Clinical daily use
Cornea /Anterior Segment OCT
CASIA2

Visualize Various Eye Conditions

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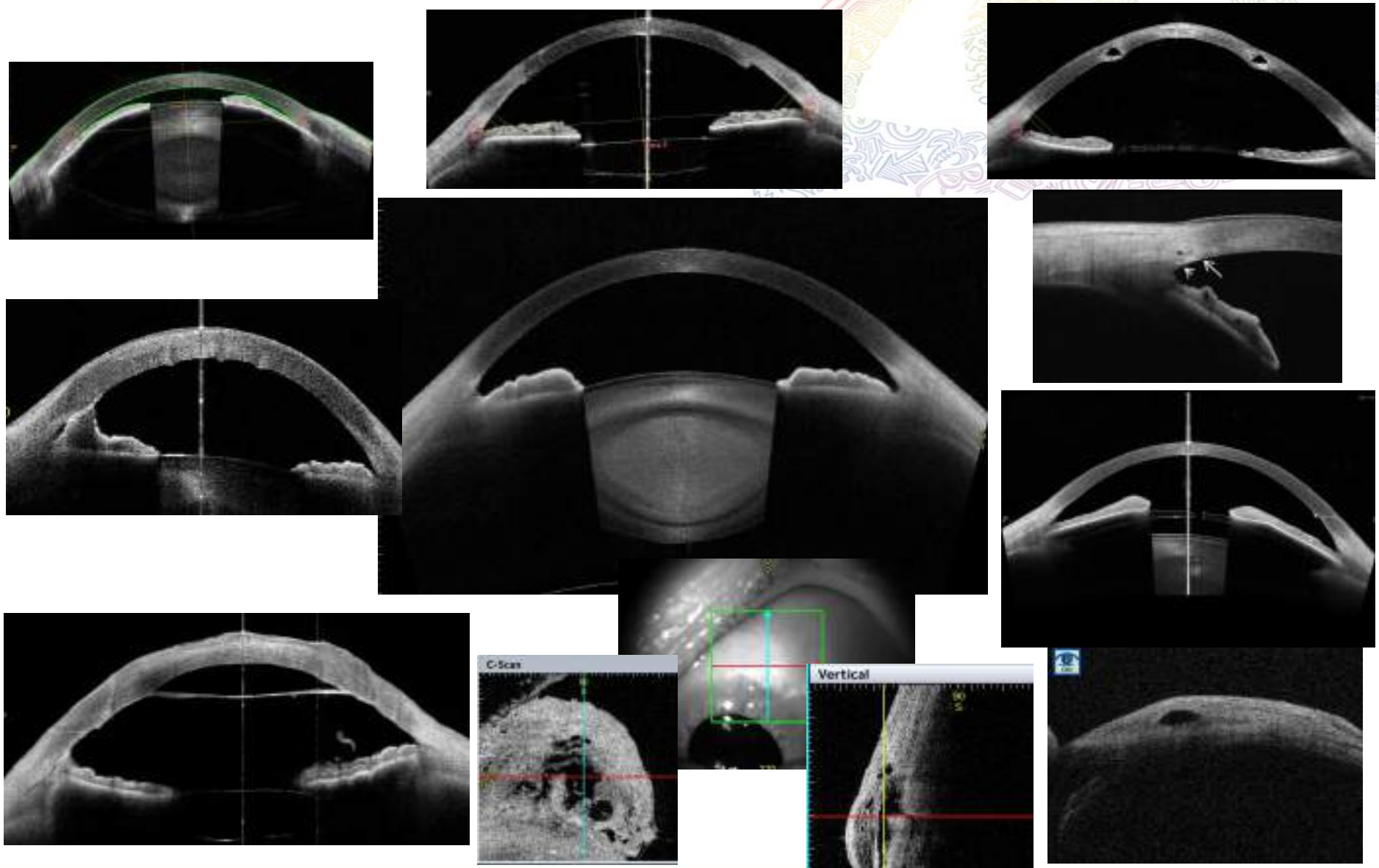

