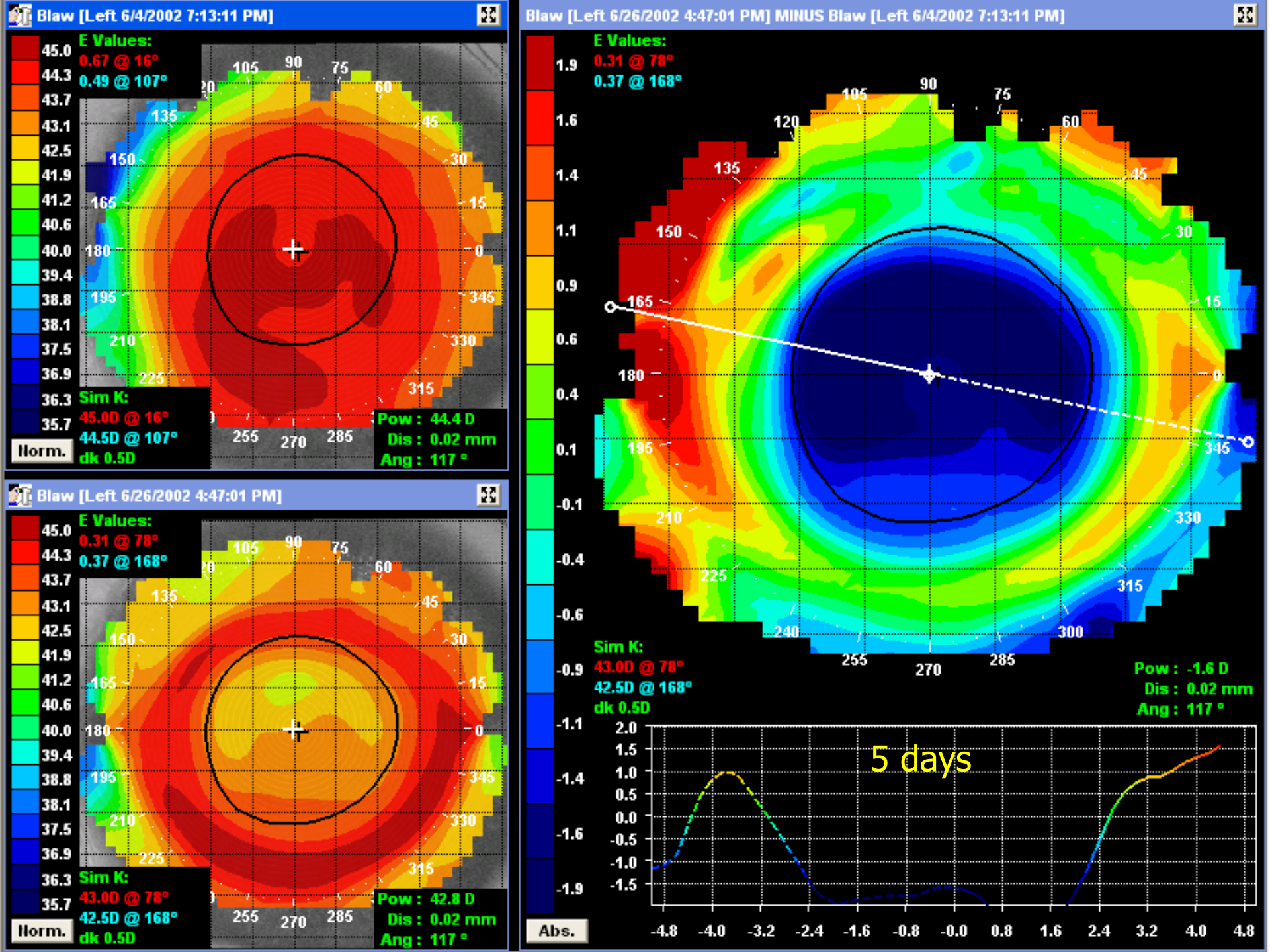
# 1 Day or Multiple Days?

- Sometimes 1 day trials can be deceiving
- Don’t guess!

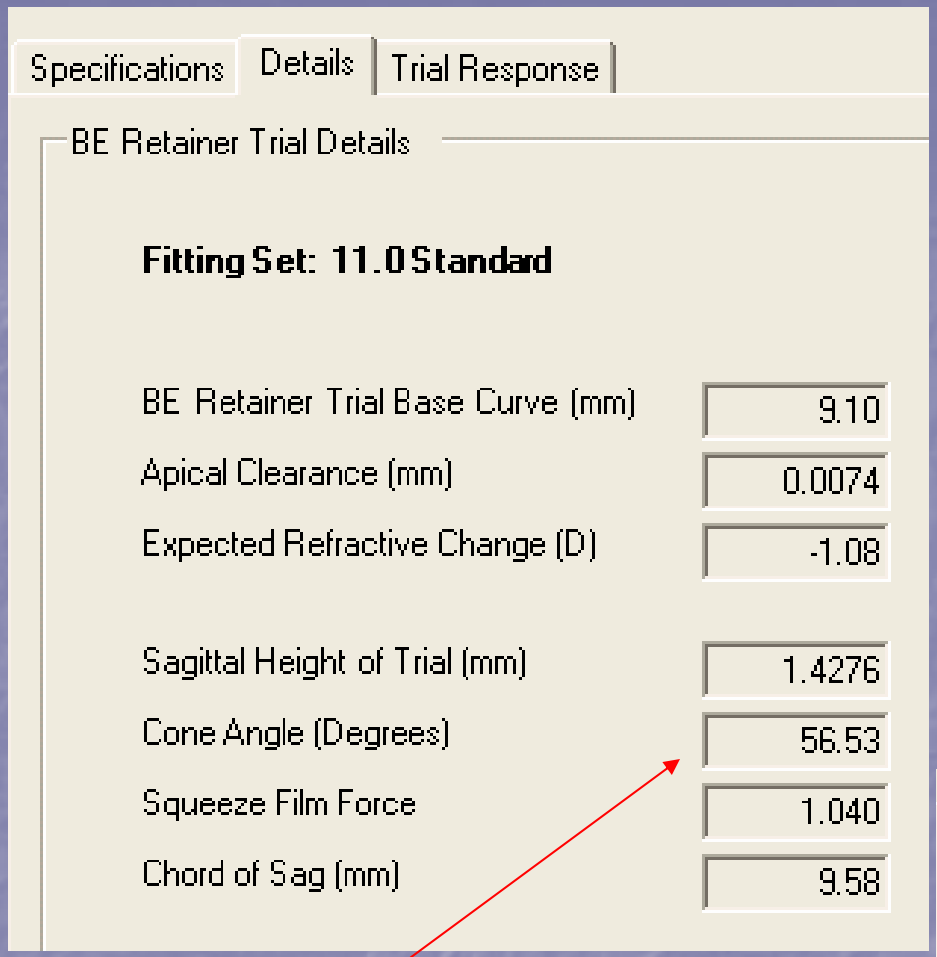
If you’re not sure…

- Prolong the trial process if the topography is not conclusive (2-5 days)


Blaw [Left 6/4/2002 7:13:11 PM]
E Values:
0.67 @ 16°
0.49 @ 107°
Sim K:
45.0D @ 16°
44.5D @ 107°
dk 0.5D
Pow : 44.4 D
Dis : 0.02 mm
Ang : 117 °
Norm.
Blaw [Left 6/21/2002 9:32:36 AM]
E Values:
0.47 @ 166°
0.27 @ 77°
Sim K:
43.5D @ 166°
43.0D @ 77°
dk 0.6D
Pow : 43.8 D
Dis : 0.02 mm
Ang : 117 °
Norm.
Blaw [Left 6/21/2002 9:32:36 AM] MINUS Blaw [Left 6/4/2002 7:13:11 PM]
E Values:
0.47 @ 166°
0.27 @ 77°
Sim K:
43.5D @ 166°
43.0D @ 77°
dk 0.6D
Pow : -0.5 D
Dis : 0.02 mm
Ang : 117 °
1 Day
Abs.


Blaw [Left 6/4/2002 7:13:11 PM]
E Values:
0.67 @ 16°
0.49 @ 107°
Sim K:
45.0D @ 16°
44.5D @ 107°
dk 0.5D
Pow : 44.4 D
Dis : 0.02 mm
Ang : 117 °
Norm.
Blaw [Left 6/26/2002 4:47:01 PM]
E Values:
0.31 @ 78°
0.37 @ 168°
Sim K:
43.0D @ 78°
42.5D @ 168°
dk 0.5D
Pow : 42.8 D
Dis : 0.02 mm
Ang : 117 °
Norm.
Blaw [Left 6/26/2002 4:47:01 PM] MINUS Blaw [Left 6/4/2002 7:13:11 PM]
E Values:
0.31 @ 78°
0.37 @ 168°
Sim K:
43.0D @ 78°
42.5D @ 168°
dk 0.5D
Pow : -1.6 D
Dis : 0.02 mm
Ang : 117 °
5 days
Abs.

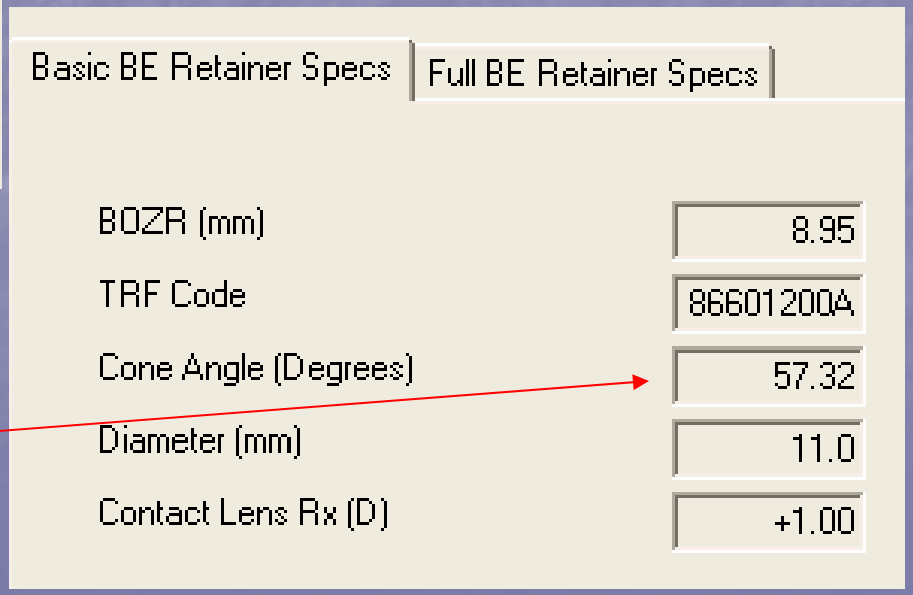
# Cone Angle is Important!



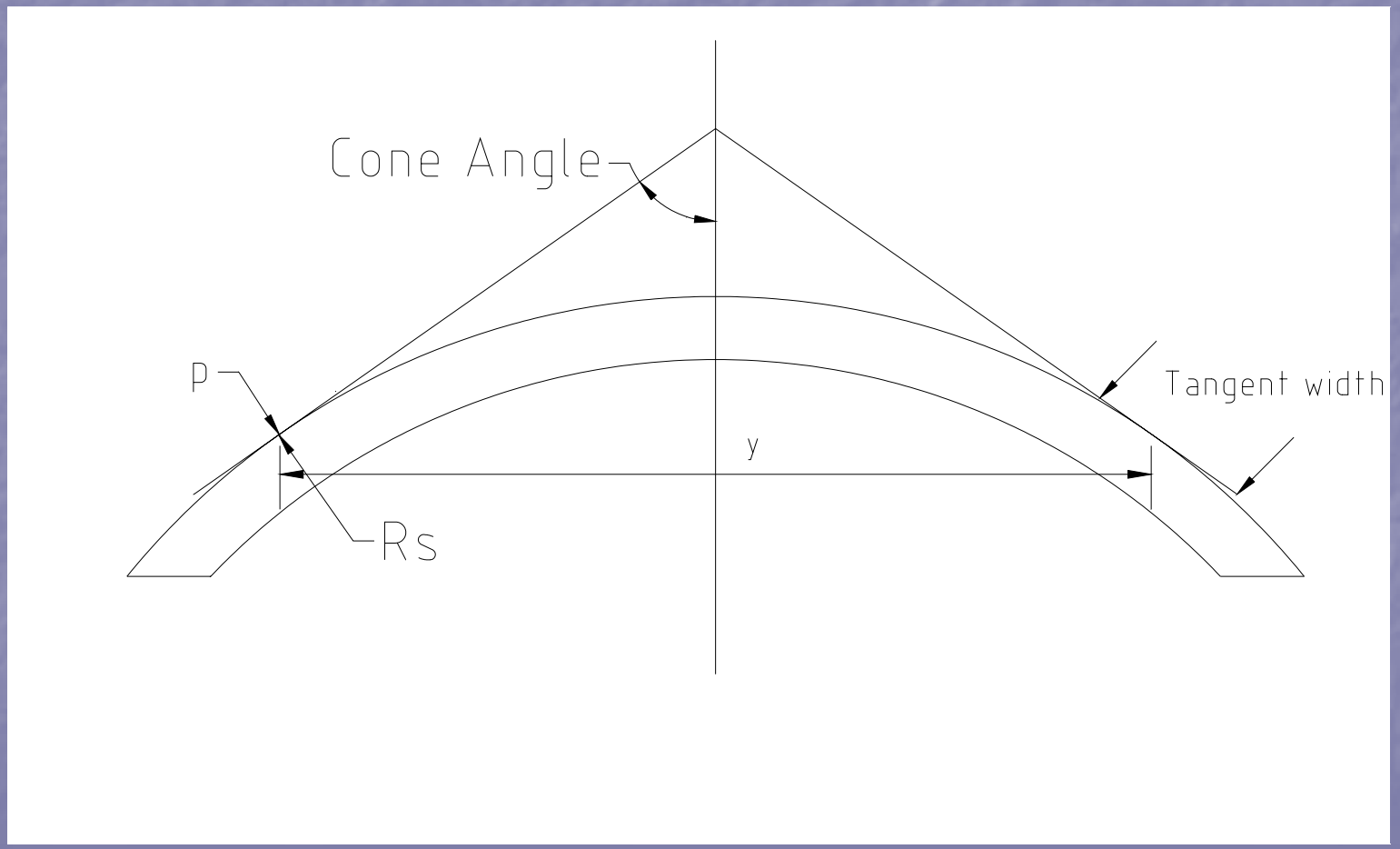

When the cone angle of trial versus the cone angle of the custom order are significantly different (>0.37 °), expect the custom order to position differently than the trial result. In this case, the cone angle of the custom order is looser (> angle) which could result in a more superior position than the trial.

