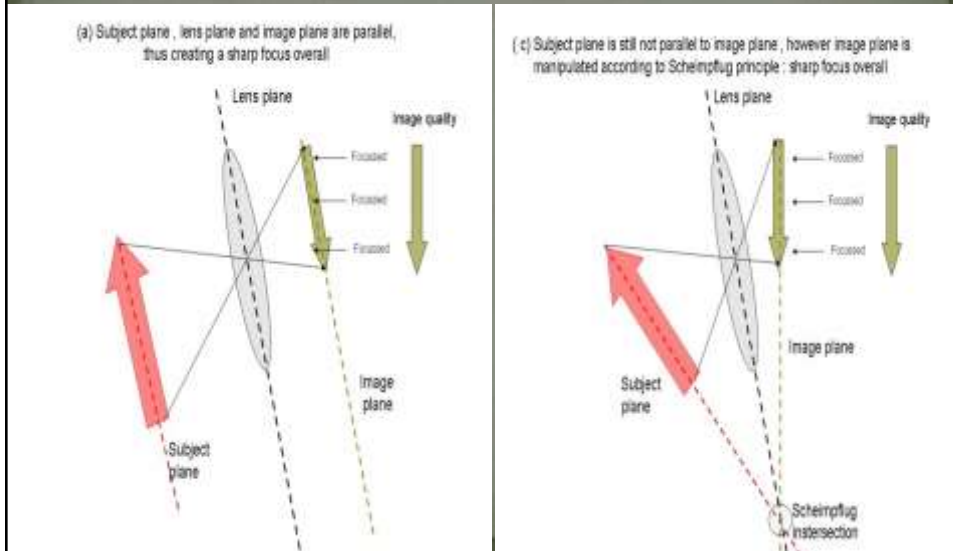


Tips in Pentacam Interpertation

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ALEXANDRIA UNIVERSITY
FRCS GLASGOW

**I HAVE NO FINANCIAL
INTEREST**

Scheimpflug principle based assessment

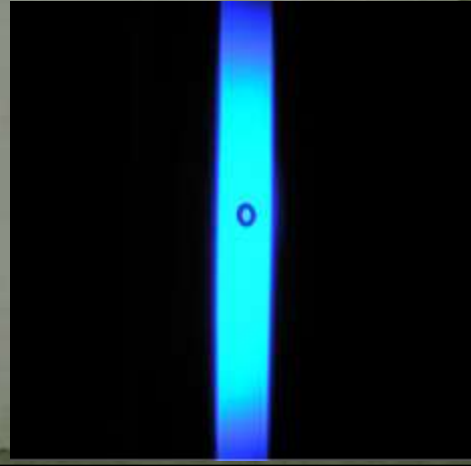


PENTA = 5 CAM= CAMERA

1. TOPOGRAPHY
2. PACHYMETRY
3. ANTERIOR ELEVATION
4. POSTERIOR ELEVATION
5. DENSITY METER

- ANTERIOR CHAMBER EVALUATION
- AC ANGLE MEASUREMENT
- IOP CORRELATION

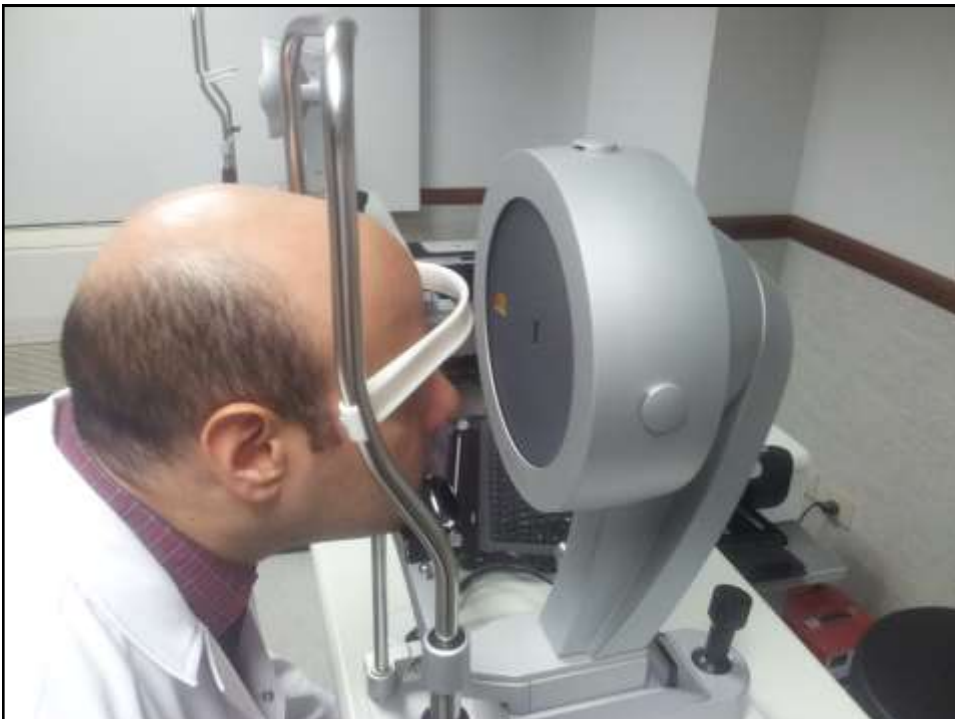
- The device have two cameras, one in the center for controlling fixation, and a rotating camera to capture the slit images.



	Regular Pentacam	HR Pentacam
Light source	blue LEDs (475 nm UV-free)	
Speed	50 images in 2 seconds, 500 measuring points per image	50 images in 2 seconds, 2760 measuring points per Scheimpflug image
Number of measured points	max. 25.000	max. 138.000

Proper image acquisition requires:

- Dark room
- Proper head position
- Wide open eyes
- Absent blinking





Print out of Pentacam:

1. Refractive maps
2. Keratoconus assay maps:
 - Bellin- Ambrosio maps
 - Keratoconus maps

✓ Overview

- 1 Large Color Map
- 4 Maps Selectable
- 4 Maps Refractive
- 4 Maps Topometric
- 4 Maps Chamber
- Scheimpflug Images
- Zernike Analysis
- Keratoconus
- Topometric