Visualize Various Eye Conditions

SKYMED

Advanced topography

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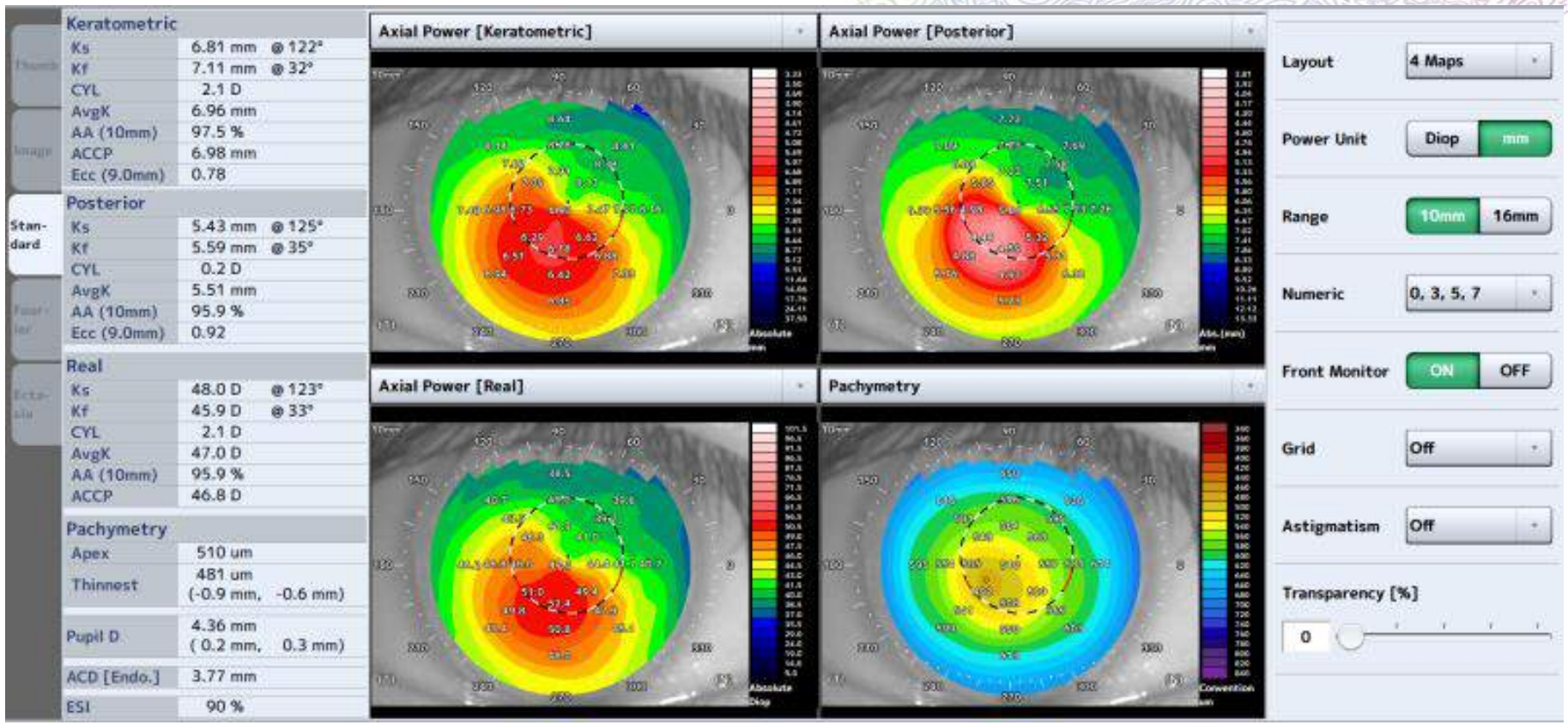
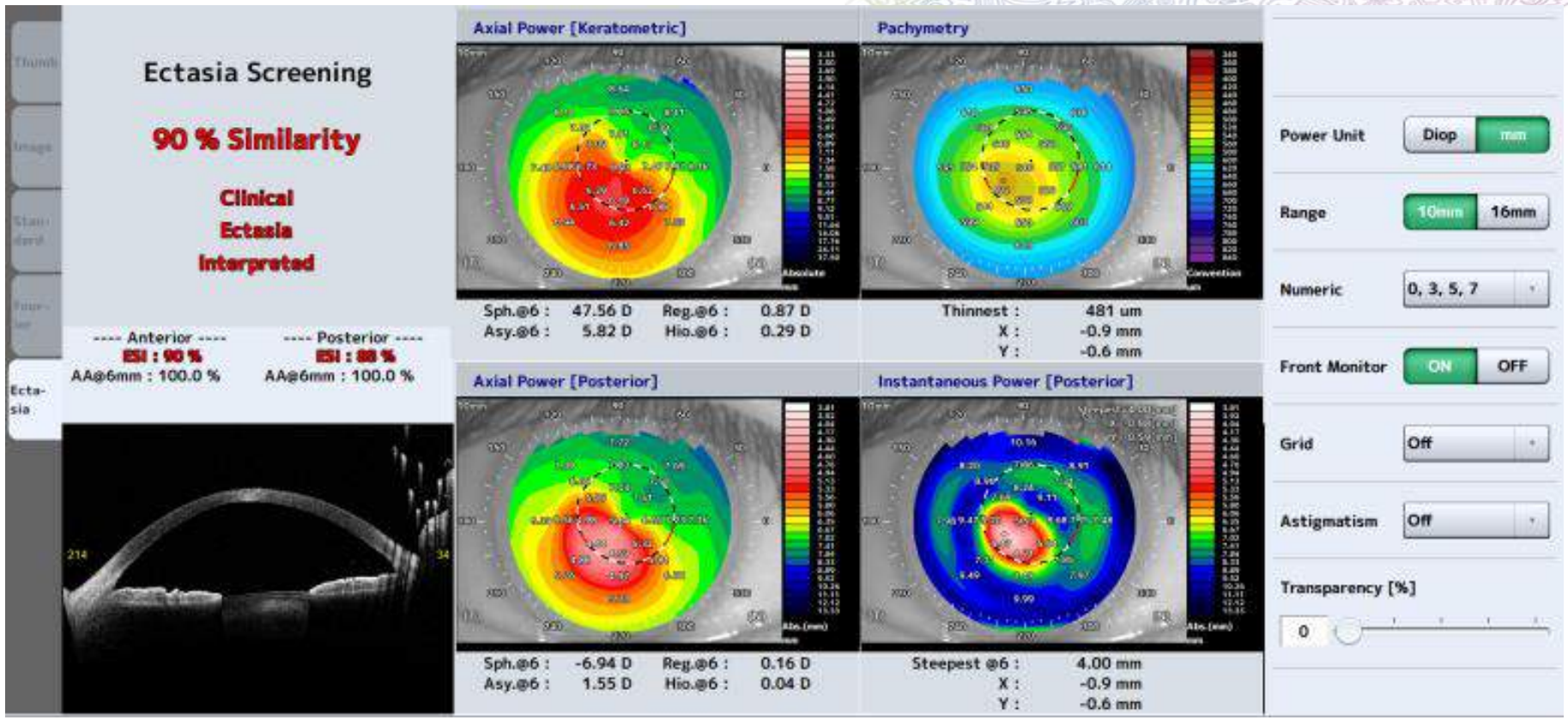
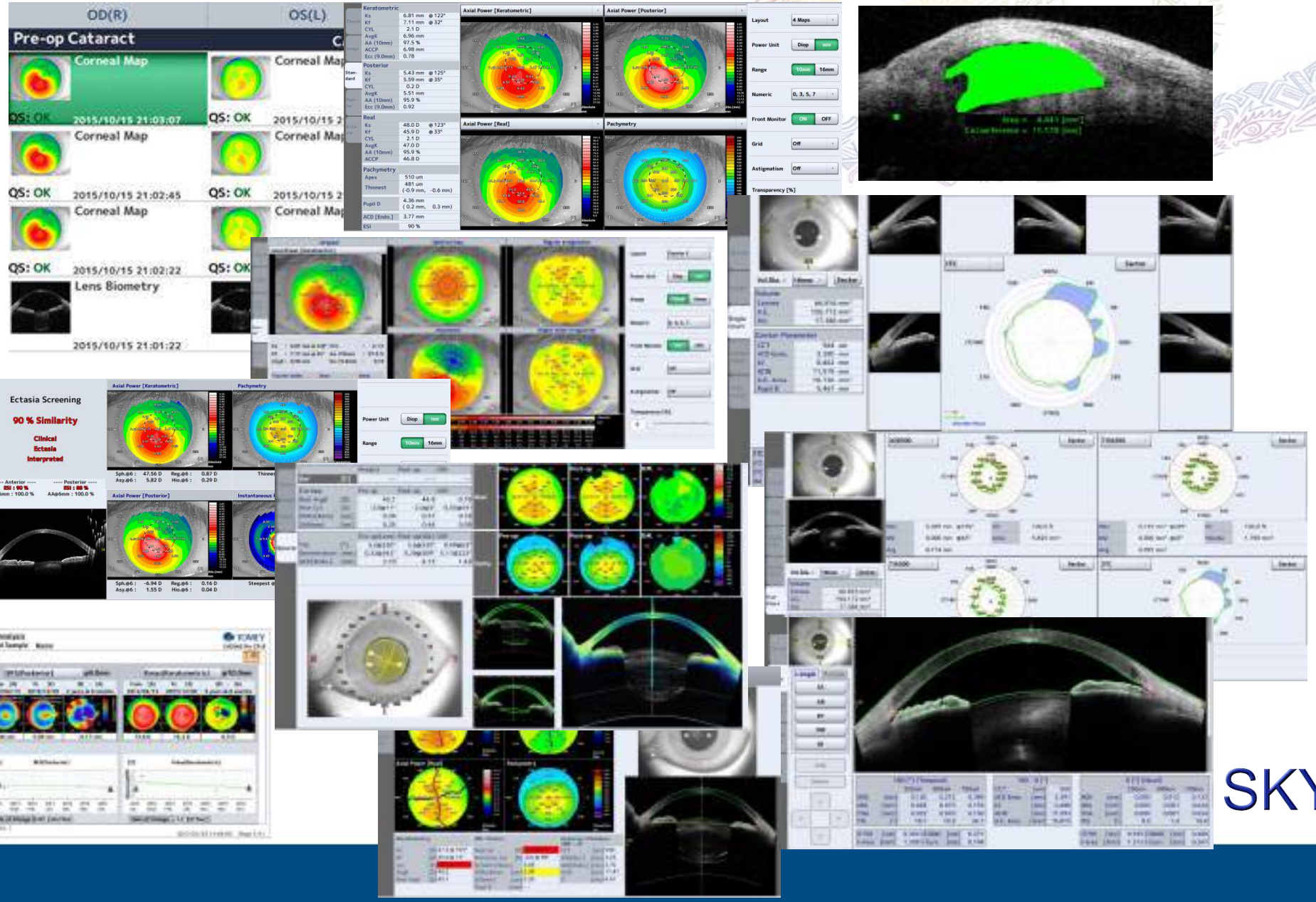