BE Retainer diagnostic cone angle:
56.53°

Calculated custom BE Retainer parameters for the same patient
57.32 °



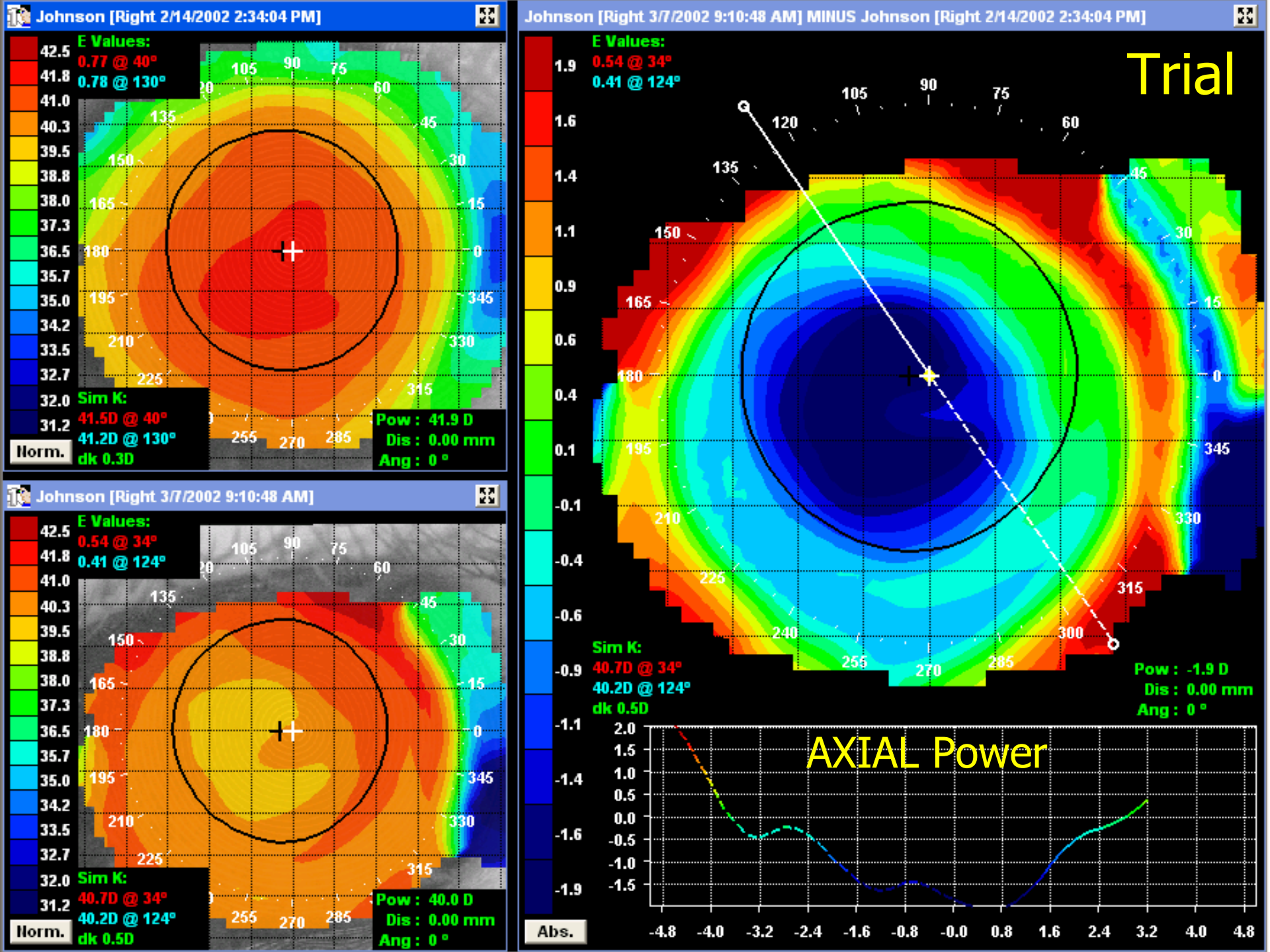
# Tangential Cone Angle Periphery

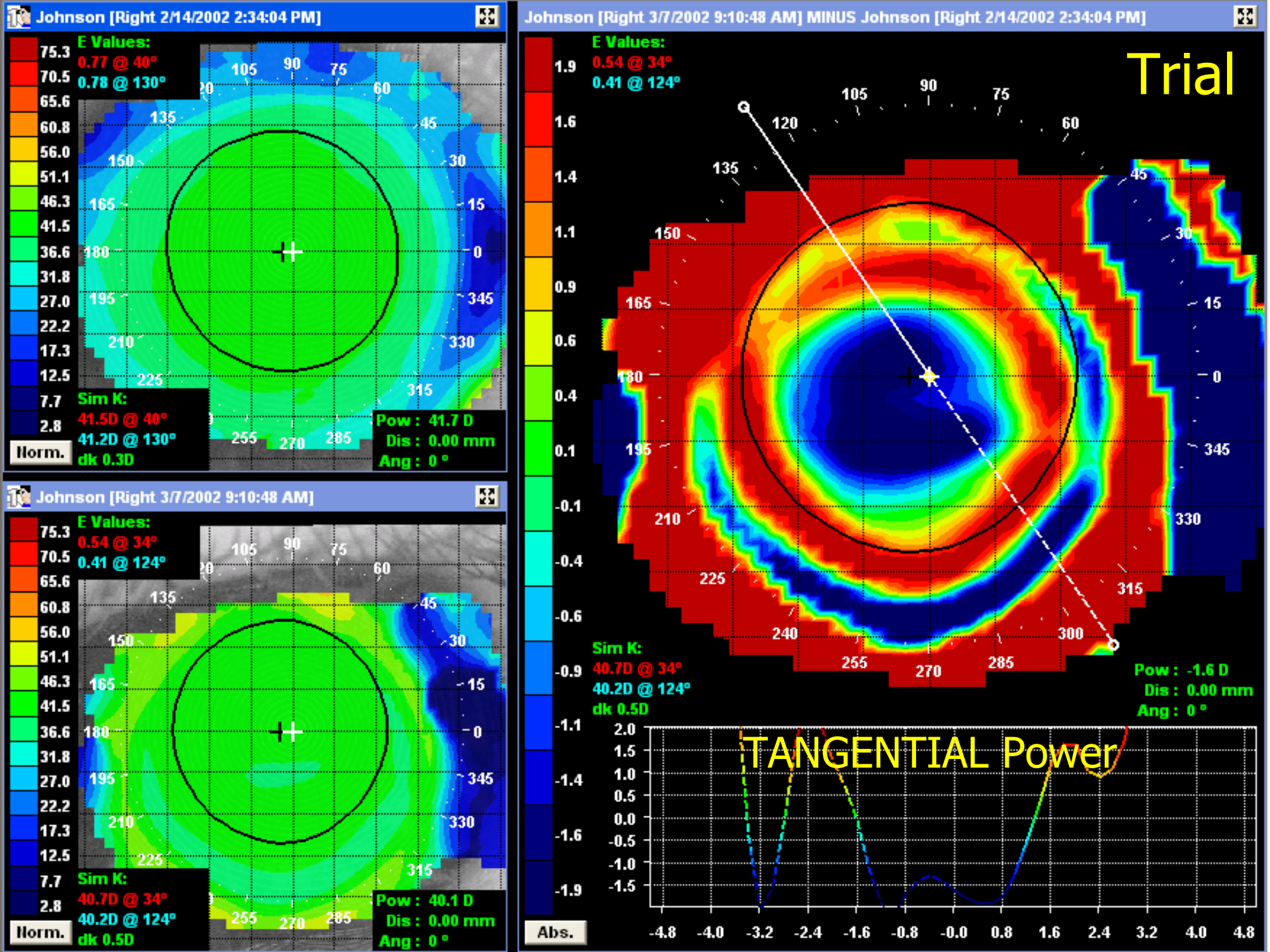


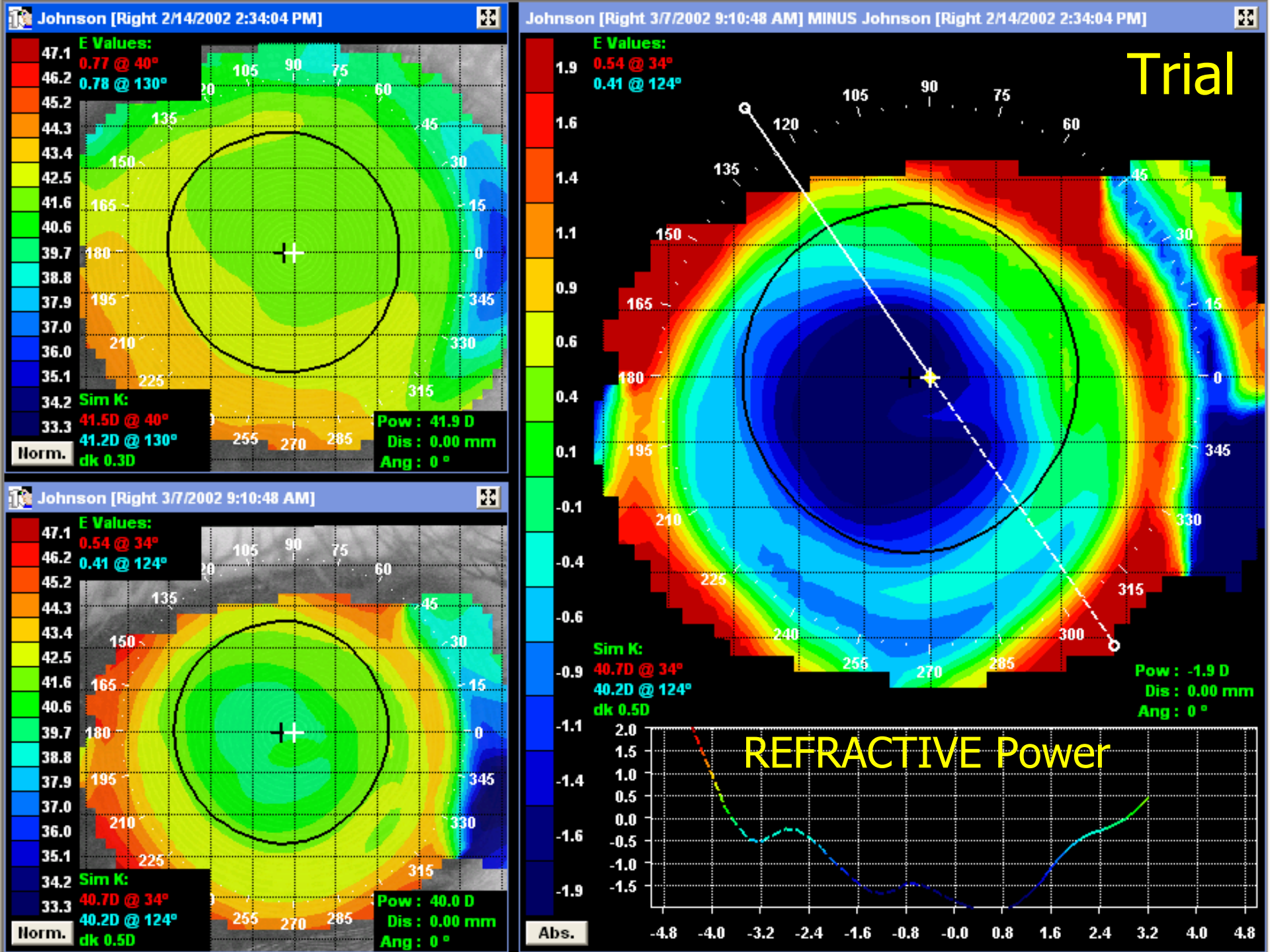
# Cone Angles

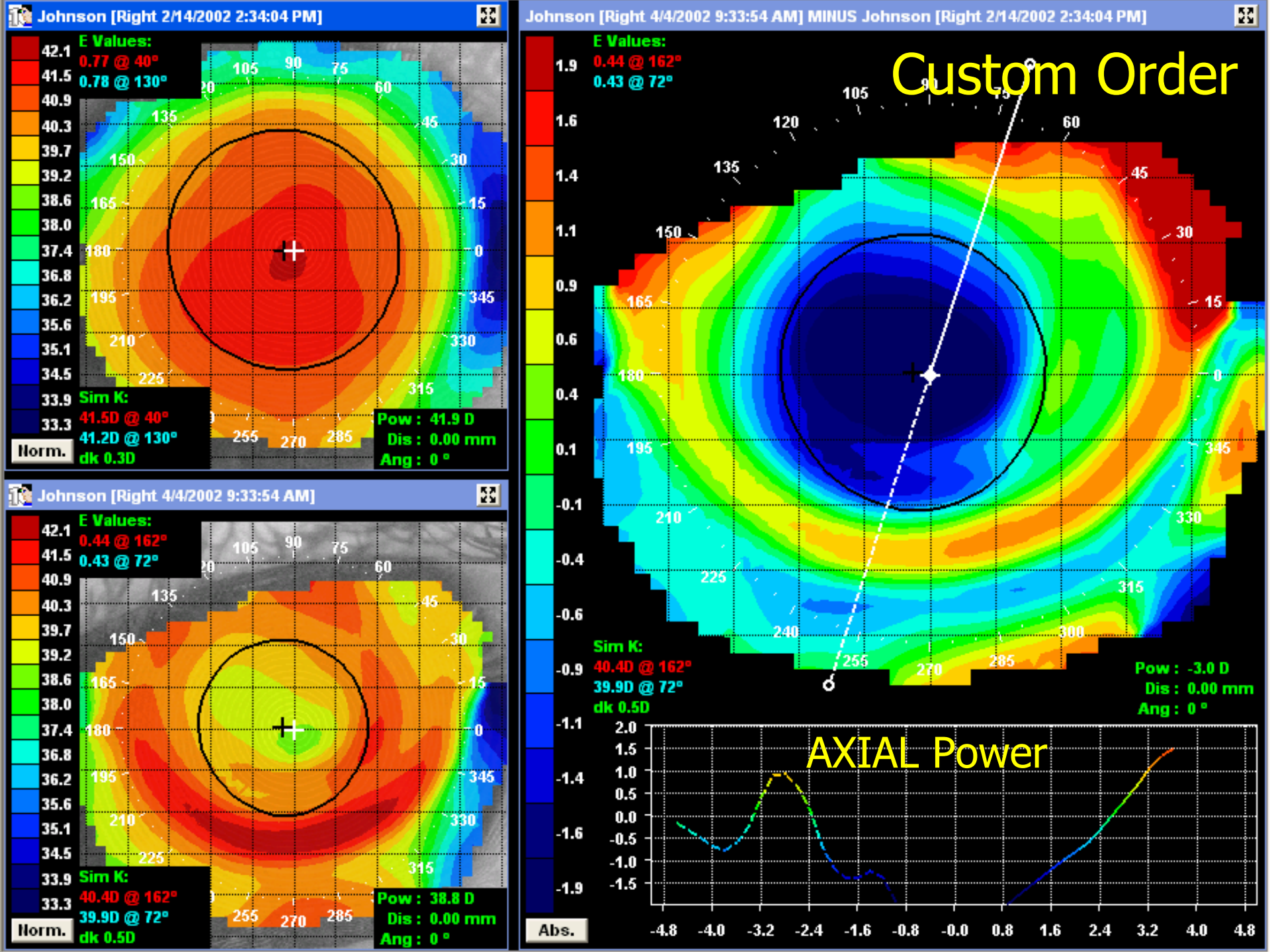
- The cone angle determines the vertical positioning of the BE Retainer.  If a trial results in a "Bulls-eye" that is slightly high and the cone angle is looser (> angle °) than the calculated custom parameters, then assume that the tighter cone angle of the custom BE Retainer will position more centrally.
- Conversely, if the trial results in perfect centration but the calculated custom order has a cone angle >0.37 ° different, then assume the custom BE Retainer may position slightly lower or higher.
- Adjust the cone angle if necessary to achieve the desired positioning of effect (contact your consultant)

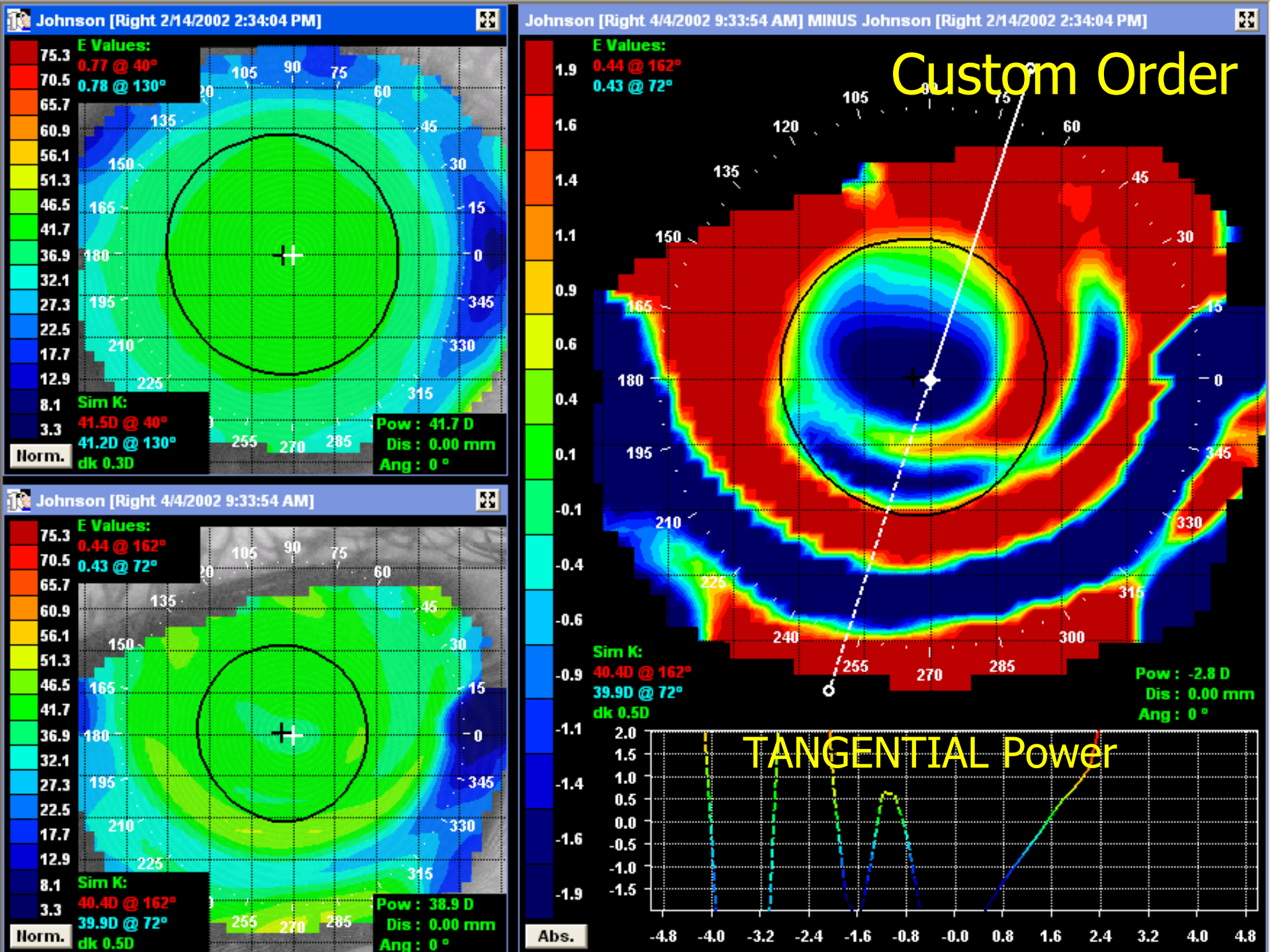
In the following example, the trial has a tighter cone angle (56.53) than the custom BE Retainer (57.32). Note the improved positioning of the effect with the ideal cone angle (trial is slightly low but the custom is perfectly centered)