Virtual Eye

Tomography

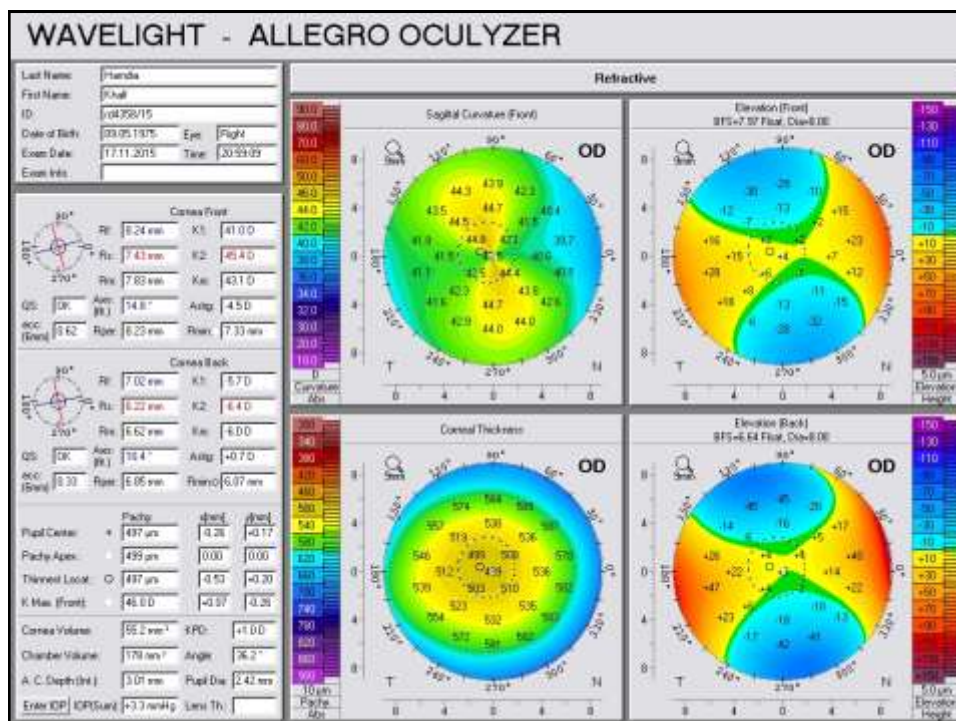
Show 2 Exams

Show 2 Exams Pachymetric

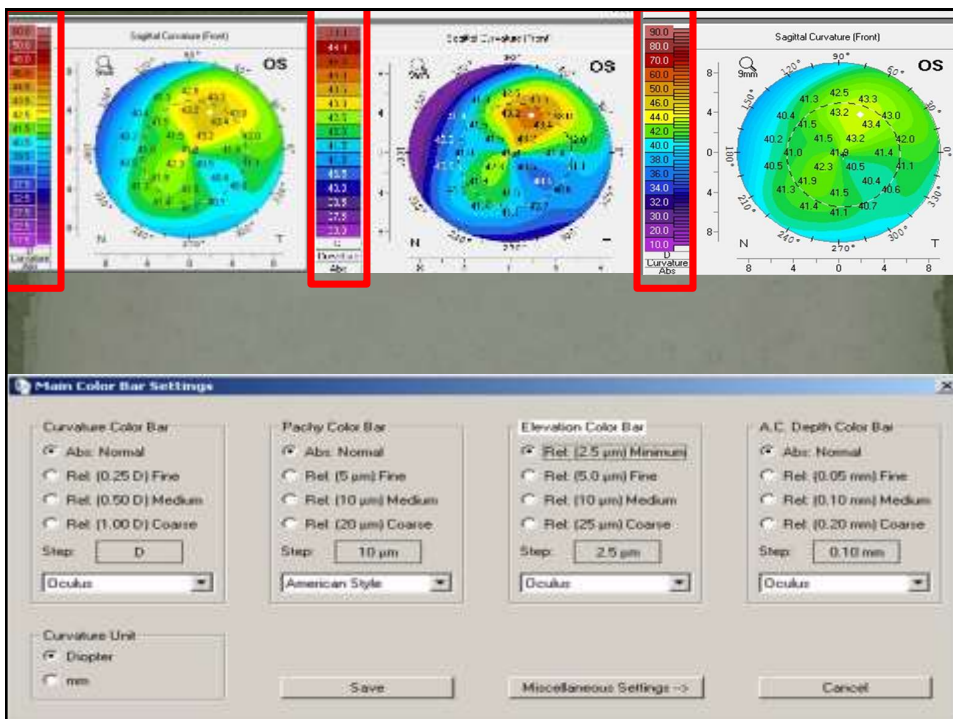
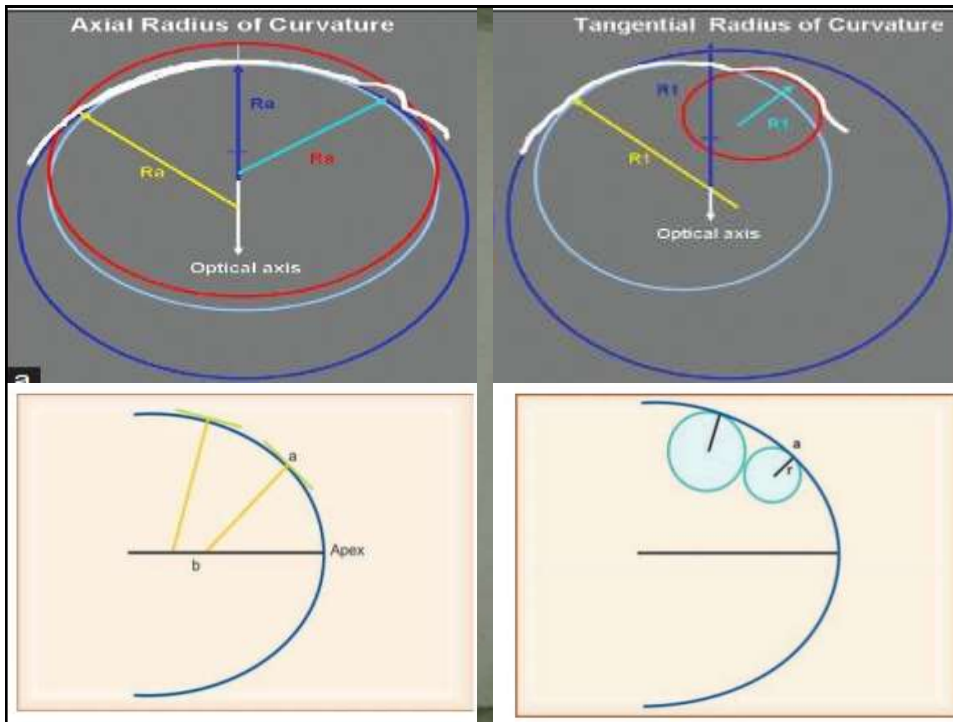
Show 2 Exams Topometric

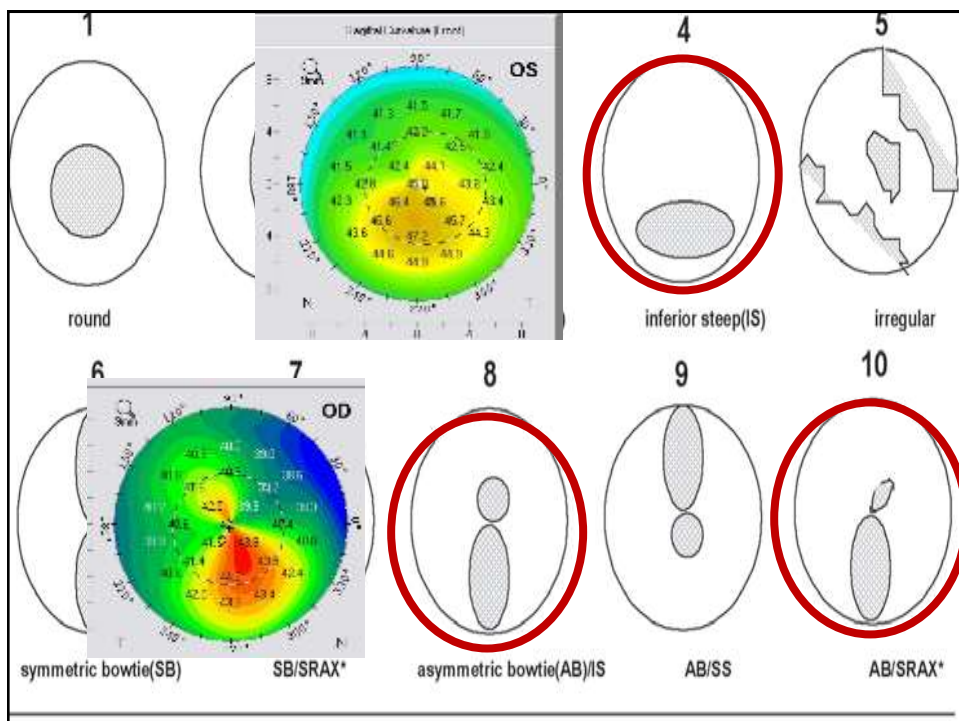
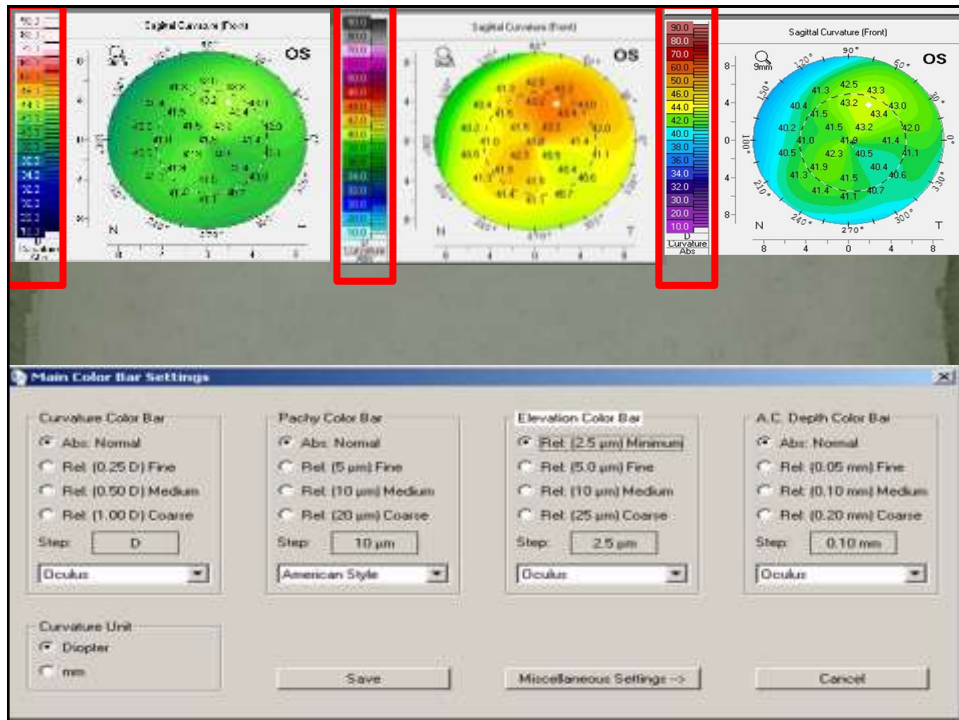
Compare 2 Exams