Advanced topography

SKYMED



Automated Numerical Analysis Function



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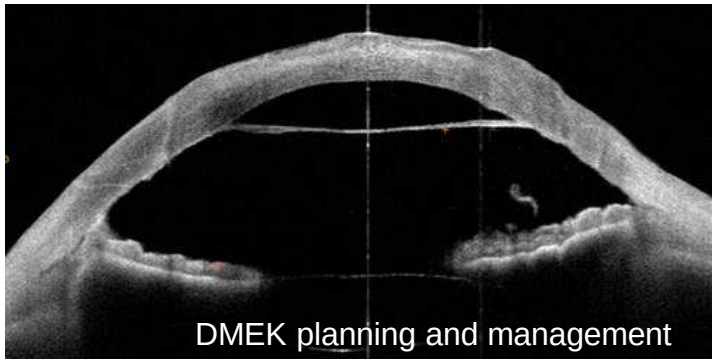
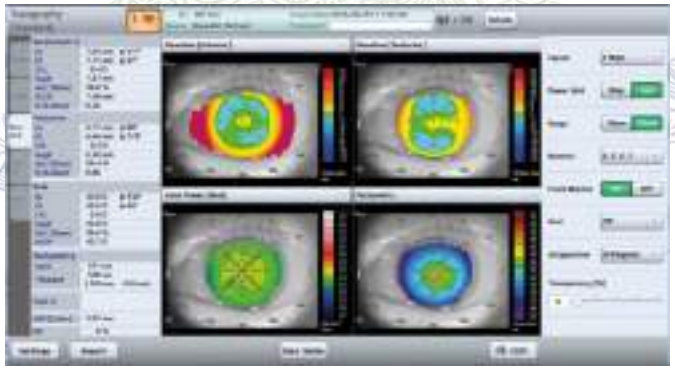
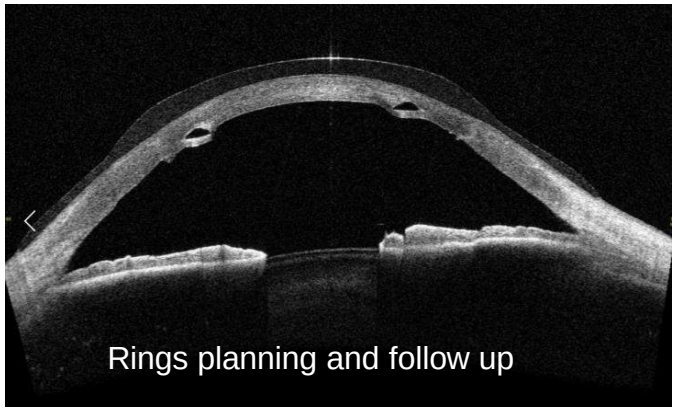
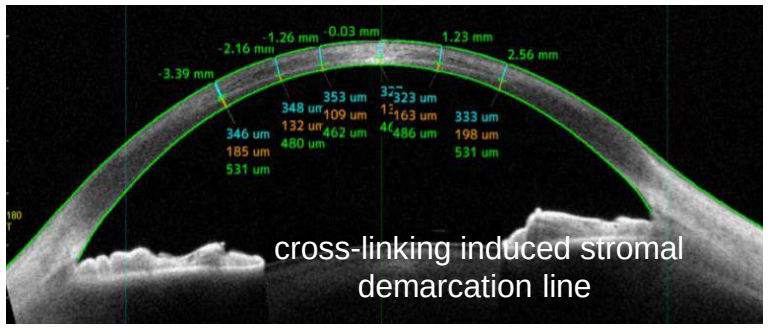
Cornea Related Information Pre And Post OP