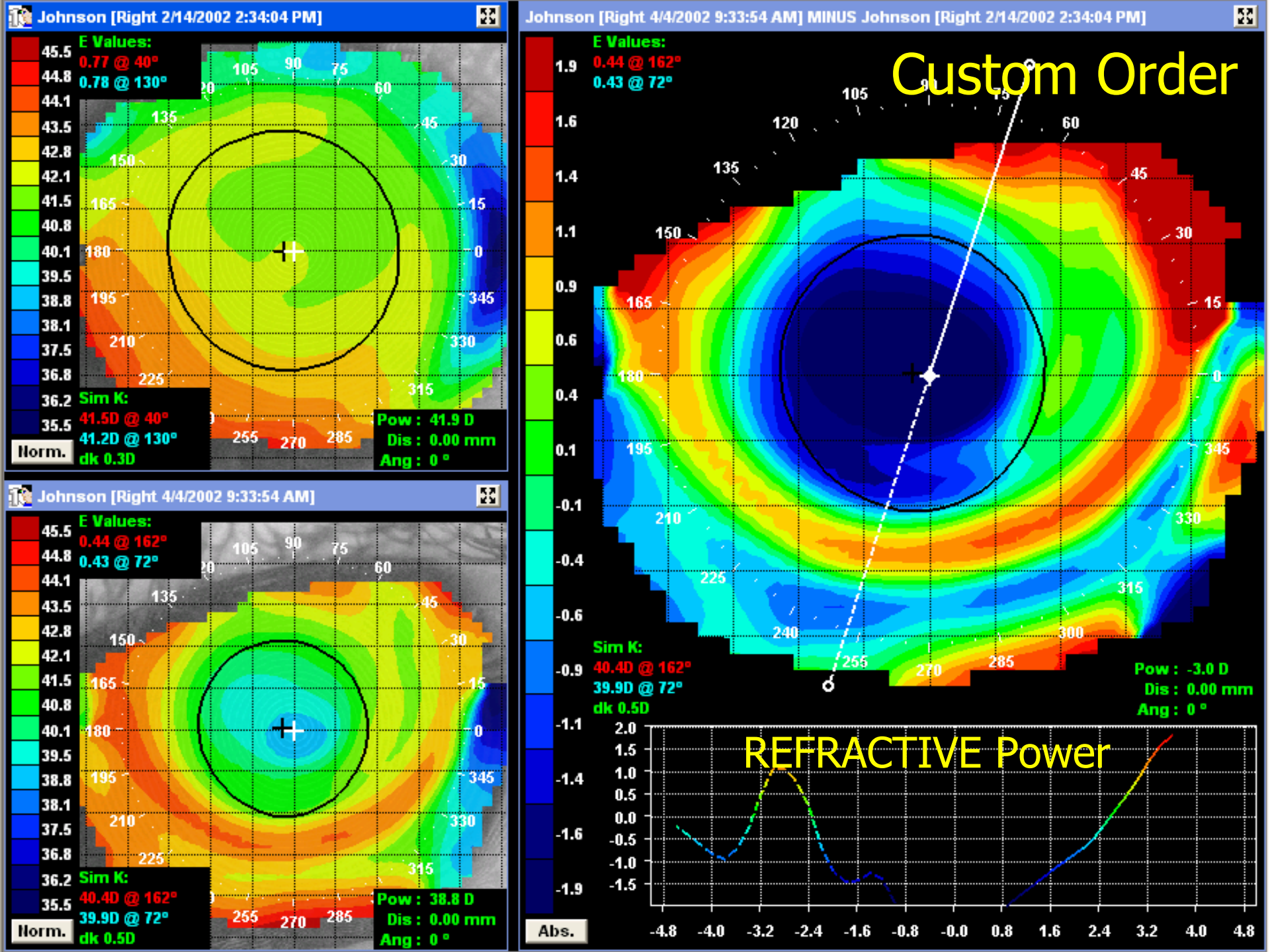

Johnson [Right 2/14/2002 2:34:04 PM]
E Values:
0.77 @ 40°
0.78 @ 130°
Sim K:
41.5D @ 40°
41.2D @ 130°
dk 0.3D
Pow : 41.9 D
Dis : 0.00 mm
Ang : 0 °
Norm.
Johnson [Right 3/7/2002 9:10:48 AM]
E Values:
0.54 @ 34°
0.41 @ 124°
Sim K:
40.7D @ 34°
40.2D @ 124°
dk 0.5D
Pow : 40.0 D
Dis : 0.00 mm
Ang : 0 °
Norm.
Johnson [Right 3/7/2002 9:10:48 AM] MINUS Johnson [Right 2/14/2002 2:34:04 PM]
Trial
E Values:
0.54 @ 34°
0.41 @ 124°
Sim K:
40.7D @ 34°
40.2D @ 124°
dk 0.5D
Pow : -1.9 D
Dis : 0.00 mm
Ang : 0 °
AXIAL Power
Abs.

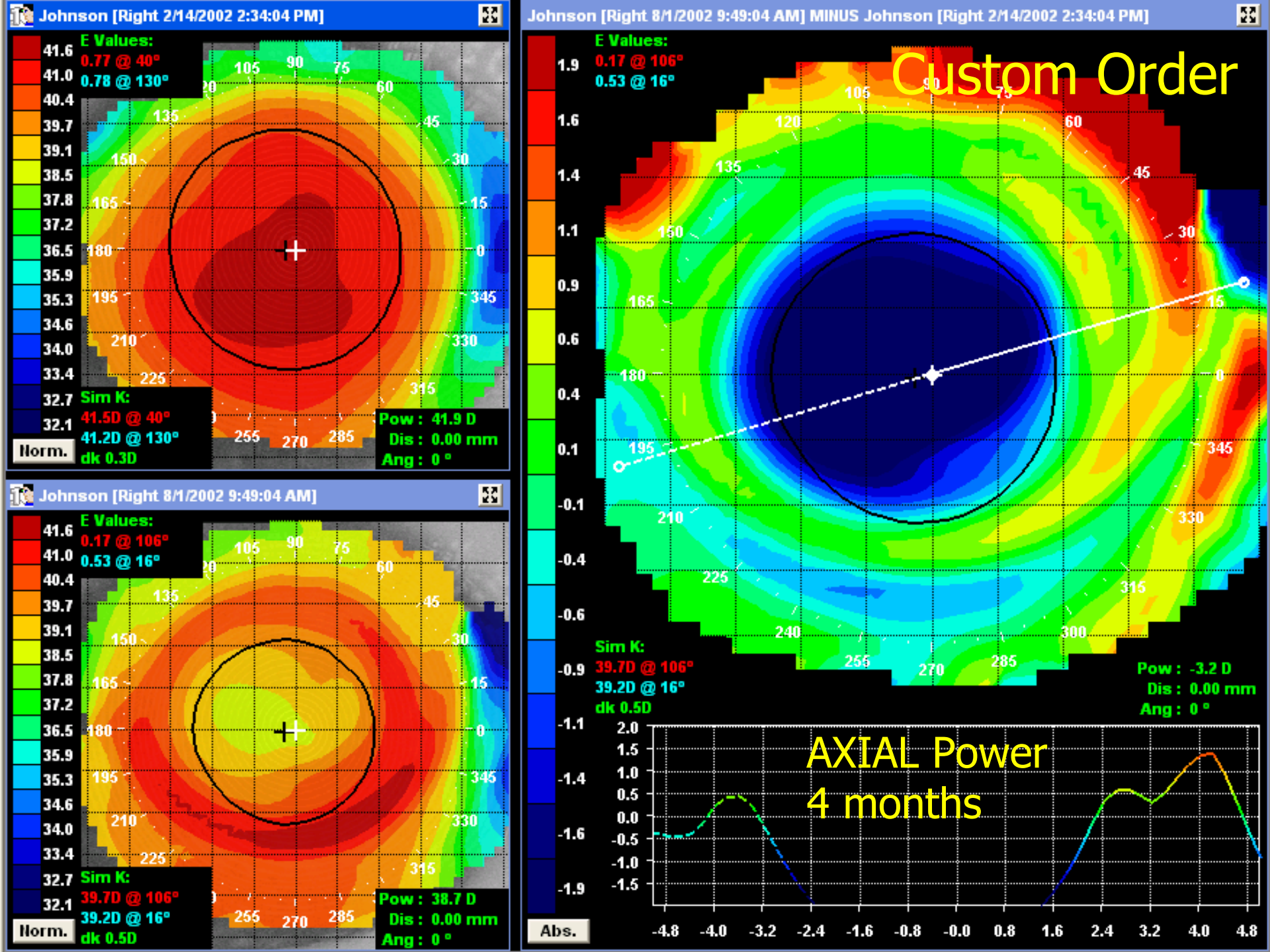

Johnson [Right 2/14/2002 2:34:04 PM]
E Values:
0.77 @ 40°
0.78 @ 130°
Sim K:
41.5D @ 40°
41.2D @ 130°
dk 0.3D
Pow : 41.7 D
Dis : 0.00 mm
Ang : 0 °
Norm.
Johnson [Right 3/7/2002 9:10:48 AM]
E Values:
0.54 @ 34°
0.41 @ 124°
Sim K:
40.7D @ 34°
40.2D @ 124°
dk 0.5D
Pow : 40.1 D
Dis : 0.00 mm
Ang : 0 °
Norm.
Johnson [Right 3/7/2002 9:10:48 AM] MINUS Johnson [Right 2/14/2002 2:34:04 PM]
Trial
E Values:
0.54 @ 34°
0.41 @ 124°
Sim K:
40.7D @ 34°
40.2D @ 124°
dk 0.5D
Pow : -1.6 D
Dis : 0.00 mm
Ang : 0 °
TANGENTIAL Power
Abs.


Johnson [Right 2/14/2002 2:34:04 PM]
E Values:
0.77 @ 40°
0.78 @ 130°
Sim K:
41.5D @ 40°
41.2D @ 130°
dk 0.3D
Pow : 41.9 D
Dis : 0.00 mm
Ang : 0 °
Norm.
Johnson [Right 3/7/2002 9:10:48 AM]
E Values:
0.54 @ 34°
0.41 @ 124°
Sim K:
40.7D @ 34°
40.2D @ 124°
dk 0.5D
Pow : 40.0 D
Dis : 0.00 mm
Ang : 0 °
Norm.
Johnson [Right 3/7/2002 9:10:48 AM] MINUS Johnson [Right 2/14/2002 2:34:04 PM]
Trial
E Values:
0.54 @ 34°
0.41 @ 124°
Sim K:
40.7D @ 34°
40.2D @ 124°
dk 0.5D
Pow : -1.9 D
Dis : 0.00 mm
Ang : 0 °
REFRACTIVE Power
Abs.


Johnson [Right 2/14/2002 2:34:04 PM]
E Values:
0.77 @ 40°
0.78 @ 130°
Sim K:
41.5D @ 40°
41.2D @ 130°
dk 0.3D
Pow : 41.9 D
Dis : 0.00 mm
Ang : 0 °
Norm.
Johnson [Right 4/4/2002 9:33:54 AM]
E Values:
0.44 @ 162°
0.43 @ 72°
Sim K:
40.4D @ 162°
39.9D @ 72°
dk 0.5D
Pow : 38.8 D
Dis : 0.00 mm
Ang : 0 °
Norm.
Johnson [Right 4/4/2002 9:33:54 AM] MINUS Johnson [Right 2/14/2002 2:34:04 PM]
Custom Order
E Values:
0.44 @ 162°
0.43 @ 72°
Sim K:
40.4D @ 162°
39.9D @ 72°
dk 0.5D
Pow : -3.0 D
Dis : 0.00 mm
Ang : 0 °
AXIAL Power
Abs.


Johnson [Right 2/14/2002 2:34:04 PM]
E Values:
0.77 @ 40°
0.78 @ 130°
Sim K:
41.5D @ 40°
41.2D @ 130°
dk 0.3D
Pow : 41.7 D
Dis : 0.00 mm
Ang : 0 °
Norm.
Johnson [Right 4/4/2002 9:33:54 AM]
E Values:
0.44 @ 162°
0.43 @ 72°
Sim K:
40.4D @ 162°
39.9D @ 72°
dk 0.5D
Pow : 38.9 D
Dis : 0.00 mm
Ang : 0 °
Norm.
Johnson [Right 4/4/2002 9:33:54 AM] MINUS Johnson [Right 2/14/2002 2:34:04 PM]
Custom Order
E Values:
0.44 @ 162°
0.43 @ 72°
Sim K:
40.4D @ 162°
39.9D @ 72°
dk 0.5D
Pow : -2.8 D
Dis : 0.00 mm
Ang : 0 °
TANGENTIAL Power
Abs.

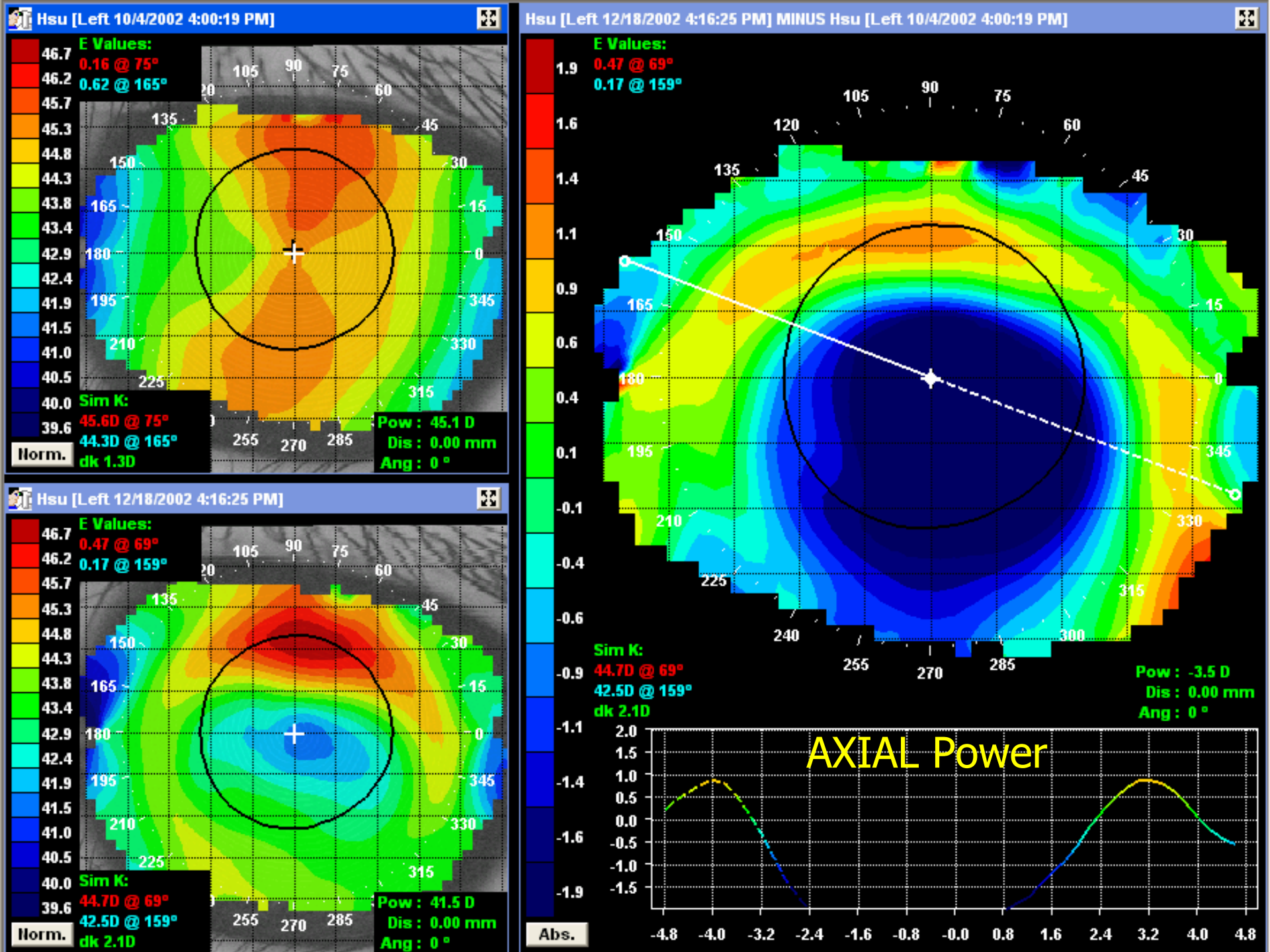

Johnson [Right 2/14/2002 2:34:04 PM]
E Values:
0.77 @ 40°
0.78 @ 130°
Sim K:
41.5D @ 40°
41.2D @ 130°
dk 0.3D
Pow : 41.9 D
Dis : 0.00 mm
Ang : 0 °
Norm.
Johnson [Right 4/4/2002 9:33:54 AM]
E Values:
0.44 @ 162°
0.43 @ 72°
Sim K:
40.4D @ 162°
39.9D @ 72°
dk 0.5D
Pow : 38.8 D
Dis : 0.00 mm
Ang : 0 °
Norm.
Johnson [Right 4/4/2002 9:33:54 AM] MINUS Johnson [Right 2/14/2002 2:34:04 PM]
Custom Order
E Values:
0.44 @ 162°
0.43 @ 72°
Sim K:
40.4D @ 162°
39.9D @ 72°
dk 0.5D
Pow : -3.0 D
Dis : 0.00 mm
Ang : 0 °
REFRACTIVE Power
Abs.