Compare 4 Exams



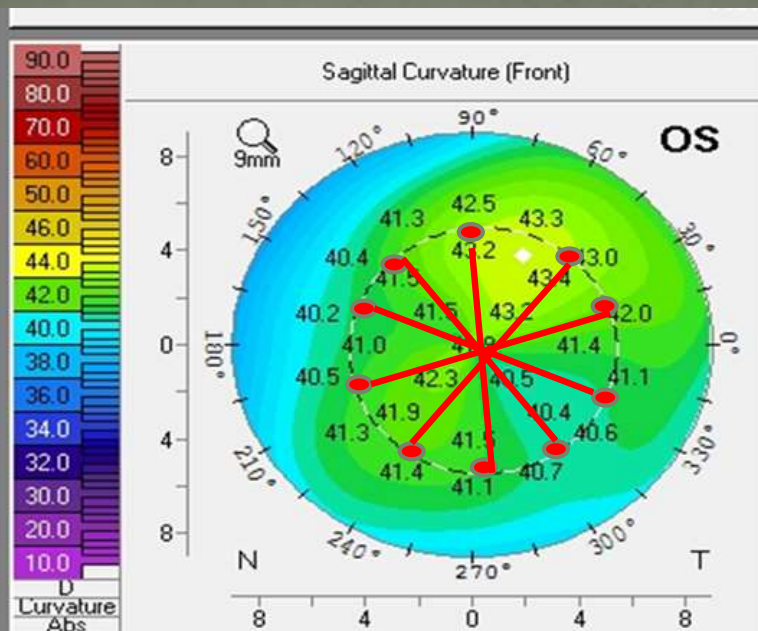




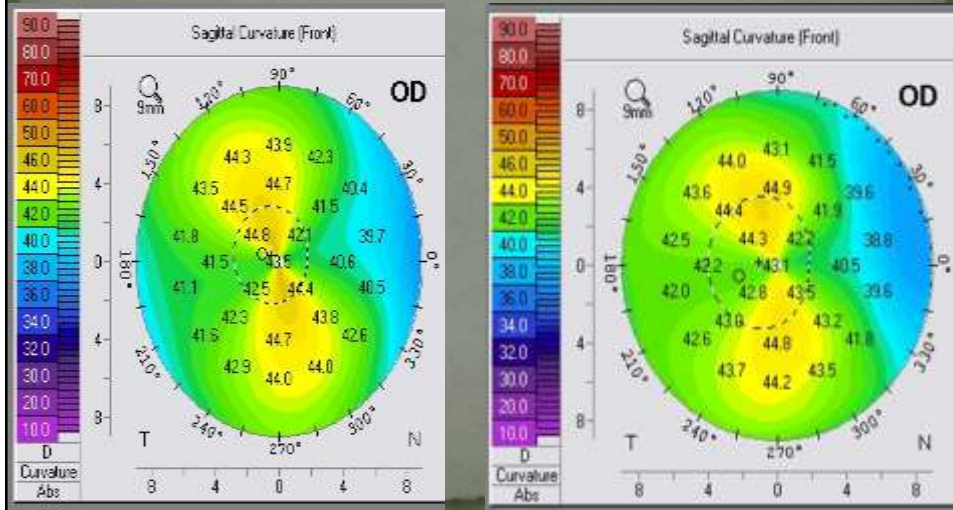


Abnormal topographic findings:

- K readings more than 49 D
- Abnormal topography as inferior steepening
- Skewing more than 22 degrees
- Astigmatism more than 5-6 D
- I-S difference of more than 1.5 D at the 4 mm circle

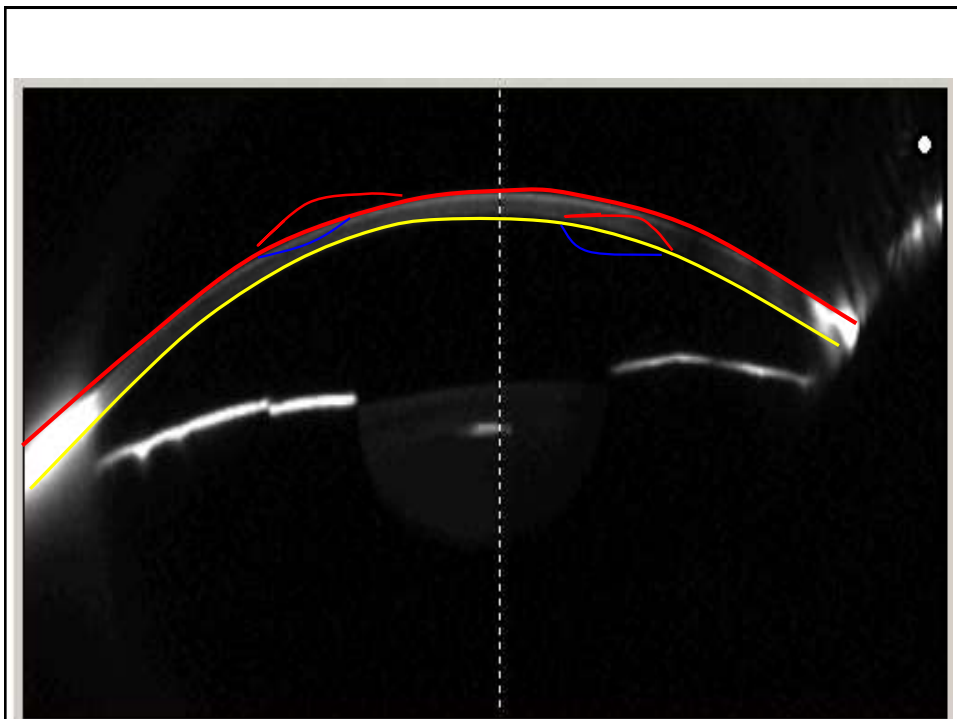
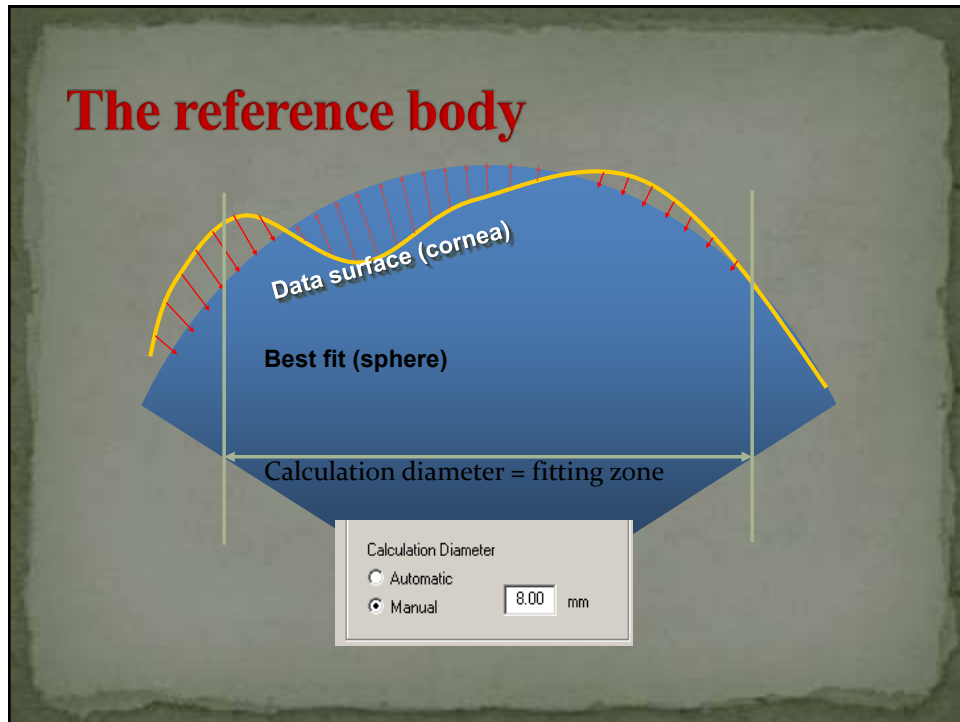