DMEK planning and management

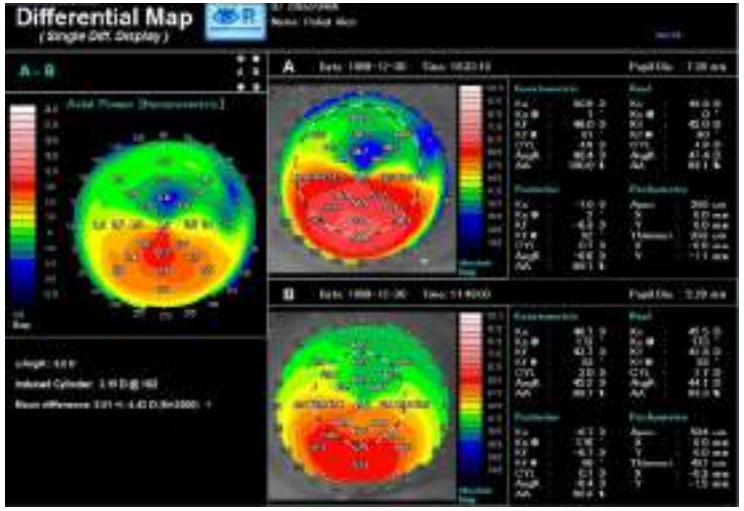


Display
Correction
Measurement
Analysis


Rings planning and follow up



cross-linking induced stromal demarcation line



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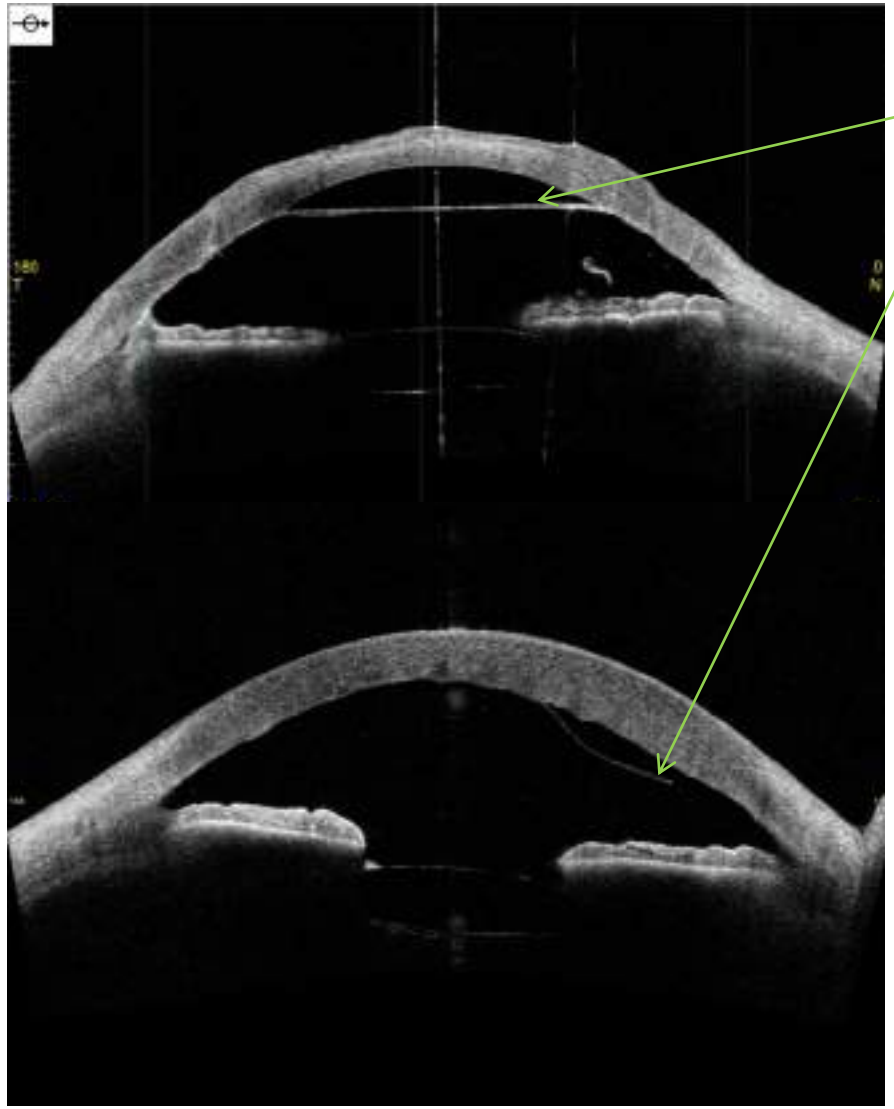
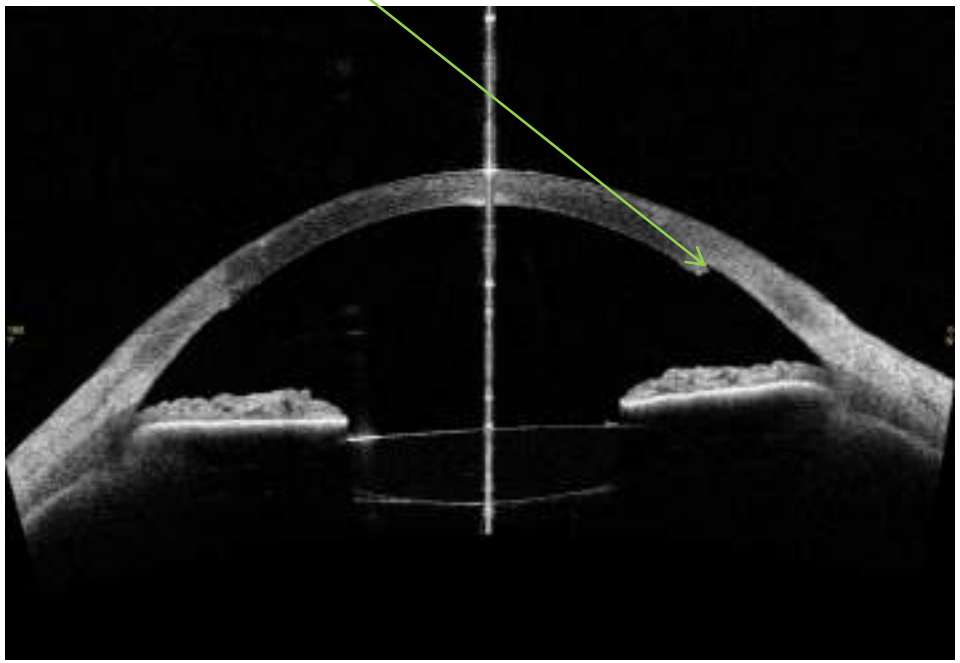
Cornea Related Information Pre And Post OP