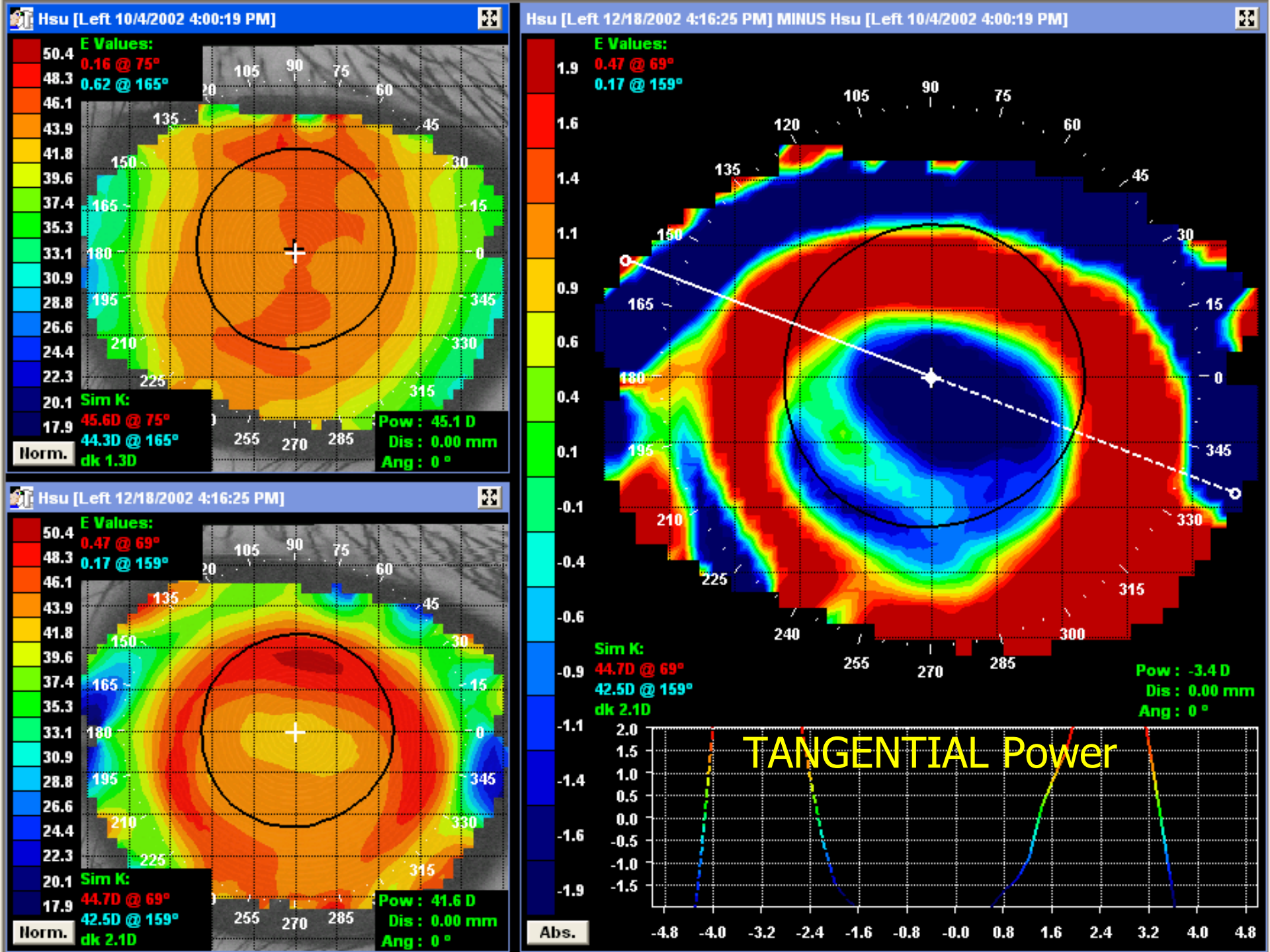

Johnson [Right 2/14/2002 2:34:04 PM]
E Values:
0.77 @ 40°
0.78 @ 130°
Sim K:
41.5D @ 40°
41.2D @ 130°
dk 0.3D
Pow : 41.9 D
Dis : 0.00 mm
Ang : 0 °
Norm.
Johnson [Right 8/1/2002 9:49:04 AM]
E Values:
0.17 @ 106°
0.53 @ 16°
Sim K:
39.7D @ 106°
39.2D @ 16°
dk 0.5D
Pow : 38.7 D
Dis : 0.00 mm
Ang : 0 °
Norm.
Johnson [Right 8/1/2002 9:49:04 AM] MINUS Johnson [Right 2/14/2002 2:34:04 PM]
Custom Order
E Values:
0.17 @ 106°
0.53 @ 16°
Sim K:
39.7D @ 106°
39.2D @ 16°
dk 0.5D
Pow : -3.2 D
Dis : 0.00 mm
Ang : 0 °
AXIAL Power
4 months
Abs.

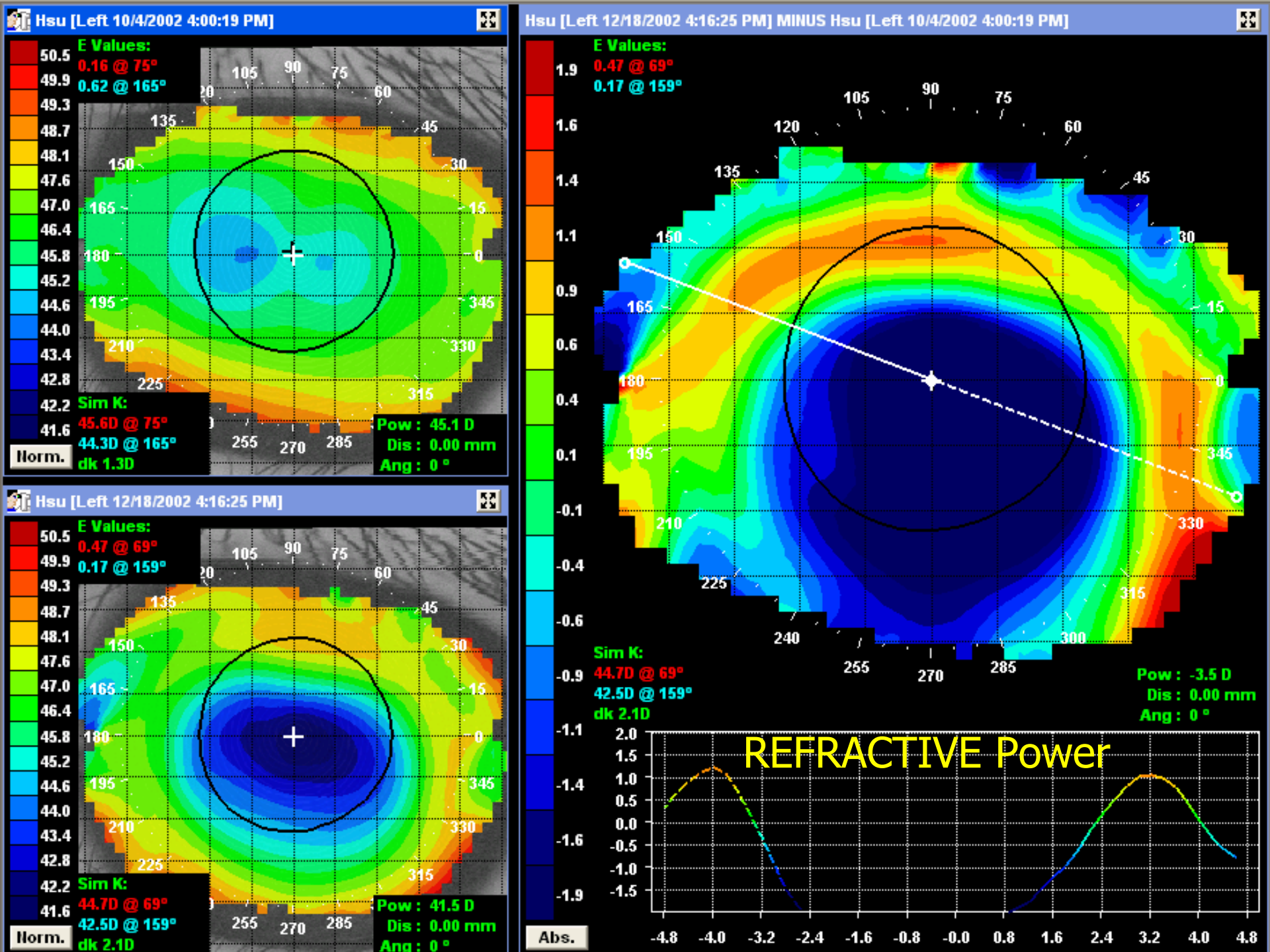
# The Cone Angle Determines position of the BE Retainer

- Cone Angle: controls vertical positioning
  - Right cone angle: Bulls-eye
  - Loose cone angle: Smiley-face
  - Tight cone angle: Central Island/ Frowny Face
- Compare trial vs. custom order
- Adjust the Sagittal height to change the cone angle

What is the result here?


Hsu [Left 10/4/2002 4:00:19 PM]
E Values:
0.16 @ 75°
0.62 @ 165°
Sim K:
45.6D @ 75°
44.3D @ 165°
dk 1.3D
Pow : 45.1 D
Dis : 0.00 mm
Ang : 0 °
Norm.
Hsu [Left 12/18/2002 4:16:25 PM]
E Values:
0.47 @ 69°
0.17 @ 159°
Sim K:
44.7D @ 69°
42.5D @ 159°
dk 2.1D
Pow : 41.5 D
Dis : 0.00 mm
Ang : 0 °
Norm.
Hsu [Left 12/18/2002 4:16:25 PM] MINUS Hsu [Left 10/4/2002 4:00:19 PM]
E Values:
0.47 @ 69°
0.17 @ 159°
Sim K:
44.7D @ 69°
42.5D @ 159°
dk 2.1D
Pow : -3.5 D
Dis : 0.00 mm
Ang : 0 °
Abs.
AXIAL Power

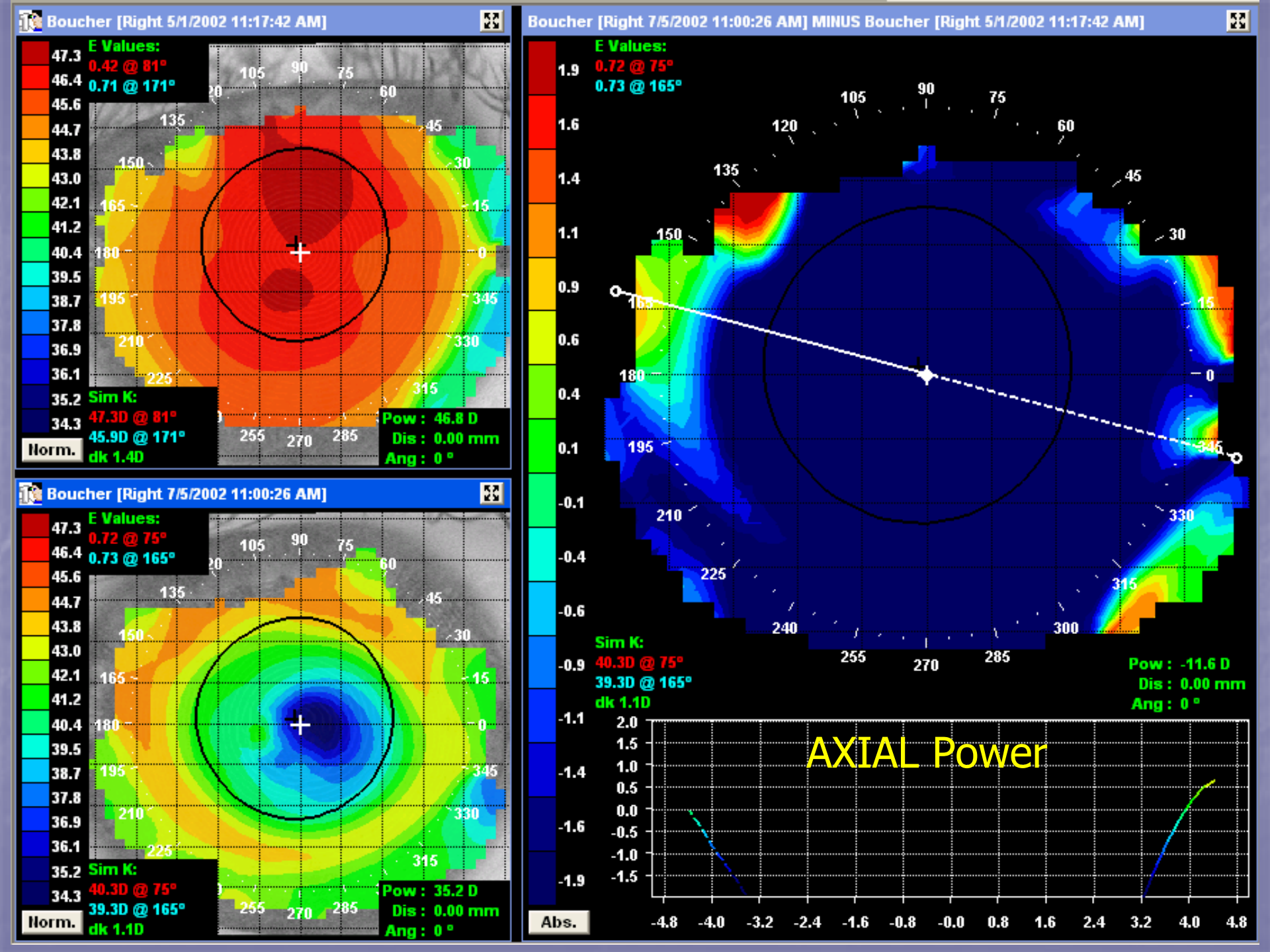

Hsu [Left 10/4/2002 4:00:19 PM]
E Values:
0.16 @ 75°
0.62 @ 165°
Sim K:
45.6D @ 75°
44.3D @ 165°
dk 1.3D
Pow : 45.1 D
Dis : 0.00 mm
Ang : 0 °
Norm.
Hsu [Left 12/18/2002 4:16:25 PM]
E Values:
0.47 @ 69°
0.17 @ 159°
Sim K:
44.7D @ 69°
42.5D @ 159°
dk 2.1D
Pow : 41.6 D
Dis : 0.00 mm
Ang : 0 °
Norm.
Hsu [Left 12/18/2002 4:16:25 PM] MINUS Hsu [Left 10/4/2002 4:00:19 PM]
E Values:
0.47 @ 69°
0.17 @ 159°
Sim K:
44.7D @ 69°
42.5D @ 159°
dk 2.1D
Pow : -3.4 D
Dis : 0.00 mm
Ang : 0 °
TANGENTIAL Power
Abs.

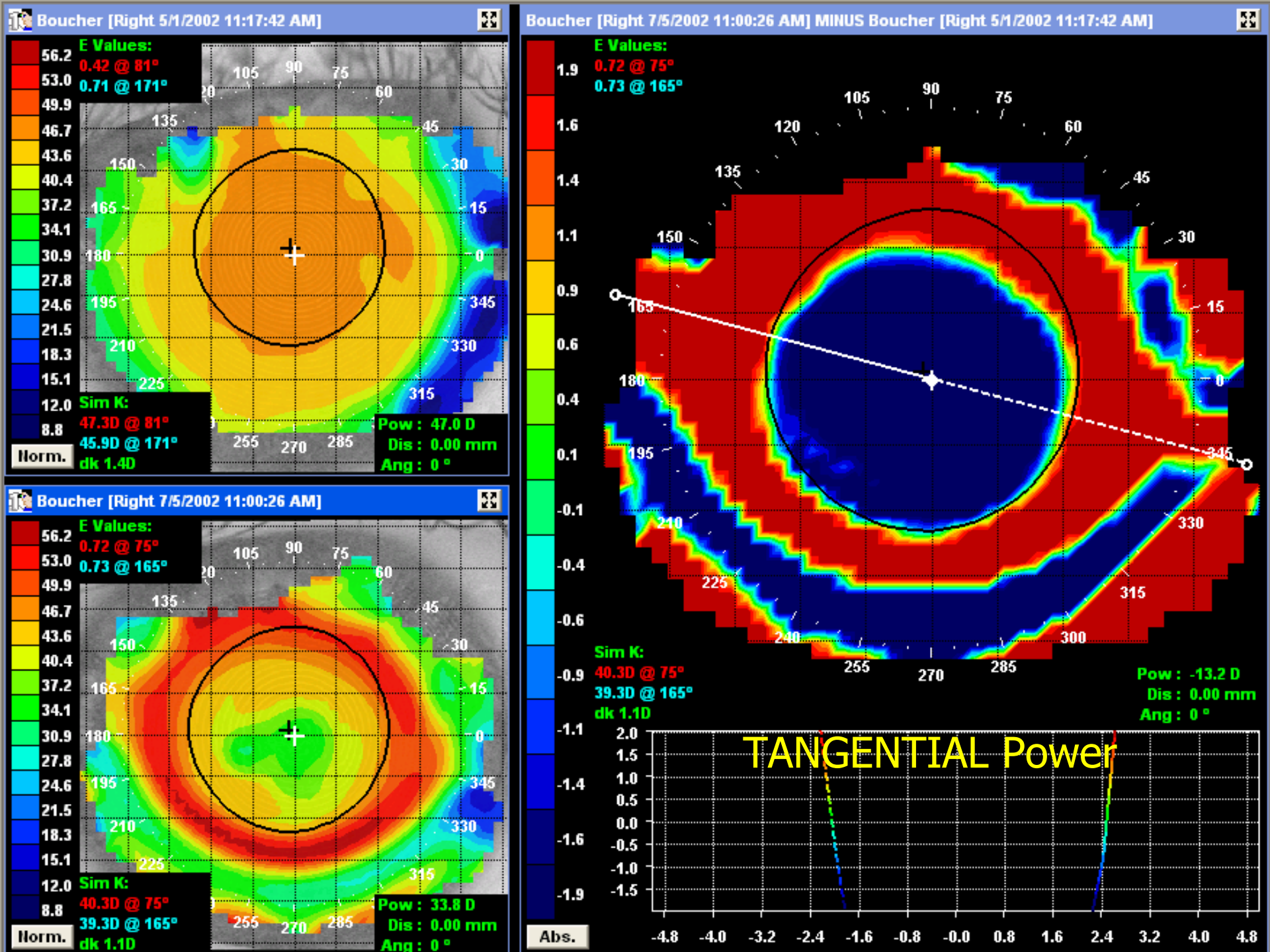

Hsu [Left 10/4/2002 4:00:19 PM]
E Values:
0.16 @ 75°
0.62 @ 165°
Sim K:
45.6D @ 75°
44.3D @ 165°
dk 1.3D
Pow : 45.1 D
Dis : 0.00 mm
Ang : 0 °
Norm.
Hsu [Left 12/18/2002 4:16:25 PM]
E Values:
0.47 @ 69°
0.17 @ 159°
Sim K:
44.7D @ 69°
42.5D @ 159°
dk 2.1D
Pow : 41.5 D
Dis : 0.00 mm
Ang : 0 °
Norm.
Hsu [Left 12/18/2002 4:16:25 PM] MINUS Hsu [Left 10/4/2002 4:00:19 PM]
E Values:
0.47 @ 69°
0.17 @ 159°
Sim K:
44.7D @ 69°
42.5D @ 159°
dk 2.1D
Pow : -3.5 D
Dis : 0.00 mm
Ang : 0 °
Abs.
REFRACTIVE Power