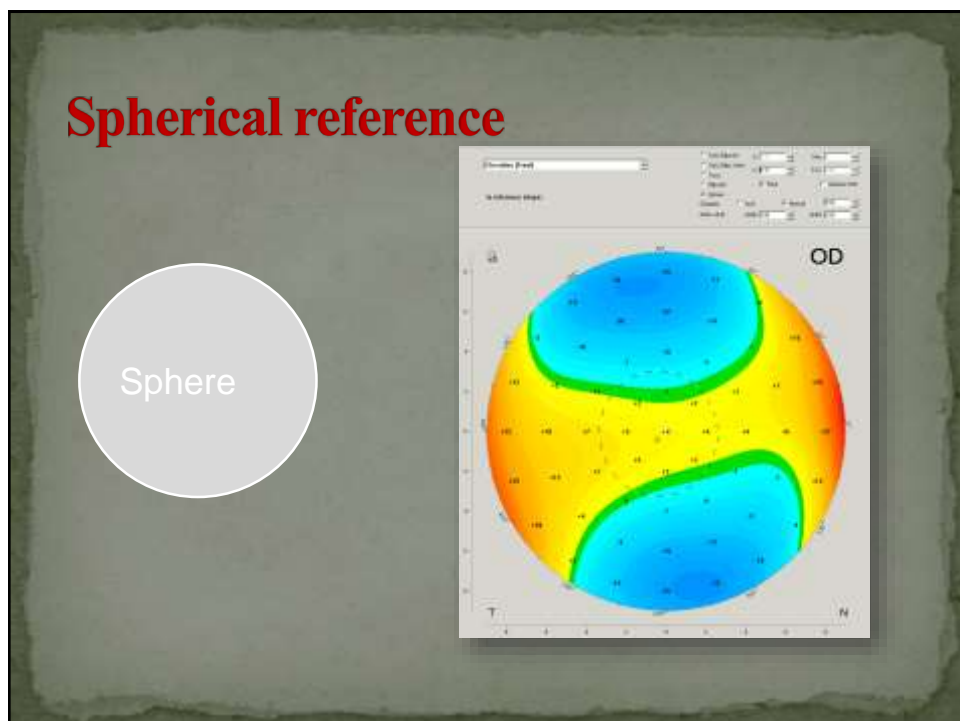
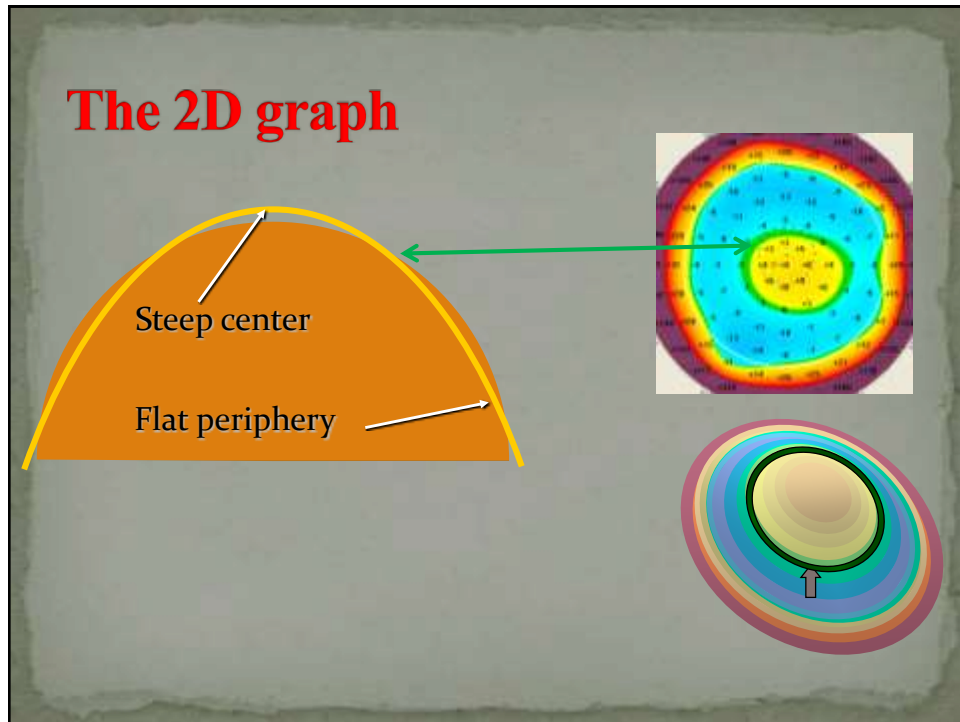
Angle kappa



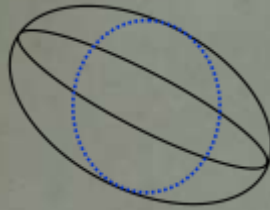
Elevation maps (Floats)

- No normal reference to compare normal from abnormal corneas.
- Comparing the acquired data to some standard reference surface (shape).
- Subtracting this known shape from the acquired data highlights the differences .(Elevation maps)

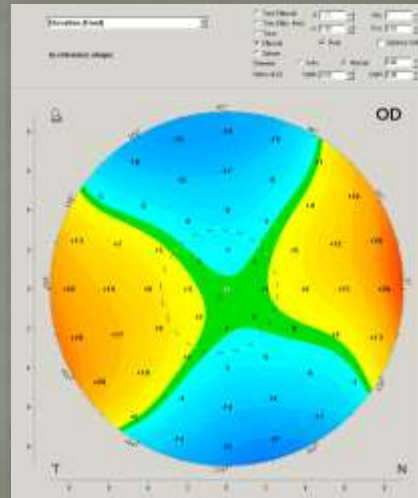




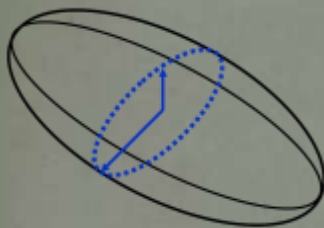
Ellipsoid reference body (float)