Detached DMEK graft requiring re-bubbling…

DSAEK graft perfectly attached



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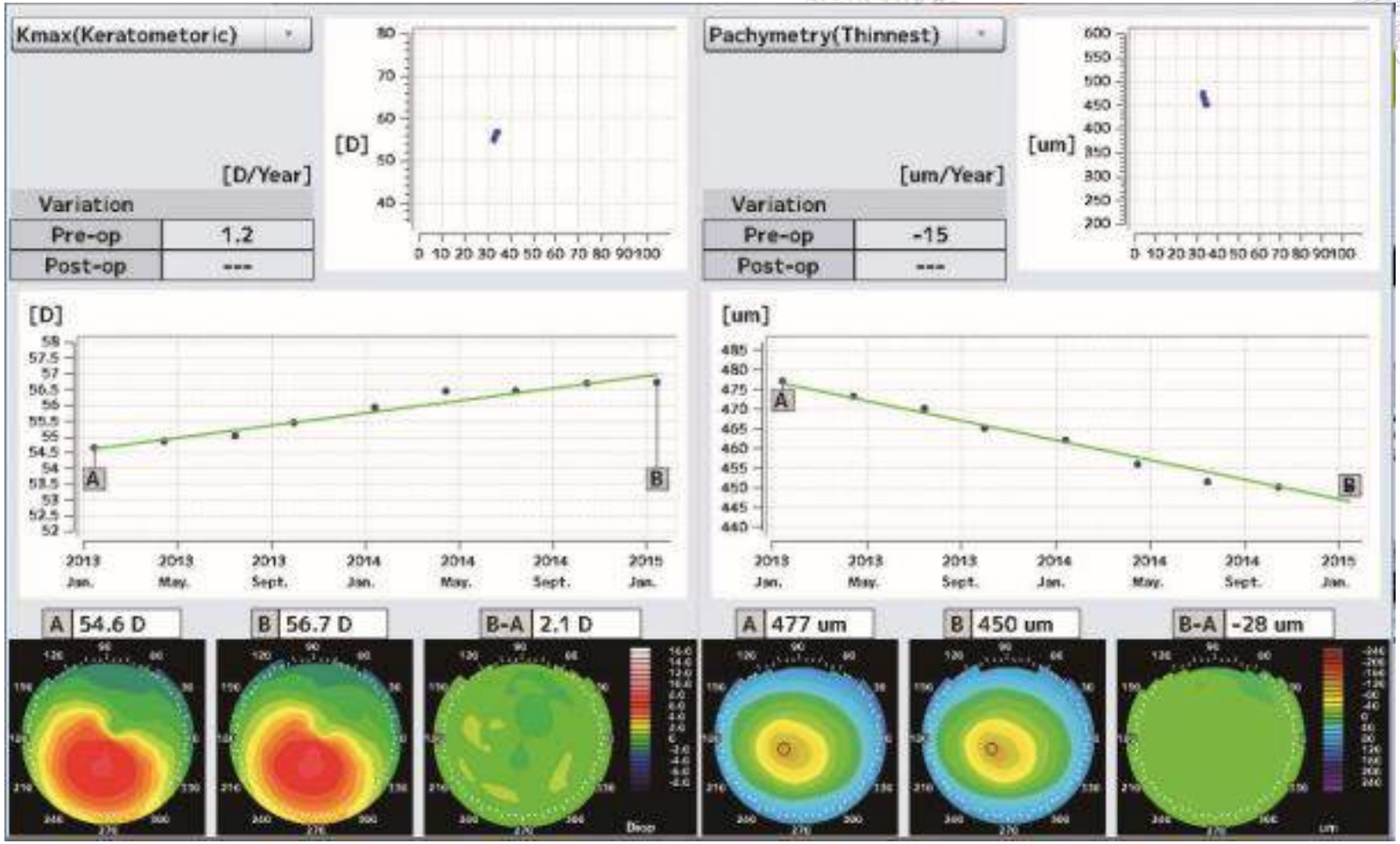
Cornea Related follow up: Trend Analysis



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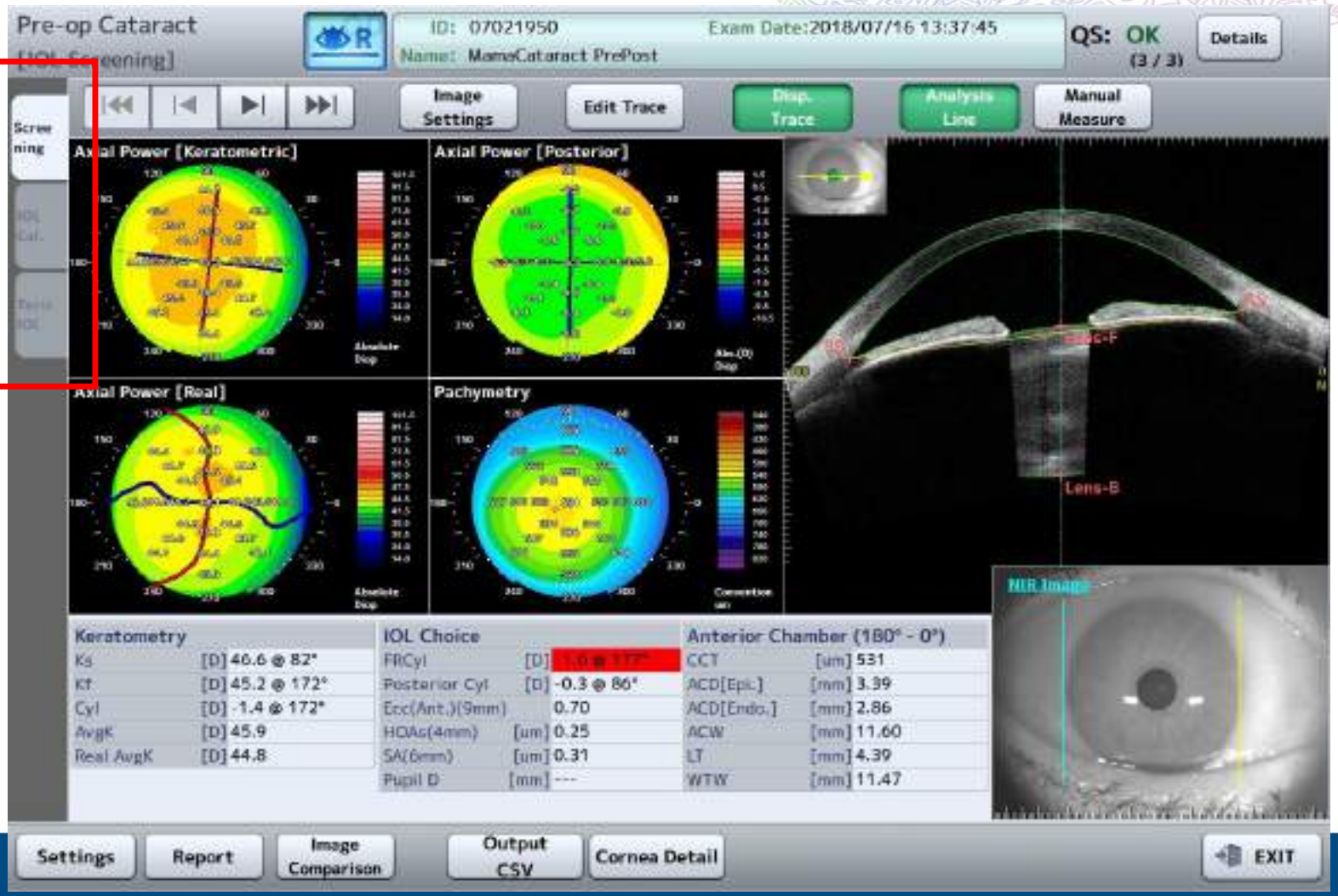
Pre-Op Cataract layout screen