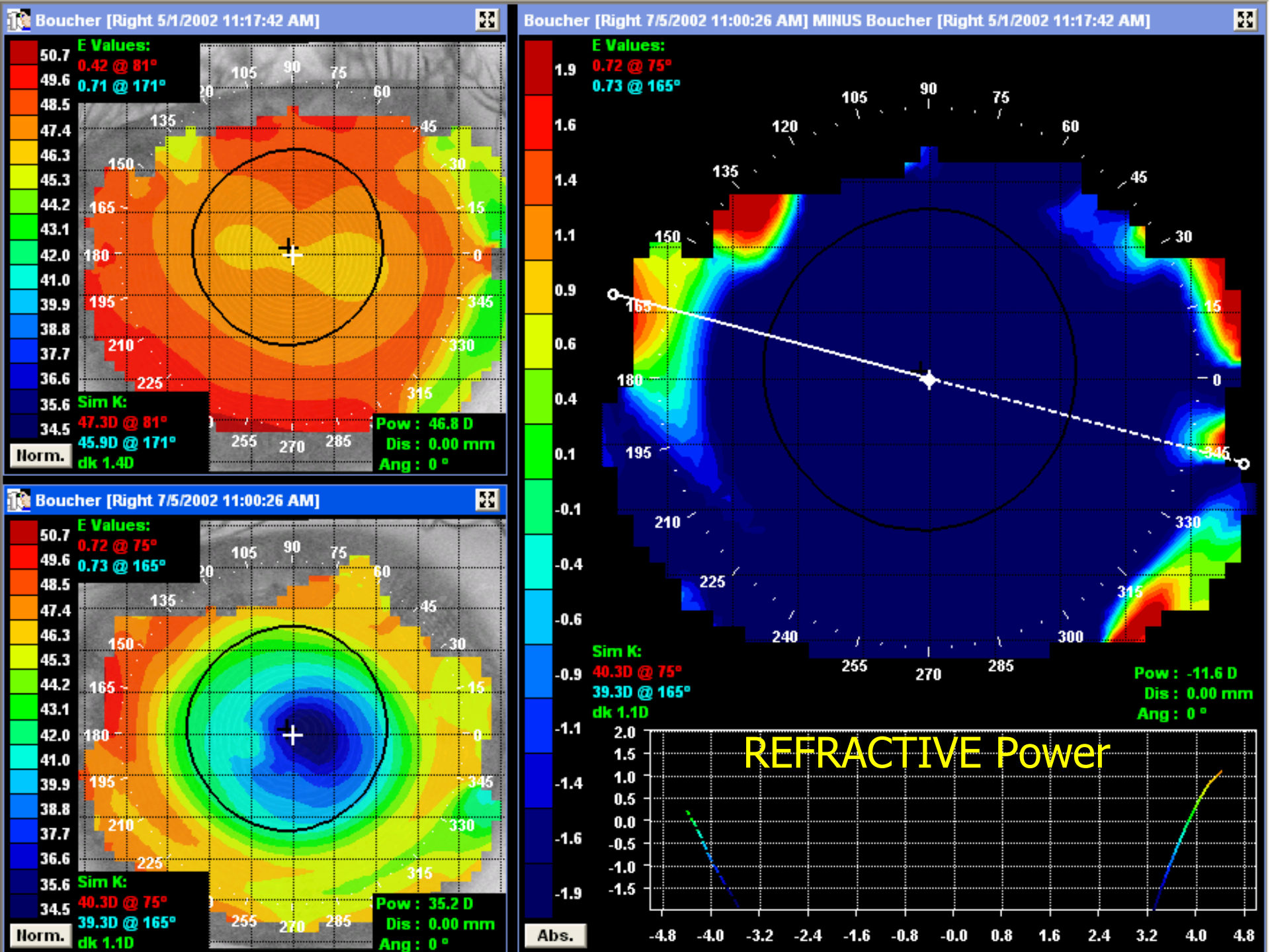
# Dealing with Frowny Faces

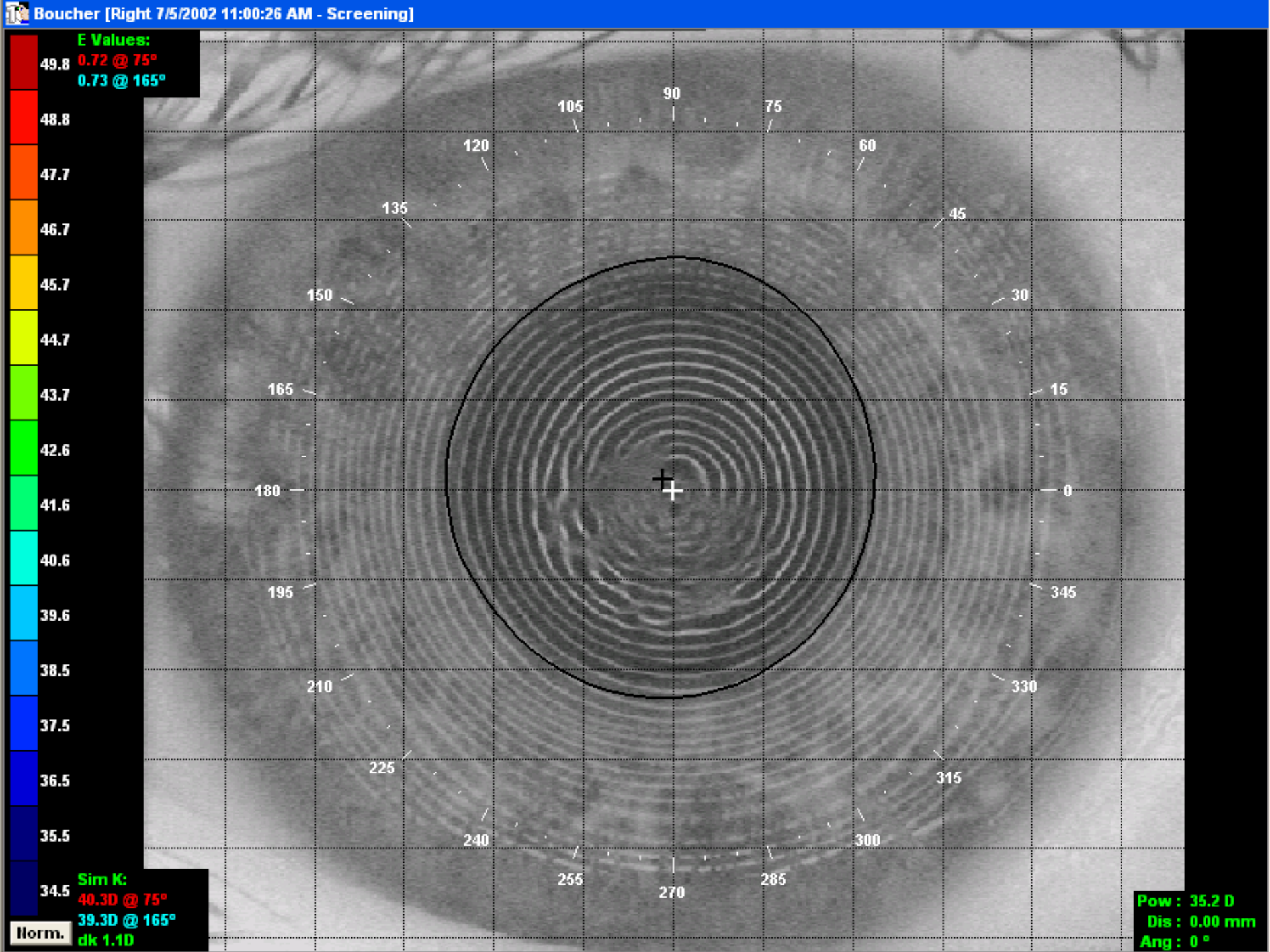
- Results from a tight cone angle
- Basically a perfect bulls-eye – just low
- Reduce Sag by 4 microns (um)
- Reduction in sag results in a “loosening” of the cone angle

What is the result here?


Boucher [Right 5/1/2002 11:17:42 AM]
E Values:
0.42 @ 81°
0.71 @ 171°
Sim K:
47.3D @ 81°
45.9D @ 171°
dk 1.4D
Pow : 46.8 D
Dis : 0.00 mm
Ang : 0 °
Norm.
Boucher [Right 7/5/2002 11:00:26 AM]
E Values:
0.72 @ 75°
0.73 @ 165°
Sim K:
40.3D @ 75°
39.3D @ 165°
dk 1.1D
Pow : 35.2 D
Dis : 0.00 mm
Ang : 0 °
Norm.
Boucher [Right 7/5/2002 11:00:26 AM] MINUS Boucher [Right 5/1/2002 11:17:42 AM]
E Values:
0.72 @ 75°
0.73 @ 165°
Sim K:
40.3D @ 75°
39.3D @ 165°
dk 1.1D
Pow : -11.6 D
Dis : 0.00 mm
Ang : 0 °
Abs.
AXIAL Power


Boucher [Right 5/1/2002 11:17:42 AM]
E Values:
0.42 @ 81°
0.71 @ 171°
Sim K:
47.3D @ 81°
45.9D @ 171°
dk 1.4D
Pow : 47.0 D
Dis : 0.00 mm
Ang : 0 °
Norm.
Boucher [Right 7/5/2002 11:00:26 AM]
E Values:
0.72 @ 75°
0.73 @ 165°
Sim K:
40.3D @ 75°
39.3D @ 165°
dk 1.1D
Pow : 33.8 D
Dis : 0.00 mm
Ang : 0 °
Norm.
Boucher [Right 7/5/2002 11:00:26 AM] MINUS Boucher [Right 5/1/2002 11:17:42 AM]
E Values:
0.72 @ 75°
0.73 @ 165°
Sim K:
40.3D @ 75°
39.3D @ 165°
dk 1.1D
Pow : -13.2 D
Dis : 0.00 mm
Ang : 0 °
Abs.
TANGENTIAL Power

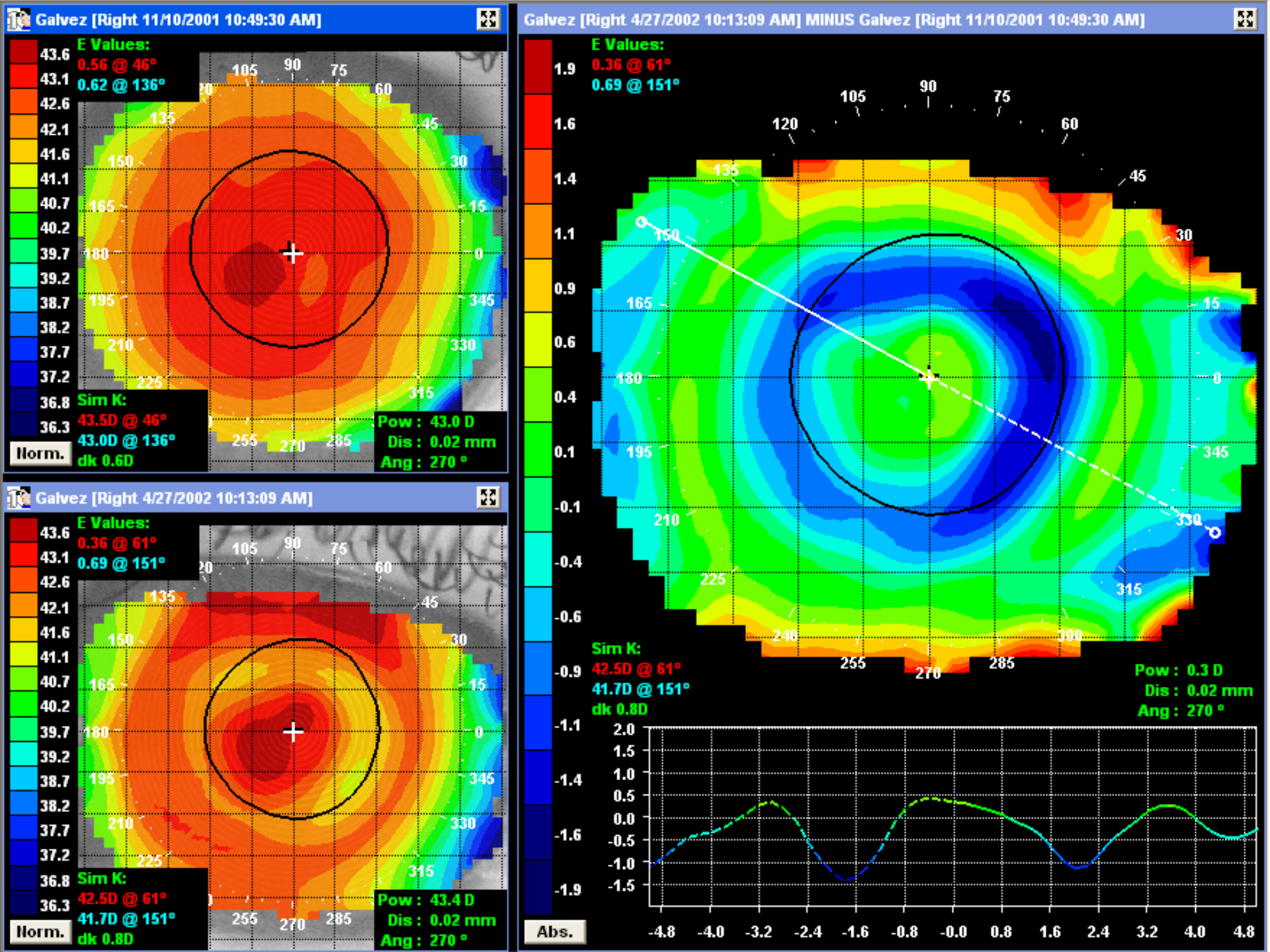

Boucher [Right 5/1/2002 11:17:42 AM]
E Values:
0.42 @ 81°
0.71 @ 171°
Sim K:
47.3D @ 81°
45.9D @ 171°
dk 1.4D
Pow : 46.8 D
Dis : 0.00 mm
Ang : 0 °
Norm.
Boucher [Right 7/5/2002 11:00:26 AM]
E Values:
0.72 @ 75°
0.73 @ 165°
Sim K:
40.3D @ 75°
39.3D @ 165°
dk 1.1D
Pow : 35.2 D
Dis : 0.00 mm
Ang : 0 °
Norm.
Boucher [Right 7/5/2002 11:00:26 AM] MINUS Boucher [Right 5/1/2002 11:17:42 AM]
E Values:
0.72 @ 75°
0.73 @ 165°
Sim K:
40.3D @ 75°
39.3D @ 165°
dk 1.1D
Pow : -11.6 D
Dis : 0.00 mm
Ang : 0 °
Abs.
REFRACTIVE Power