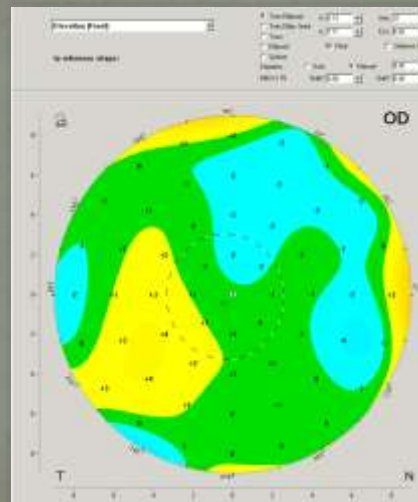
Ellipsoid



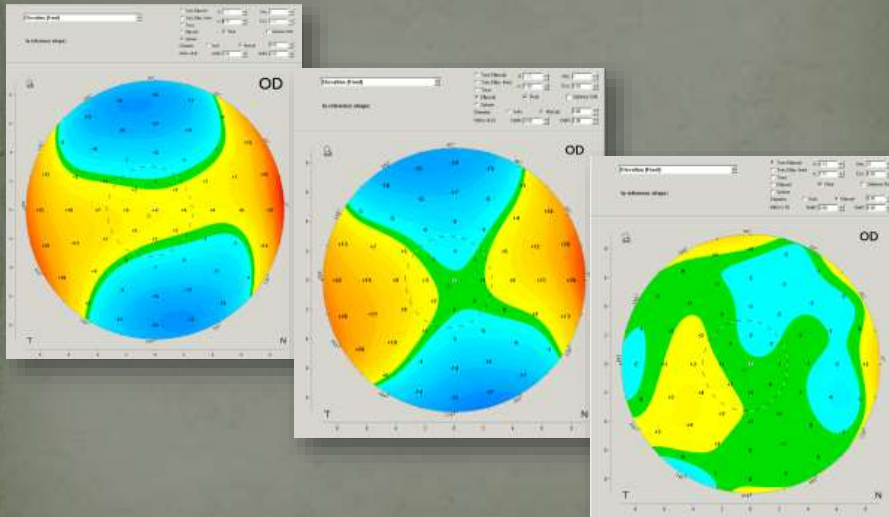
Toric Ellipsoid reference body (float)



Toric Ellipsoid



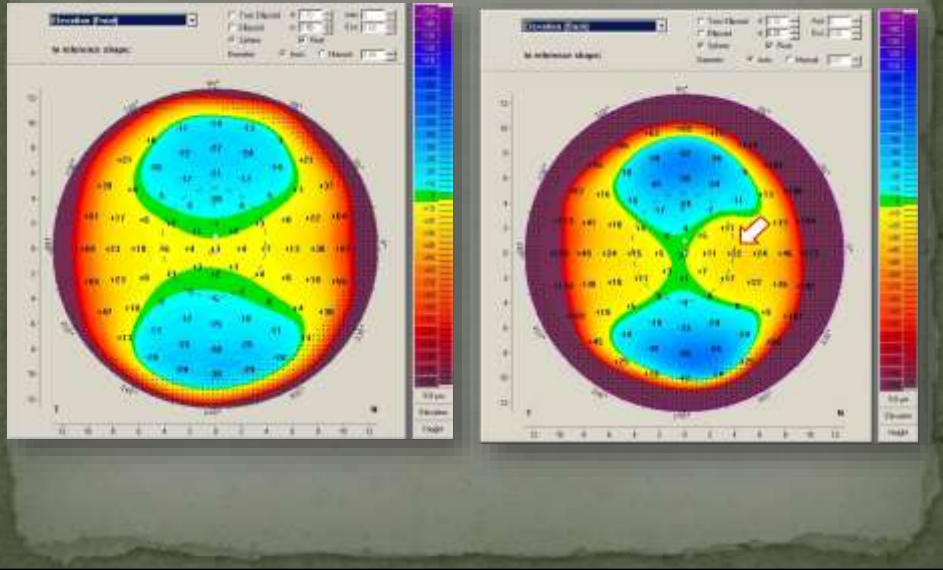
Compare reference bodies



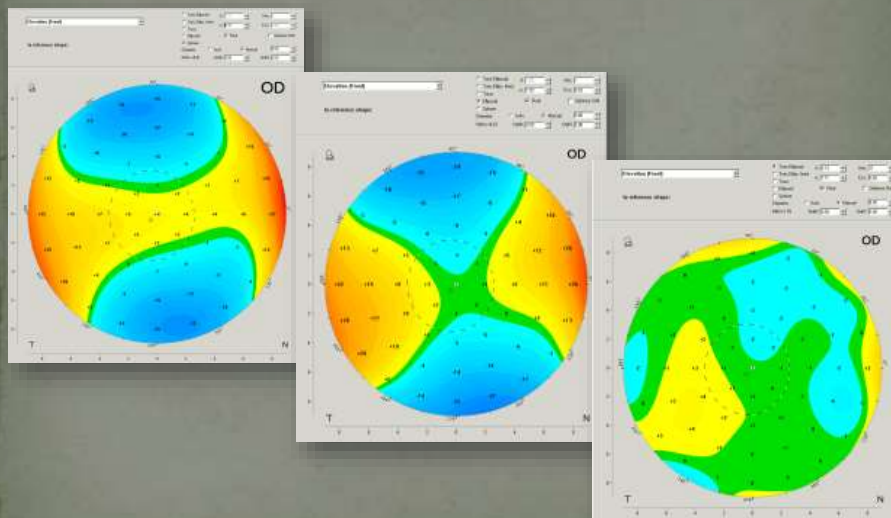
What should I check by looking at the elevation maps?

- Shape
- Parameter

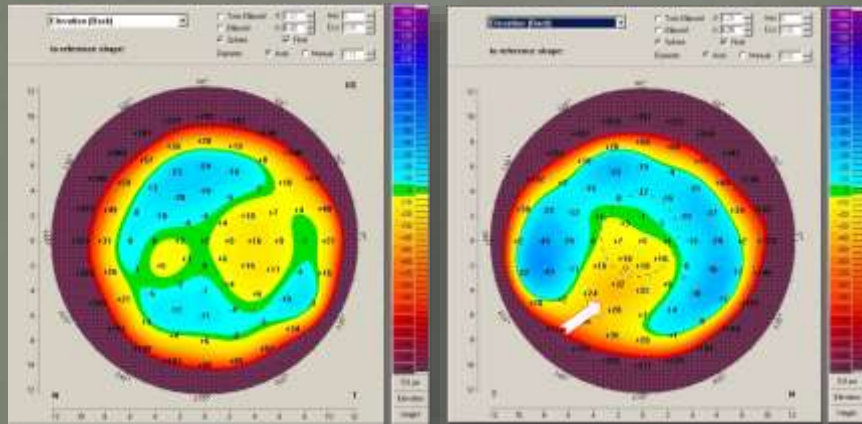
Shape



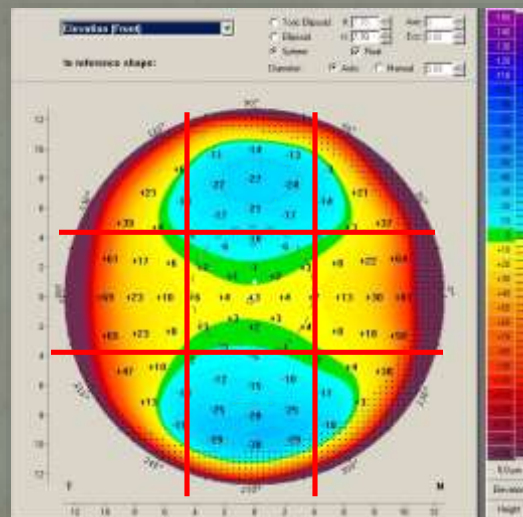
Compare reference bodies



Shape



Parameters



Parameters (Anterior floats)