- Pre-Op → complete software to calculate IOL's with adding the AL into the screen (or use our OA-2000 automatically)



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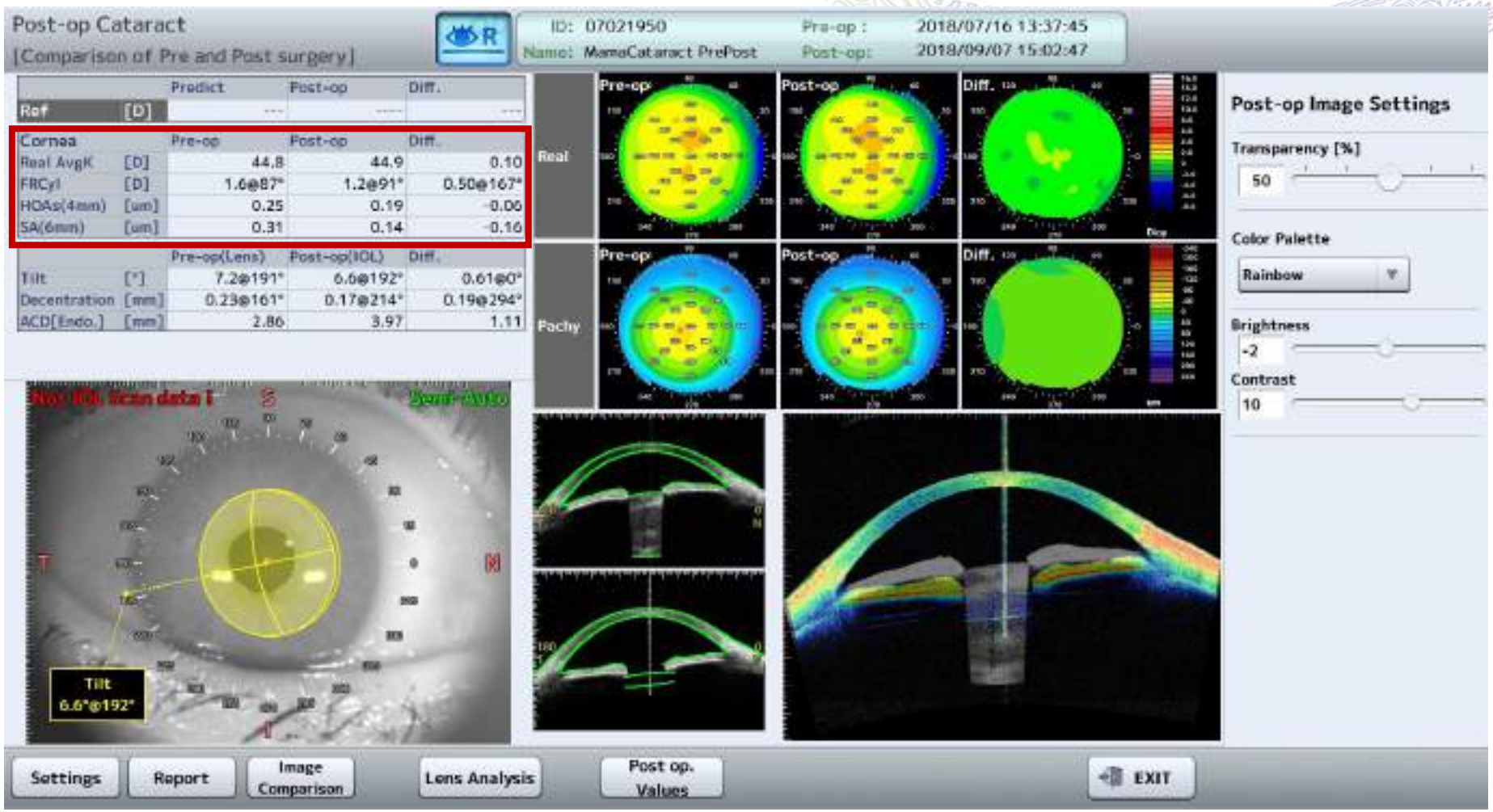
Post-Op Cataract layout screen