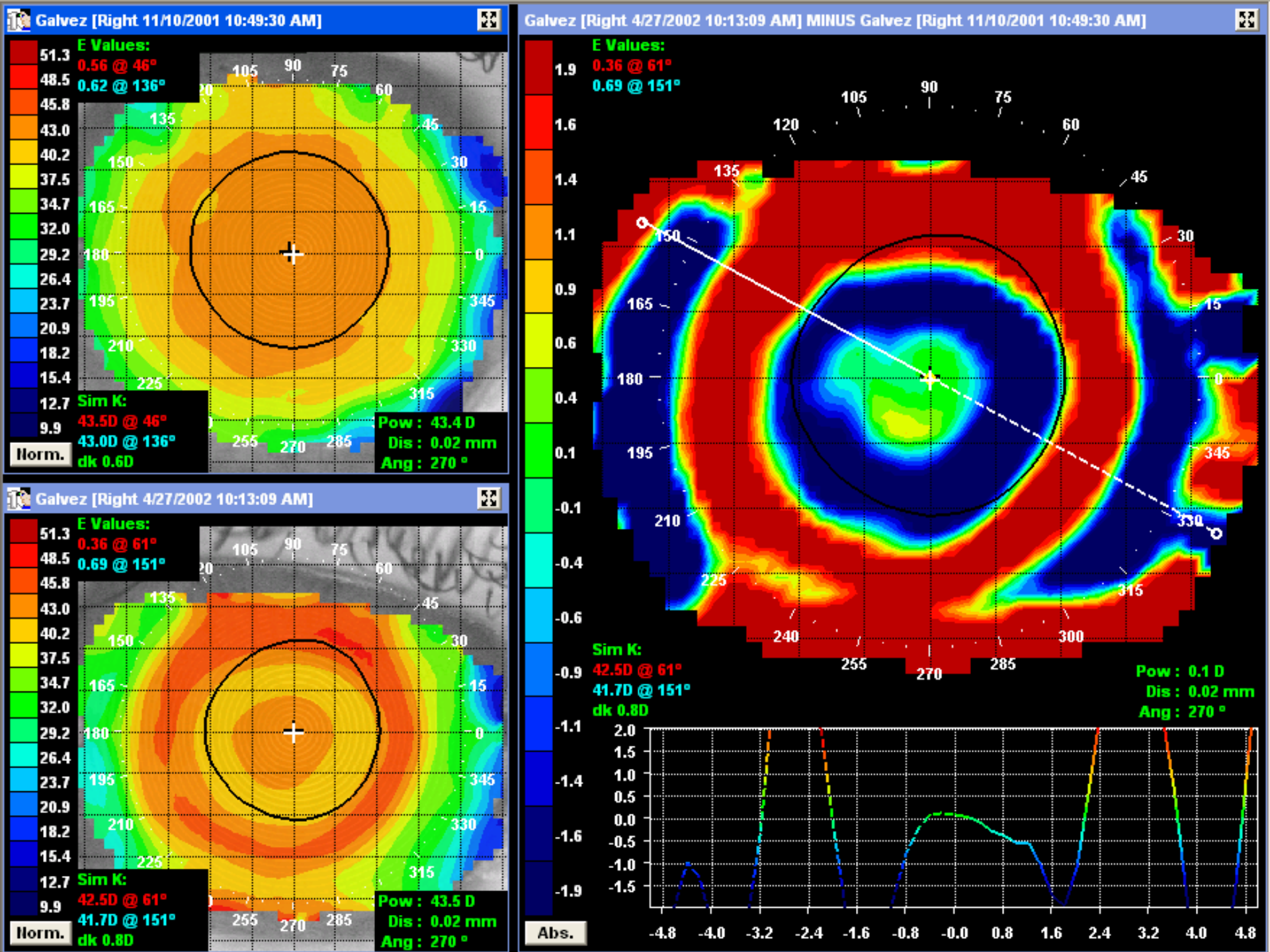

Boucher [Right 7/5/2002 11:00:26 AM - Screening]
E Values:
0.72 @ 75°
0.73 @ 165°
49.8
48.8
47.7
46.7
45.7
44.7
43.7
42.6
41.6
40.6
39.6
38.5
37.5
36.5
35.5
34.5
Sim K:
40.3D @ 75°
39.3D @ 165°
dk 1.1D
Norm.
90
105
75
120
60
135
45
150
30
165
15
180
0
195
345
210
330
225
315
240
300
255
285
270
Pow : 35.2 D
Dis : 0.00 mm
Ang : 0 °

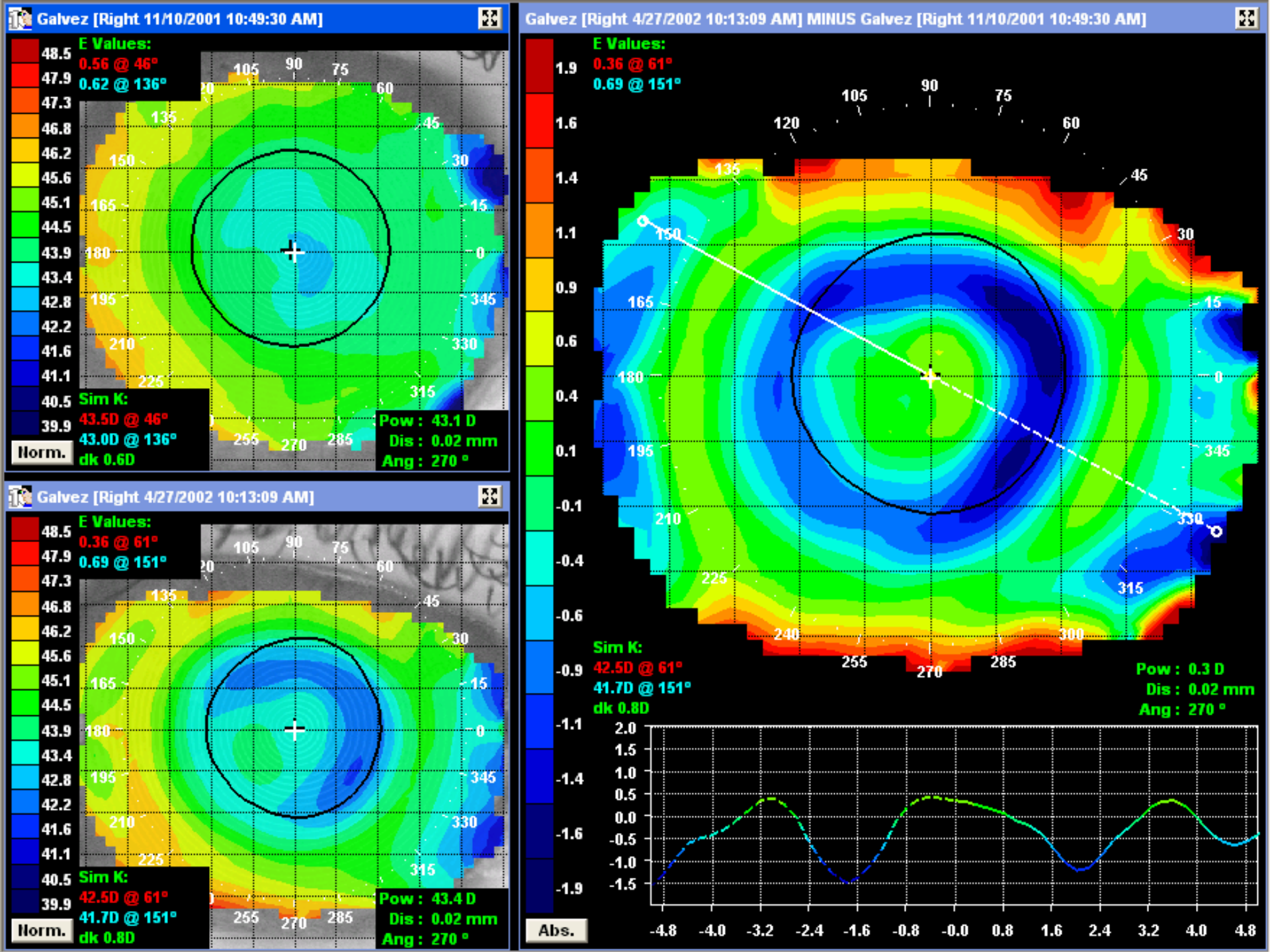
# Dealing with Divots

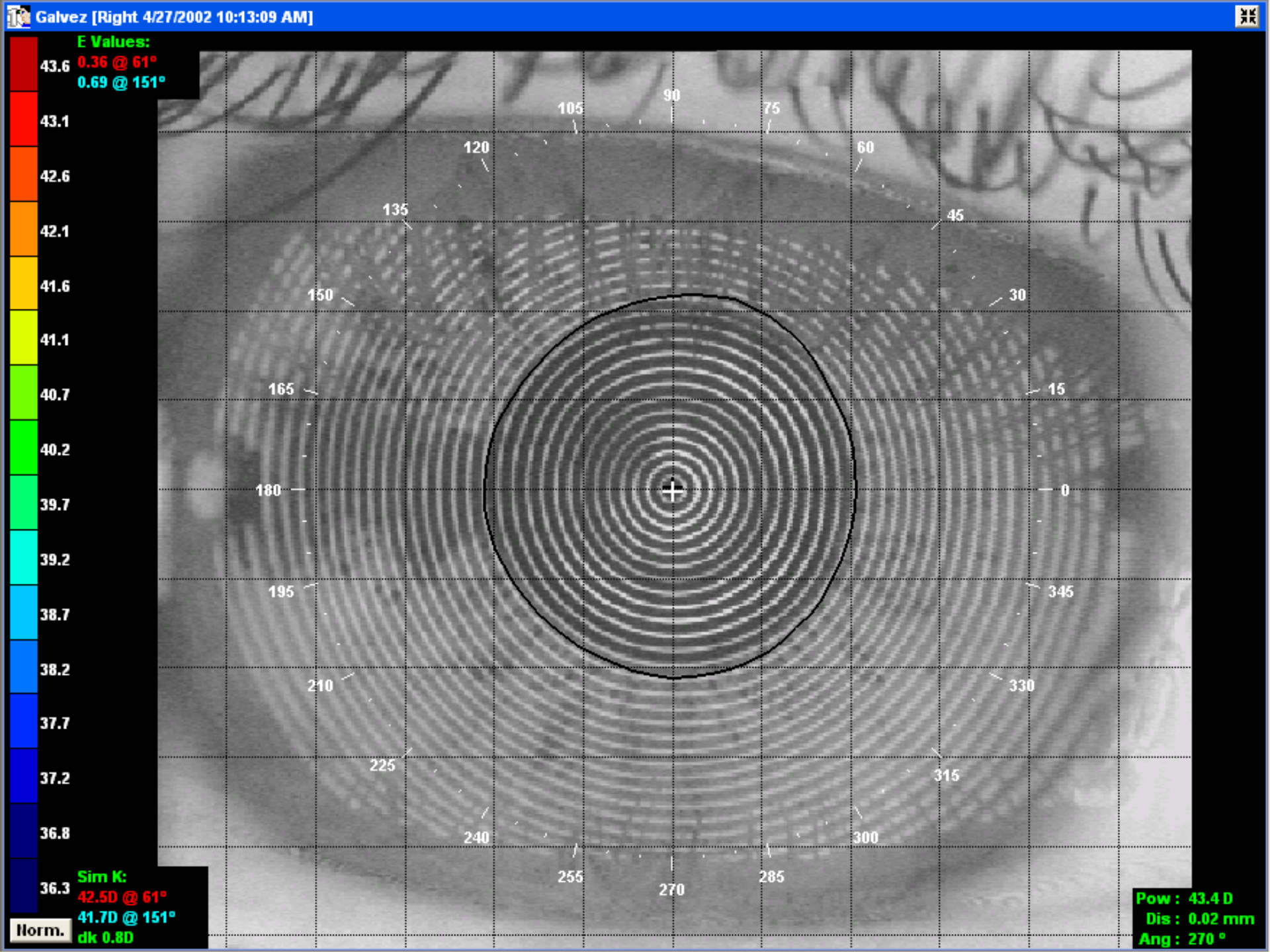
- Topography error
  - Disrupted epithelium?
  - Inconsistent tear film?
- Retainer in touch with the cornea?
- If no staining – re-take map
- If staining
  - Grade 1:  8um higher in sag (next steeper trial)
  - Grade 2:  16um higher in sag (2 trial steps steeper)

What is the result here?


Galvez [Right 11/10/2001 10:49:30 AM]
E Values:
0.56 @ 46°
0.62 @ 136°
Sim K:
43.5D @ 46°
43.0D @ 136°
dk 0.6D
Pow : 43.0 D
Dis : 0.02 mm
Ang : 270 °
Norm.
Galvez [Right 4/27/2002 10:13:09 AM]
E Values:
0.36 @ 61°
0.69 @ 151°
Sim K:
42.5D @ 61°
41.7D @ 151°
dk 0.8D
Pow : 43.4 D
Dis : 0.02 mm
Ang : 270 °
Norm.
Galvez [Right 4/27/2002 10:13:09 AM] MINUS Galvez [Right 11/10/2001 10:49:30 AM]
E Values:
0.36 @ 61°
0.69 @ 151°
Sim K:
42.5D @ 61°
41.7D @ 151°
dk 0.8D
Pow : 0.3 D
Dis : 0.02 mm
Ang : 270 °
Abs.


Galvez [Right 11/10/2001 10:49:30 AM]
E Values:
0.56 @ 46°
0.62 @ 136°
Sim K:
43.5D @ 46°
43.0D @ 136°
dk 0.6D
Pow : 43.4 D
Dis : 0.02 mm
Ang : 270 °
Norm.
Galvez [Right 4/27/2002 10:13:09 AM]
E Values:
0.36 @ 61°
0.69 @ 151°
Sim K:
42.5D @ 61°
41.7D @ 151°
dk 0.8D
Pow : 43.5 D
Dis : 0.02 mm
Ang : 270 °
Norm.
Galvez [Right 4/27/2002 10:13:09 AM] MINUS Galvez [Right 11/10/2001 10:49:30 AM]
E Values:
0.36 @ 61°
0.69 @ 151°
Sim K:
42.5D @ 61°
41.7D @ 151°
dk 0.8D
Pow : 0.1 D
Dis : 0.02 mm
Ang : 270 °
Abs.

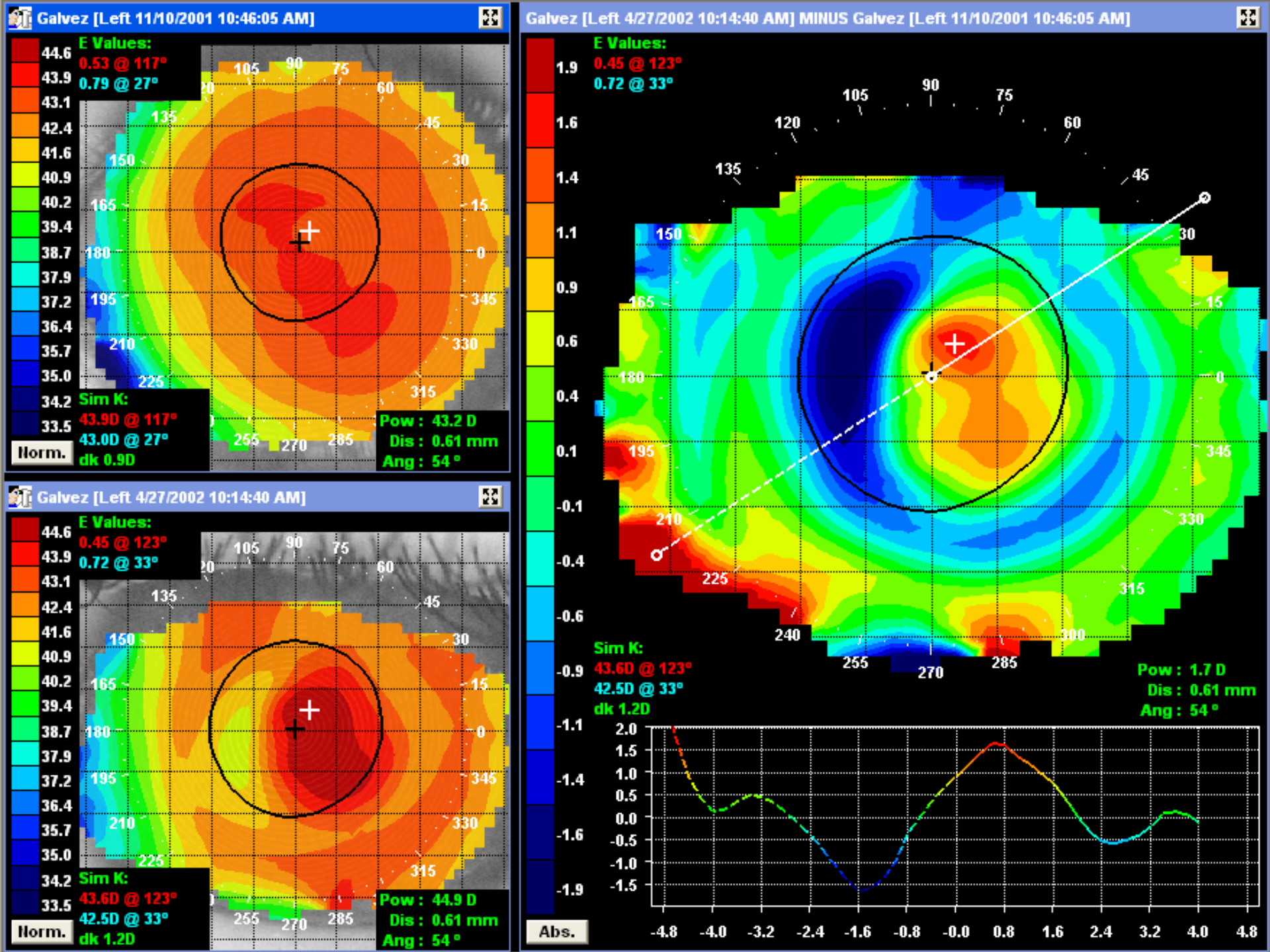

Galvez [Right 11/10/2001 10:49:30 AM]
E Values:
0.56 @ 46°
0.62 @ 136°
Sim K:
43.5D @ 46°
43.0D @ 136°
dk 0.6D
Pow : 43.1 D
Dis : 0.02 mm
Ang : 270 °
Norm.
Galvez [Right 4/27/2002 10:13:09 AM]
E Values:
0.36 @ 61°
0.69 @ 151°
Sim K:
42.5D @ 61°
41.7D @ 151°
dk 0.8D
Pow : 43.4 D
Dis : 0.02 mm
Ang : 270 °
Norm.
Galvez [Right 4/27/2002 10:13:09 AM] MINUS Galvez [Right 11/10/2001 10:49:30 AM]
E Values:
0.36 @ 61°
0.69 @ 151°
Sim K:
42.5D @ 61°
41.7D @ 151°
dk 0.8D
Pow : 0.3 D
Dis : 0.02 mm
Ang : 270 °
Abs.