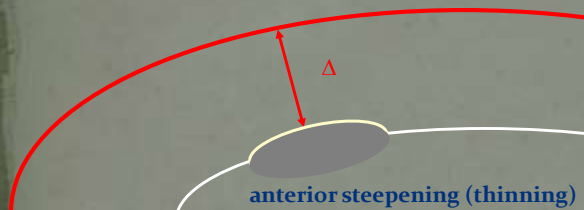
9 mm zone for fitting the BFS:

- Less than +12 μm are considered normal
- Between +12 μm and +15 μm are suspicious
- More than +15 μm are typically indicative of keratoconus

Parameters (Anterior floats)

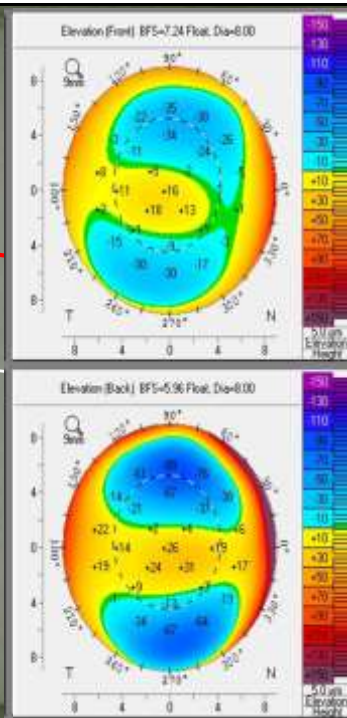
- **8 mm zone for fitting the BFS**
- Less than +8 μm are considered in the normal range
- Differences > +8 μm are typically suggestive of keratoconus

Parameters (posterior floats)



At the same point ,

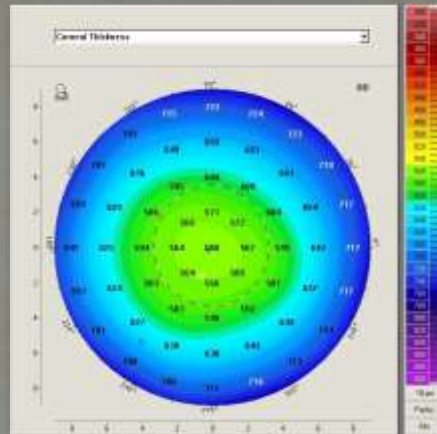
- Post. Elevation should be less than 5 micron higher than ant. elevation
- +5 to +10 micron might be suspicious
- More than 10 microns KC



What should I check by looking at the Pachymetry maps?

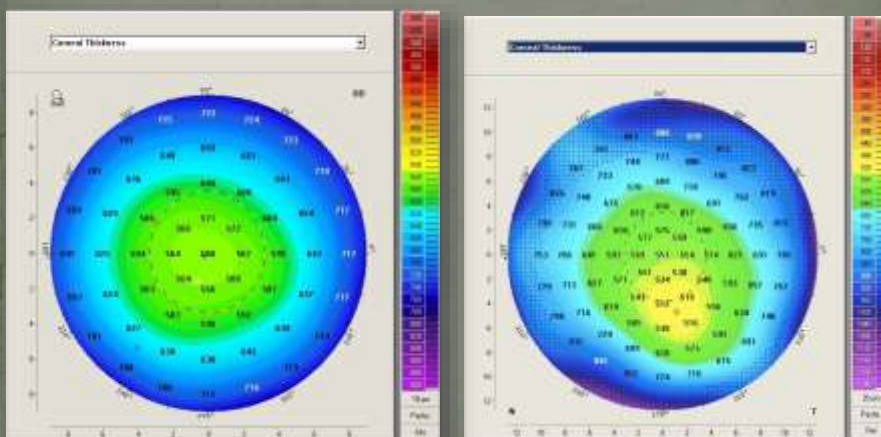
- **Parameter**
- **Thinnest location coordinates**
- **Thickness indices**

The standard thickness map



NORMAL THICKNESS MORE THAN 500 MICRONS

Displacement of thinnest location



Coordinates

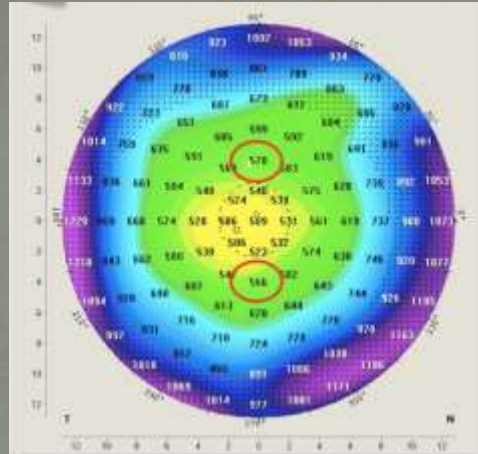
	Pachy:	x[mm]	y[mm]
Pupil Center:	+ 577 μm	-0.22	+0.07
Pachy Apex :	• 578 μm	0.00	0.00
Thinnest Locat.:	○ 577 μm	-0.29	0.00
K Max. (Front):	◆ 41.0 D	-0.07	+1.45

Difference at apex and thinnest location less than 5 microns normal , more than 10 microns KC
Displacement of thinnest location less than 0.5 mm normal , more than 1 mm is KC

Parameter

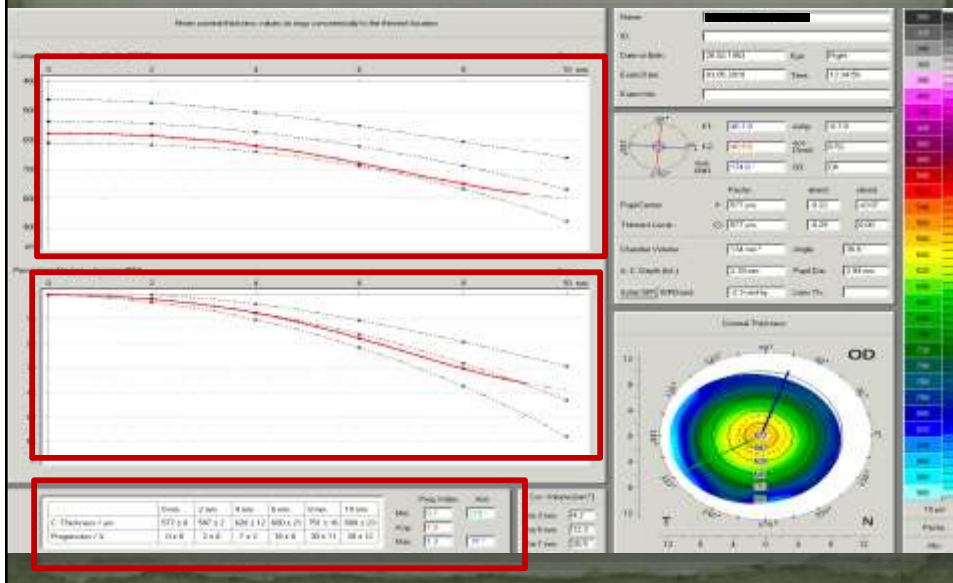
	Pachy:	x[mm]	y[mm]
Pupil Center:	+ 512 μm	-0.03	-0.06
Pachy Apex :	• 512 μm	0.00	0.00
Thinnest Locat.:	○ 495 μm	+0.44	-1.31