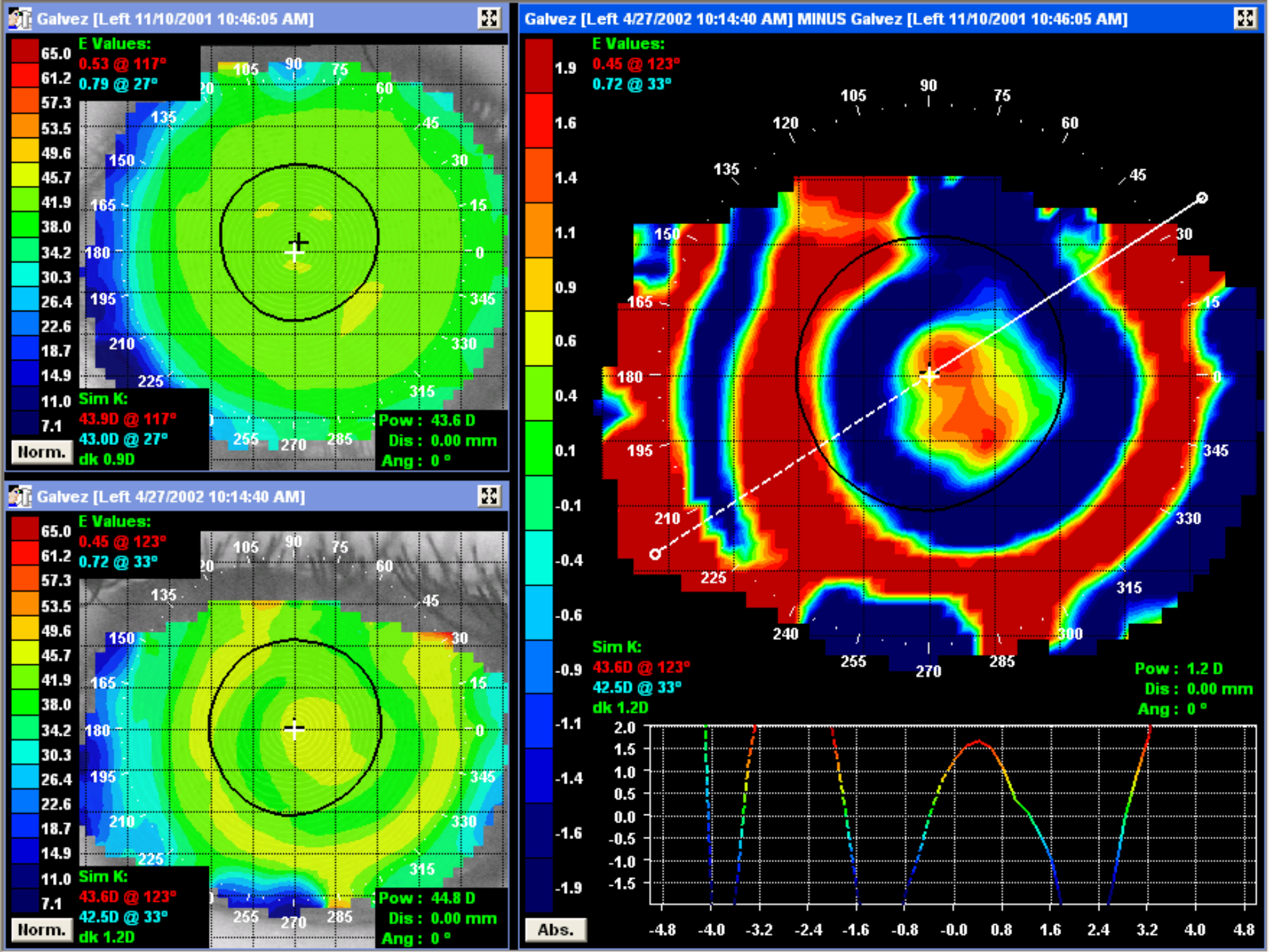

Galvez [Right 4/27/2002 10:13:09 AM]
E Values:
0.36 @ 61°
0.69 @ 151°
43.6
43.1
42.6
42.1
41.6
41.1
40.7
40.2
39.7
39.2
38.7
38.2
37.7
37.2
36.8
36.3
Sim K:
42.5D @ 61°
41.7D @ 151°
dk 0.8D
Norm.
90
105
75
120
60
135
45
150
30
165
15
180
0
195
345
210
330
225
315
240
300
255
285
270
Pow : 43.4 D
Dis : 0.02 mm
Ang : 270 °

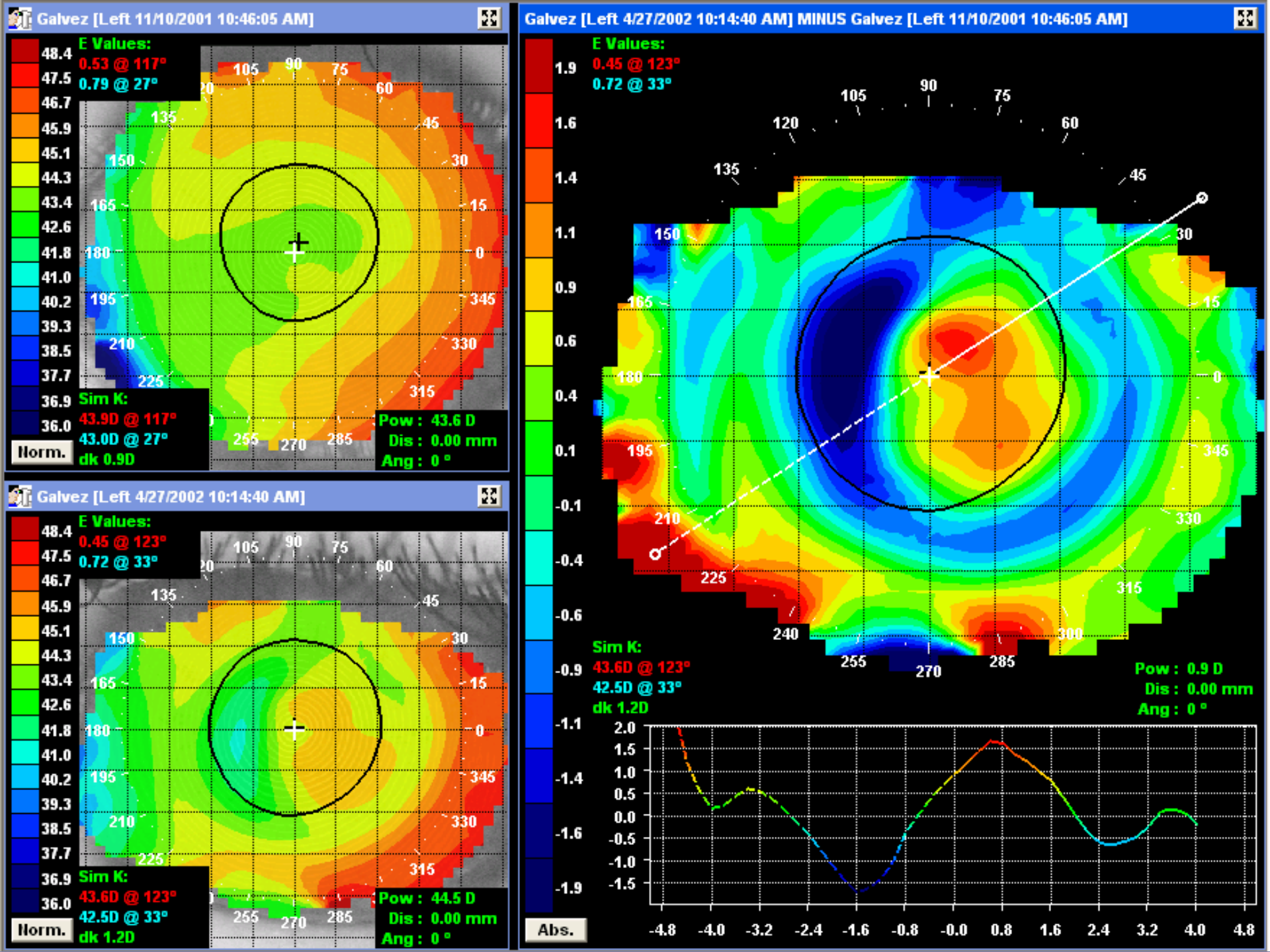
# Dealing with Mild Central Islands

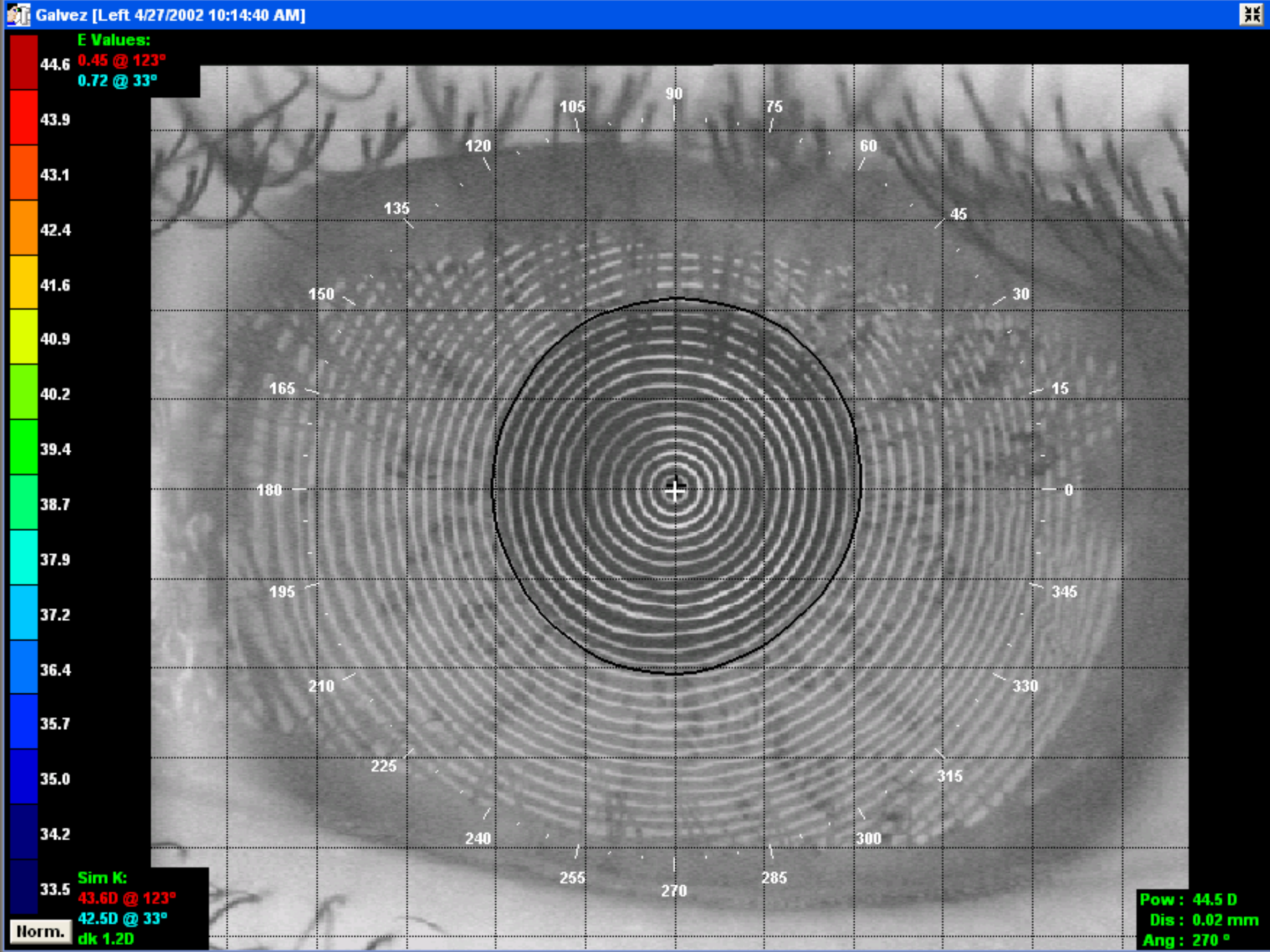
- Sag too high (apical clearance >15um)
- Steepening of the apical curvature
- Treatment effect centered to inferior
- Generally an increase in astigmatism
- Poor VA /uncorrectable (4 hours)
- Apical steepening <1.50Dp
  - Retrial 8um lower in sag (next flatter trial)

What is the result here?


Galvez [Left 11/10/2001 10:46:05 AM]
E Values:
0.53 @ 117°
0.79 @ 27°
Sim K:
43.9D @ 117°
43.0D @ 27°
dk 0.9D
Norm.
Pow : 43.2 D
Dis : 0.61 mm
Ang : 54 °
Galvez [Left 4/27/2002 10:14:40 AM]
E Values:
0.45 @ 123°
0.72 @ 33°
Sim K:
43.6D @ 123°
42.5D @ 33°
dk 1.2D
Norm.
Pow : 44.9 D
Dis : 0.61 mm
Ang : 54 °
Galvez [Left 4/27/2002 10:14:40 AM] MINUS Galvez [Left 11/10/2001 10:46:05 AM]
E Values:
0.45 @ 123°
0.72 @ 33°
Sim K:
43.6D @ 123°
42.5D @ 33°
dk 1.2D
Abs.
Pow : 1.7 D
Dis : 0.61 mm
Ang : 54 °


Galvez [Left 11/10/2001 10:46:05 AM]
E Values:
0.53 @ 117°
0.79 @ 27°
Sim K:
43.9D @ 117°
43.0D @ 27°
dk 0.9D
Pow : 43.6 D
Dis : 0.00 mm
Ang : 0 °
Norm.
Galvez [Left 4/27/2002 10:14:40 AM]
E Values:
0.45 @ 123°
0.72 @ 33°
Sim K:
43.6D @ 123°
42.5D @ 33°
dk 1.2D
Pow : 44.8 D
Dis : 0.00 mm
Ang : 0 °
Norm.
Galvez [Left 4/27/2002 10:14:40 AM] MINUS Galvez [Left 11/10/2001 10:46:05 AM]
E Values:
0.45 @ 123°
0.72 @ 33°
Sim K:
43.6D @ 123°
42.5D @ 33°
dk 1.2D
Pow : 1.2 D
Dis : 0.00 mm
Ang : 0 °
Abs.


Galvez [Left 11/10/2001 10:46:05 AM]
E Values:
0.53 @ 117°
0.79 @ 27°
Sim K:
43.9D @ 117°
43.0D @ 27°
dk 0.9D
Pow : 43.6 D
Dis : 0.00 mm
Ang : 0 °
Norm.
Galvez [Left 4/27/2002 10:14:40 AM]
E Values:
0.45 @ 123°
0.72 @ 33°
Sim K:
43.6D @ 123°
42.5D @ 33°
dk 1.2D
Pow : 44.5 D
Dis : 0.00 mm
Ang : 0 °
Norm.
Galvez [Left 4/27/2002 10:14:40 AM] MINUS Galvez [Left 11/10/2001 10:46:05 AM]
E Values:
0.45 @ 123°
0.72 @ 33°
Sim K:
43.6D @ 123°
42.5D @ 33°
dk 1.2D
Pow : 0.9 D
Dis : 0.00 mm
Ang : 0 °
Abs.