Parameters

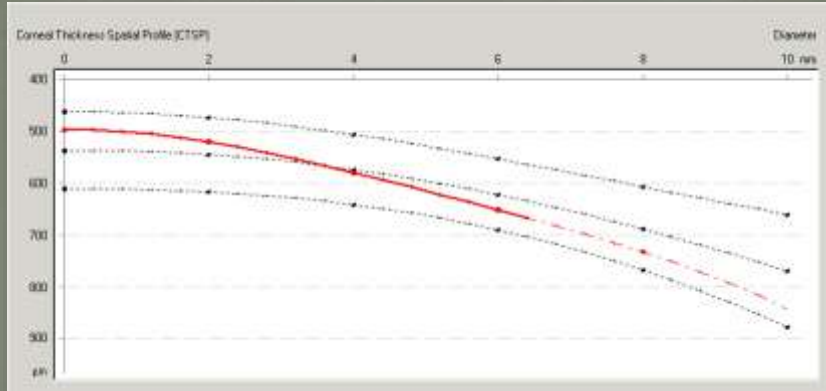


INFERIOR TO SUPERIOR DIFFERENCE LESS THAN 30 MICRONS

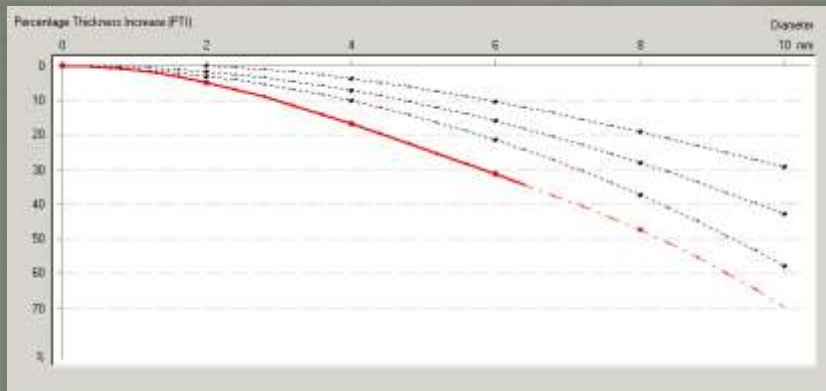
Thickness indices



Thickness indices



Thickness indices



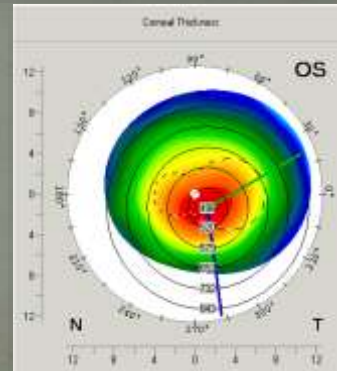
Thickness indices

	0 mm	2 mm	4 mm	6 mm	8 mm	10 mm	Prog. Index	Axis
C. Thickness / μm	496 \pm 0	520 \pm 7	579 \pm 21	652 \pm 41	732 \pm 86	843 \pm 115	2.1	20°
Progression / %	0 \pm 0	5 \pm 2	17 \pm 7	31 \pm 17	48 \pm 30	70 \pm 52	1.0	277°

Avg. = Average of the cornea

Standard deviation = average, within normal population.

Normal corneas typically have an average progression index lower than 1.2

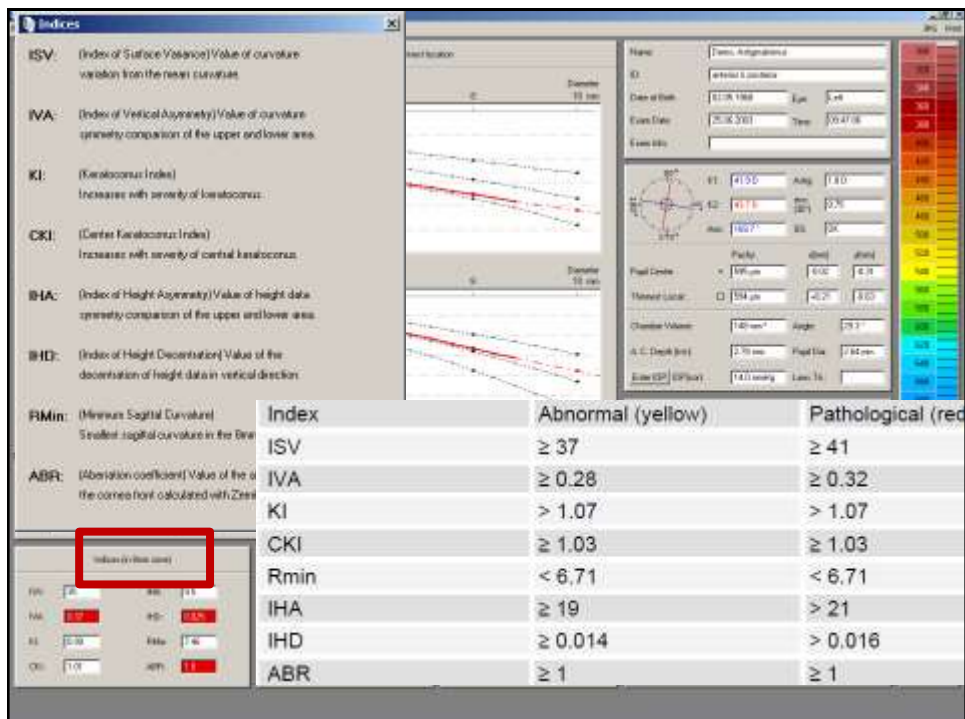


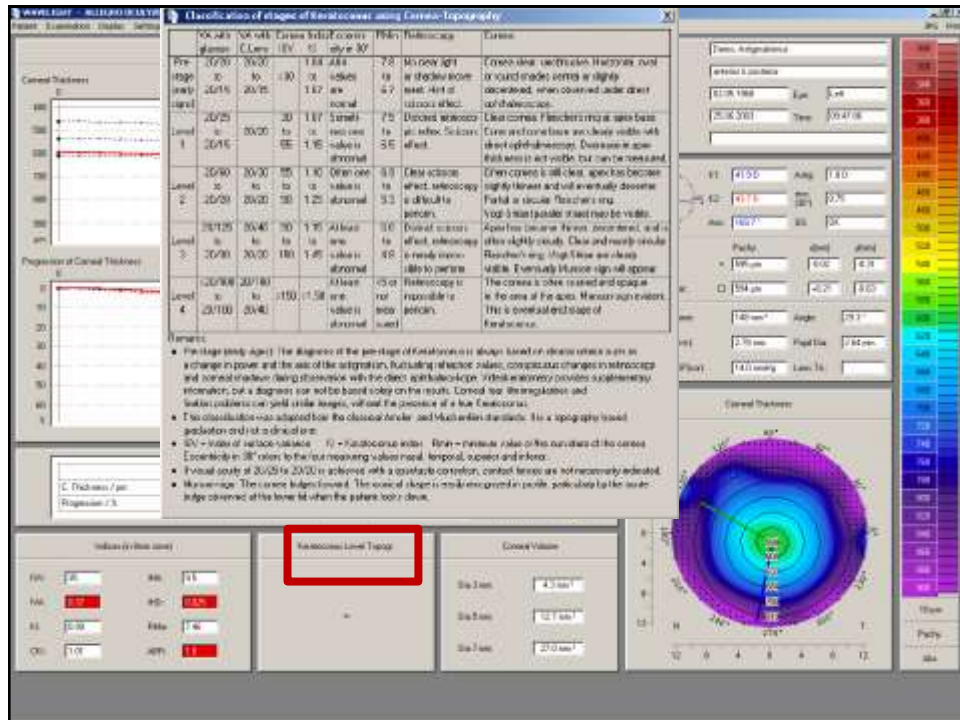
Summary

Pachymetric summery

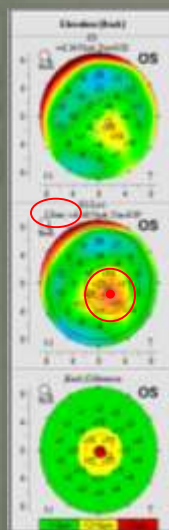
- Inf. – Sup. < 30 μm
- APEX. Pachy – Thinnest < 10 μm
- Thinnest OD \Leftrightarrow OS difference < 30 μm
- Y-coordinate < 500 μm
- Avg. < 1.2

KERATOCONUS ASSAY

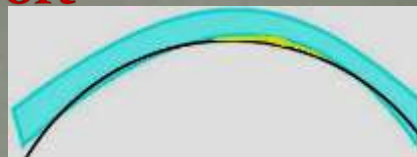




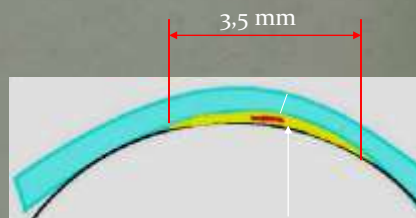
Belin/Ambrosio - Enhanced Ectasia Report



Best fit sphere

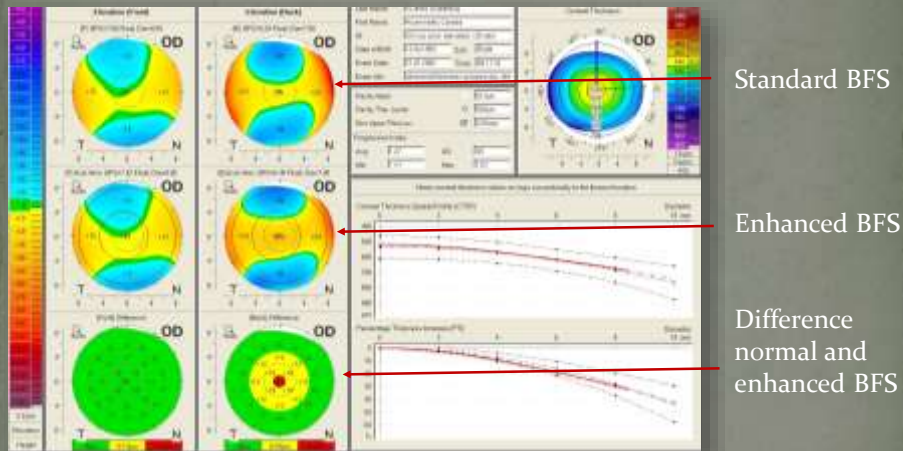
Enhanced Best
fit sphere

Excluding
3.5mm circular
area around
thinnest pachy
location!

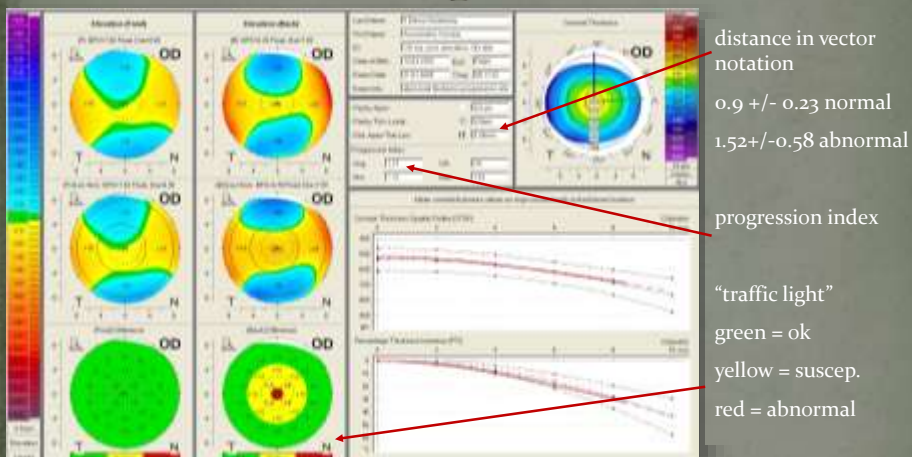


Location of thinnest pachy

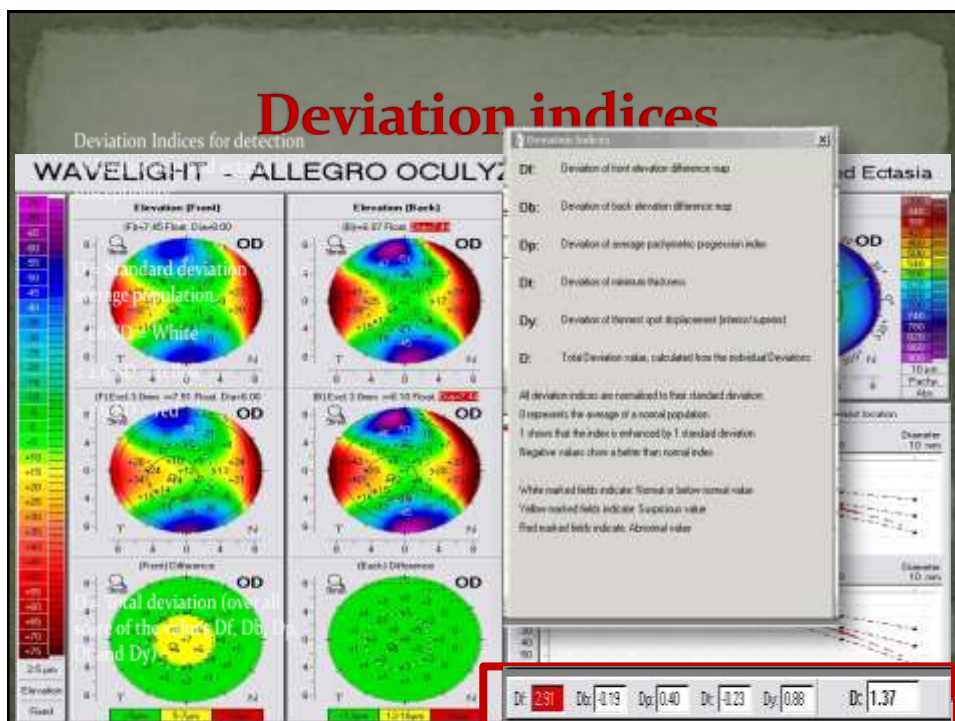
Belin/Ambrosio - Enhanced Ectasia Report



Belin/Ambrosio - Enhanced Ectasia Report



- The **green** represents a change in elevation of less than 6 microns on the front surface and 8 microns on the back surface of the cornea (normal eyes).
- The **yellow** represent a change between 6 and 12 microns for the front surface and 8 to 20 microns for the back surface. (suspect zone).
- The **red** represents difference between the 2 maps is 12 microns anteriorly or 20 microns posteriorly (Keratoconus).



Summary

Table 3.1: The normal, suspected and abnormal findings in corneal topography

	Normal value(s)	Suspected value(s)	Abnormal value(s)
Quality specification (QS)	white	yellow	red
K-readings:	look at flat K for myopic treatment look at steep K for hyperopic treatment		>48
Corneal astigmatism	compare with manifest astigmatism		>6
Average Q-value	0 to -1]0, -1[
Topometric map (vertical and inferior Q-values)		-0.5 to -0.55	>-0.55
Thinnest location			
Thickness	>500	470 – 500	<470
Difference with pachy apex thickness	<5 μ	5 – 10 μ	10 μ
Co-ordinates	<500 μ	500 – 1000 μ	>1000 μ

Summary

Pupil center co-ordinates	important for treating hyperopia and >3D astigmatism		
KPD	<+0.75	+0.75 to +1.5	>+1.5
Anterior curvature map			
Maximal K	important when treating hyperopia		
pattern	refer to topographical patterns		
I-S Rabinovich ratio			>+2
Skewed Steepest Radial Axis Index (SRAX)			>2°
Superior-inferior difference on the 4mm circle			>1.5D when the inferior is steeper >2.5 when the superior is steeper

Summary

	Normal value(s)	Suspected value(s)	Abnormal value(s)
Anterior-posterior Difference	$<5\mu$	$>5\mu$	
Isolated island (or tongue like extension)	might be an indicator for FFKC		
Corneal Thickness map			
Shape		cone like	
Superior-inferior difference	$<30\mu$	$>30\mu$	
Thinnest location difference between both eyes	$<30\mu$	$>30\mu$	
Keratoconus diagram			
Shape and location of the curve		-out of normative range-deviation before the 6mm circle	
Average	1	1.1 – 1.2	> 1.2
Indices of irregularity	white	yellow	red

"if there are too many doubts, there is no doubt!".

“Never order unilateral pentacam You never know what you may find.”