Galvez [Left 4/27/2002 10:14:40 AM]
E Values:
0.45 @ 123°
0.72 @ 33°
44.6
43.9
43.1
42.4
41.6
40.9
40.2
39.4
38.7
37.9
37.2
36.4
35.7
35.0
34.2
33.5
Sim K:
43.6D @ 123°
42.5D @ 33°
dk 1.2D
Norm.
90
105
75
120
60
135
45
150
30
165
15
180
0
195
345
210
330
225
315
240
300
255
285
270
Pow : 44.5 D
Dis : 0.02 mm
Ang : 270 °

# Dealing with Advanced Central Islands

- Sag too high (apical clearance >15um)
- Steepening of the apical curvature
- Treatment effect inferior
- Generally an increase in astigmatism
- Poor VA /uncorrectable (4 hours)
- Apical steepening >1.50Dp
  - Retrial 16um lower in sag (2 trial steps flatter)

# Over Corrections

- Sag of BE Retainer too close to the cornea
- Too much Squeeze Film Force
- Solution:
  - Increase Sag
  - Lower target Rx
- Be sure that the BE Retainer sag INCREASES before re-ordering the custom order
- Manufacturing error ±1um (micron)
- Contact your consultant for assistance

# Under Corrections

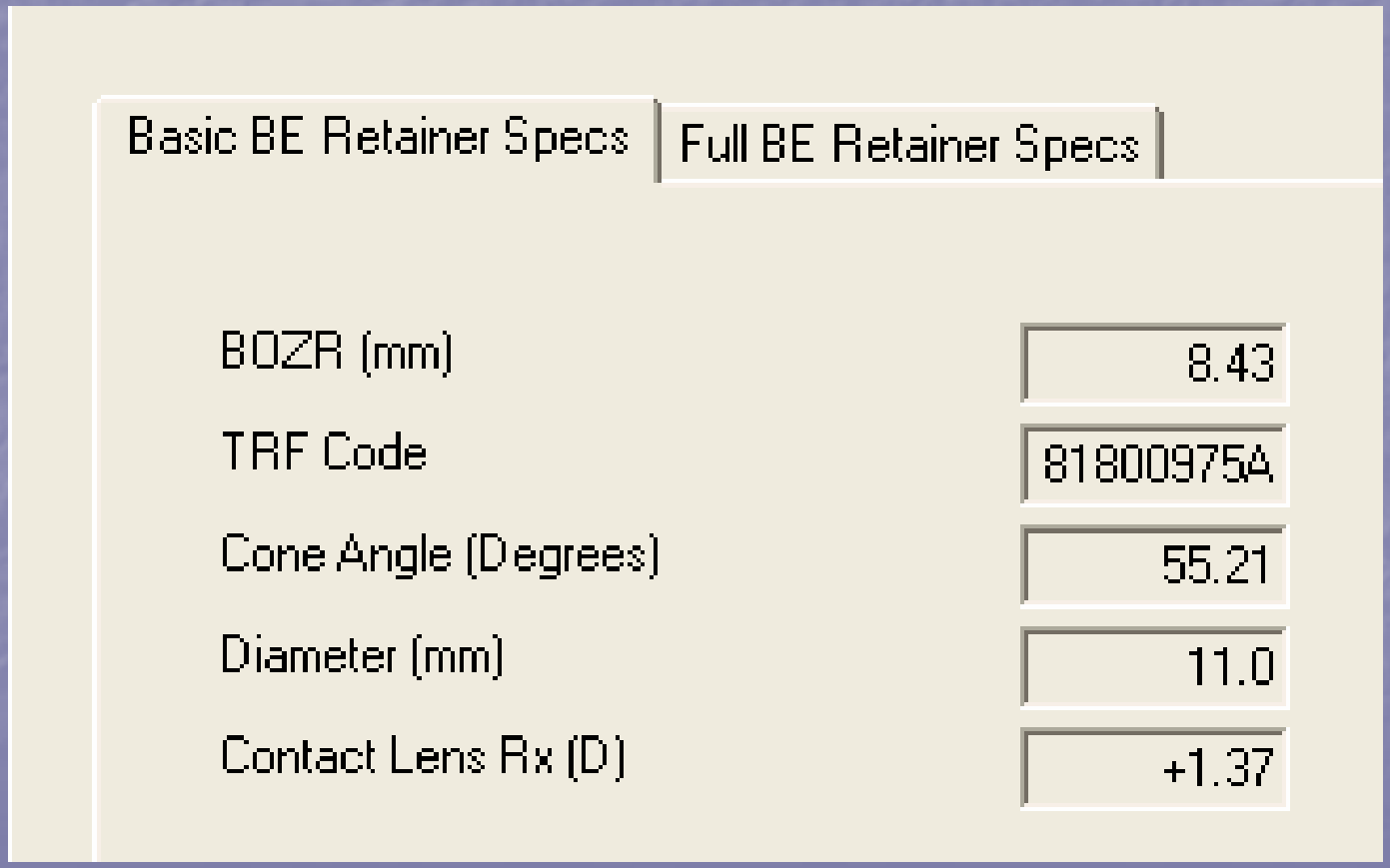
- Sag of BE Retainer too far away from the cornea
- Too little Squeeze Film Force
- Solution:
  - Decrease Sag
  - Increase target Rx
- Be sure that the BE Retainer sag DECREASES before re-ordering the custom order
- Manufacturing error ±1um (micron)
- Contact your consultant for assistance

If a modification is required, how do you make changes?

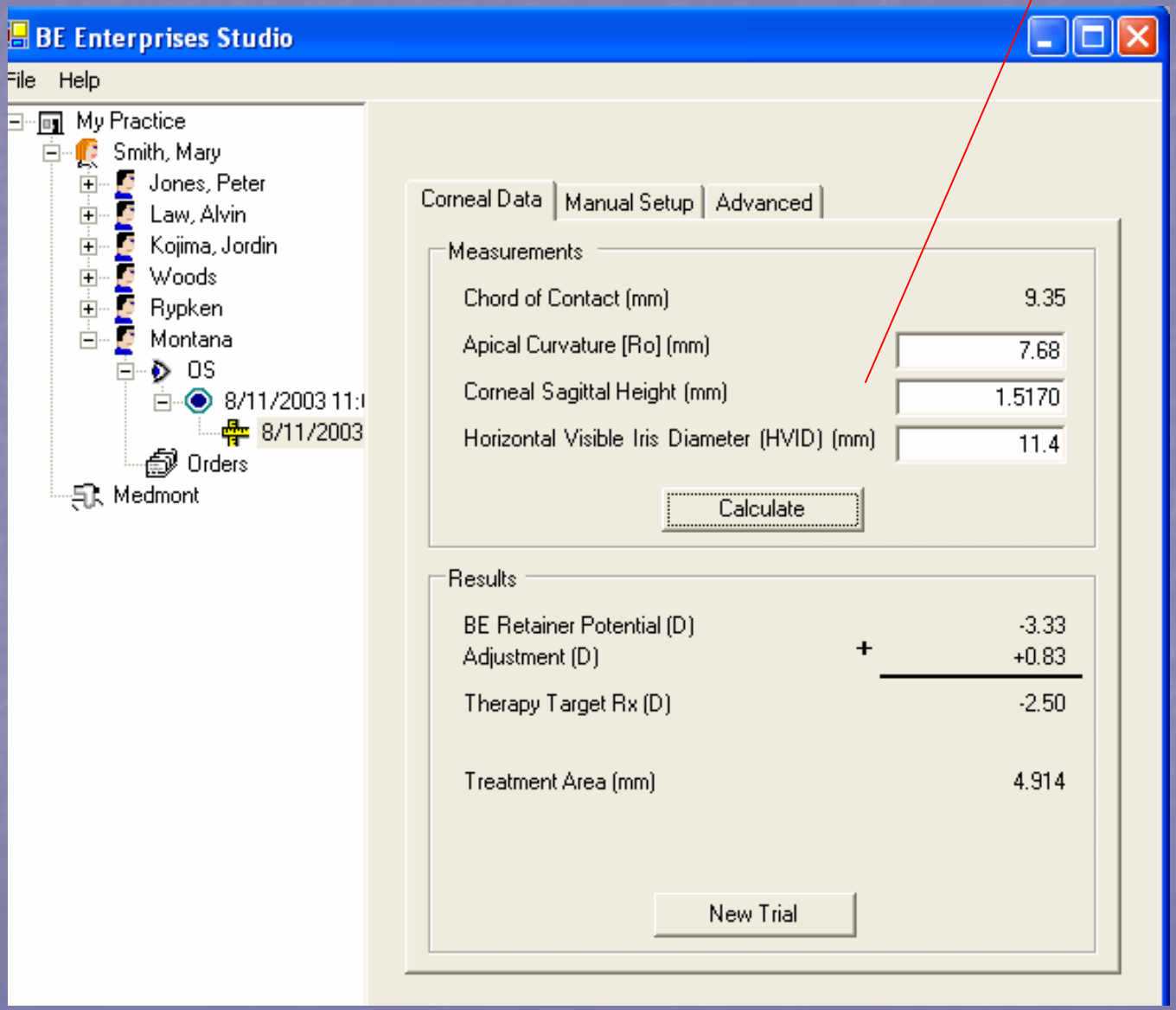
BE Retainer Data?

Corneal Data?

# You can’t modify custom order parameters!



# Always record corneal data



# Always, Always, Always Record corneal data

- BE Retainers can't be modified from custom order parameters
- Modifications must ALWAYS be made based on CORNEAL data
- Be sure to ALWAYS record the path taken to the final parameters:
  - Ro
  - Sag/Eccentricity
  - HVID
  - Target Rx
  - Trial Used
  - Rx Change
  - # of days to achieve the Rx change

# Employ the BE Retainer Worksheet

## BE Retainer™
## Optimal Orthokeratology Worksheet

Patient Name: Joan Smith

DOB: 6/13/1980

OD

| Ro (apical curvature) | | | | | Sagittal Height (or E) | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 7.803 | 7.791 | 7.810 | 7.796 | | 1.5006 | 1.4983 | 1.4991 | 1.5010 |
| | | | Average Ro | 7.80 | | | | Average Sag | 1.4998 |

| Date | Rx | Ro | Corneal Sag | HVID | Target Rx | BC/ Trial | TRF Code | Cone Angle | Dia | Power | BE Sag | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1/9/03 | -3.00-0.50x9 | 7.80 | 1.4998 | 11.5 | -3.50 | 8.60 | Potential: | 2.77Dp | 11.0 | | 1.5064 | AC 6.5μm/1.48Dp ERC |
| 1/13/03 | | | | | | 8.60 | 1 night Trial | | | | | Bulls-eye Topography |
| | | | | | | | Order | Custom | BE | | | w/1.00 Dp Rx Change |
| 1/14/03 | Custom Order | 7.80 | 1.4998 | 11.5 | -3.50 | 8.60 | 83051050 | 55.38 | 11.0 | +0.50 | 1.5026 | |
| 1/21/03 | | | | | | | 1 night in BE | | Custom | | | B/E Topography |
| | | | | | | | | | | | | w/ 3.50 Dp Change |
| | | | | | | | | | | | | 20/15 AM |

OS

| Ro (apical curvature) | | | | | Sagittal Height (or E) | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | 7.842 | 7.849 | 7.861 | 7.856 | | 1.4902 | 1.4813 | 1.4837 | 1.4865 |
| | | | Average Ro | 7.852 | | | | Average Sag | 1.4854 |

| Date | Rx | Ro | Corneal Sag | HVID | Target Rx | BC/ Trial | TRF Code | Cone Angle | Dia | Power | BE Sag | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1/9/03 | -2.75-0.75x10 | 7.852 | 1.4854 | 11.5 | -3.25 | 8.70 | Potential: | 2.85 | 11.0 | | 1.4905 | AC 5.4μm/200D ERC |
| 1/11/03 | | | | | | 8.70 | 1 night Trial | | | | | Smiley Face Topography |
| 1/13/03 | | " | 1.4933 | " | " | 8.65 | Potential: | 2.49 | " | 8μm Adj. | | AC 4.9μm/237D ERC |
| 1/14/03 | | | | | | 8.65 | 1 night Trial | | | | 1.4992 | Bulls-eye Topography |
| | | | | | | | Order | Custom | BE | | | w/1.50D Exchange |
| " | | " | " | " | " | 8.65 | 83451100 | 55.39 | 11.0 | +0.75 | 1.4971 | |
| 1/21/03 | | | | | | | 1 night in | Custom | BE | | | B/E w/3.12 Dp Rx C |

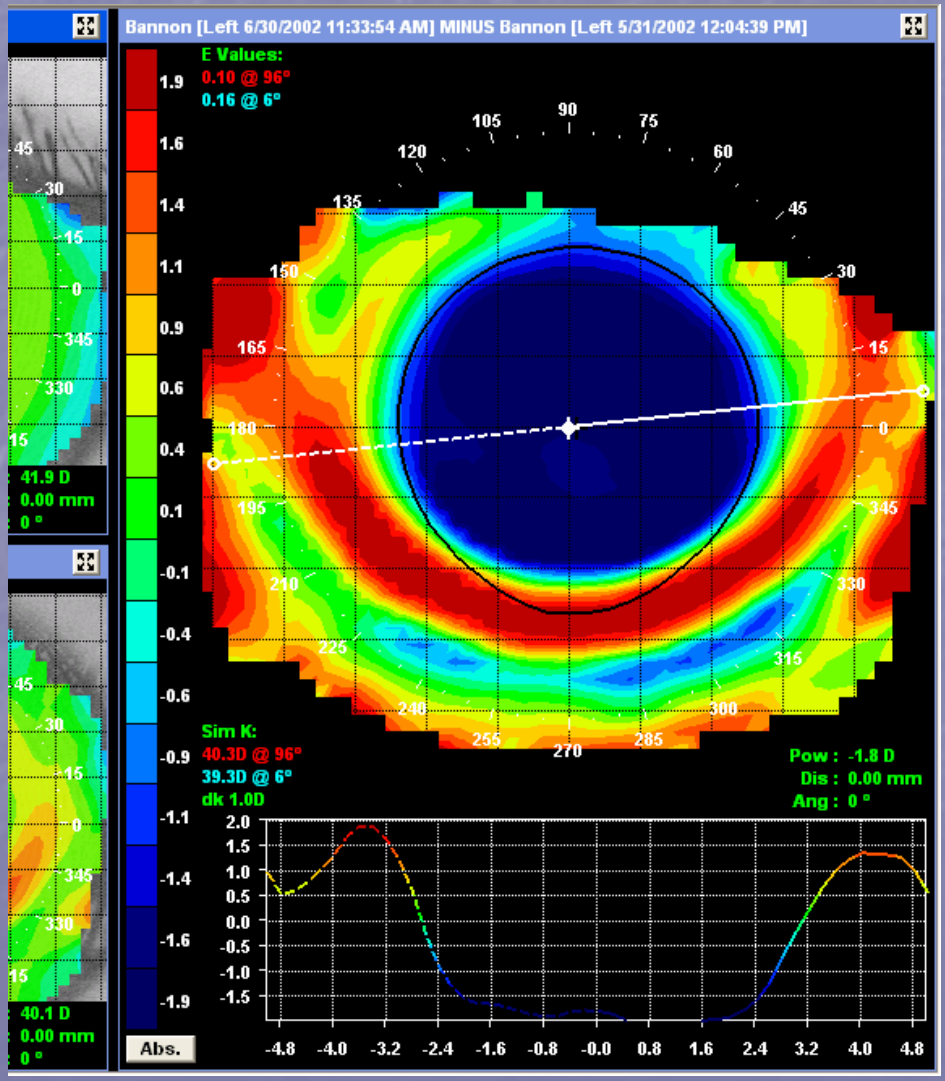
**SSFF Trial Rule** (Smiley Face: Steepen; Frowney Face or Central Island: Flatten). **FAST Sagittal Height Rule** (Flat: Add; Steep: Take Away)

# Loss of Effect

- 20/15 after 1 week, 1 month
- 6 months later, 20/40, 20/50.  Why???
- Same cornea, Same BE Retainer
- Build-up of deposits?
  - Clean back surface with Boston Solution/Q-Tip
- Warped retainer?
  - Verify BC – replace retainer if warped
- Mechanical cleaning unit

# Flare & Glare

- Flare & Glare usually disappears after 1 month
- If F & G problems continue to exist, calculate an expanded treatment zone

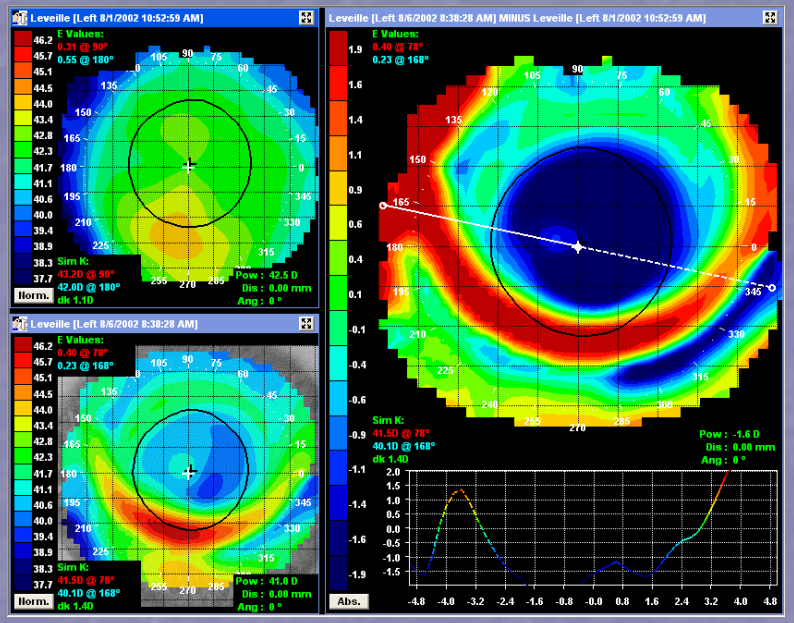


# Solving Flare & Glare

- BE Retainers have 2 size optic zones
  - "A" Zone
  - "B" Zone
- Take the patient to full effect with the "A" zone (>1 month)
- Drop the corneal sag
- Maximize the treatment zone
- Order the "B" zone custom BE Retainer

# Don’t try to explain the topographical response to your consultant…

# Email graphic files!

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Snaps a picture of your computer screen

# *The BE Retainer:* Benefits

- Peer/Referral group throughout the world
- Consultant support
- Provide installation & training
- Sales & Marketing support
- Product upgrades
- BE Retainers are sold ONLY to certified BE orthokeratologists

# *The BE Retainer:* Summary

- Provide your patients with a safe, effective, adjustable and reversible alternative to glasses, conventional contacts & laser surgery
- Unparalleled Revenue Source
- Patient retention
- Practice builder
- Allows you to control the fit process
- Systematic approach
- A new practice challenge

Contact your consultant if you have questions regarding the BE Retainer Comprehensive Training Course

1-800-663-4248

randy@beretainer.com