- PostOp → with pre-op information CASIA2 creates an overlay and shows differential map



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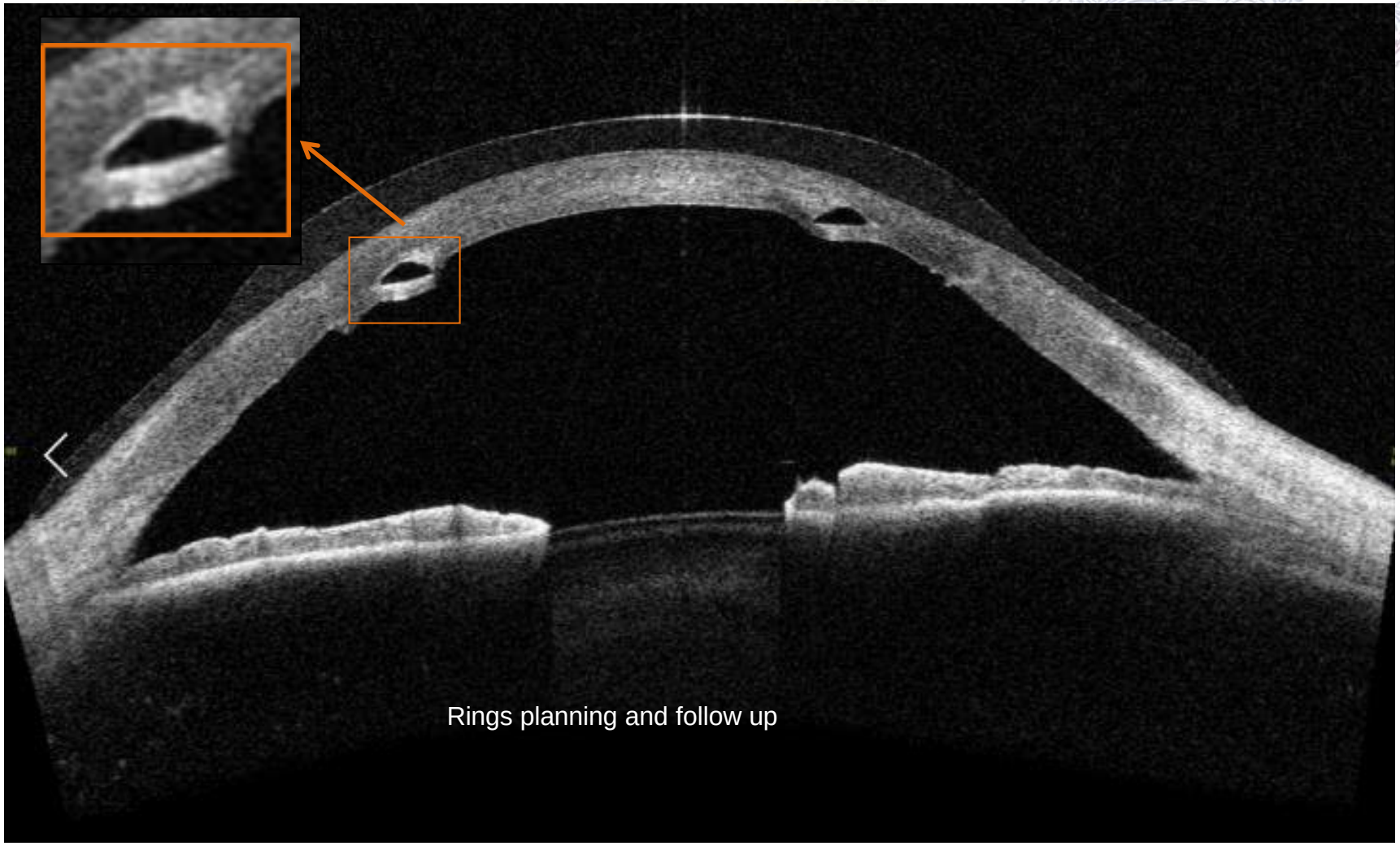
Cornea-related Information Pre And Post OP



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Cornea Rings Pre And Post OP

Ferrara Ring:

Optical zone: 5 mm / 6 mm triangular shape

KeraRing:

Optical zone: 5 mm / 6 mm triangular shape

Implanted more centrally → significant flattening effect, more Halos and Glare

INTACS:

optical zone 7 mm hexagonal form

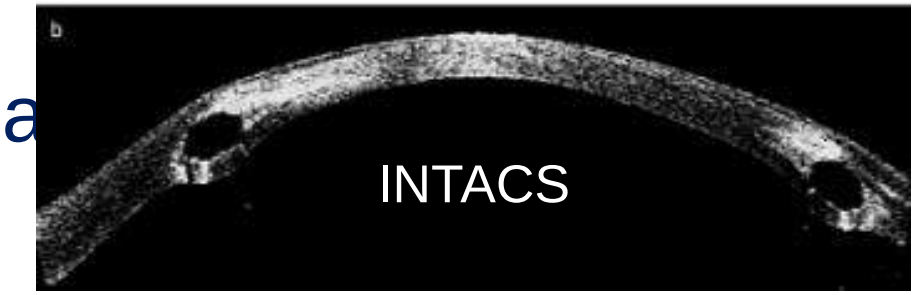
INTACS SK (UKS):

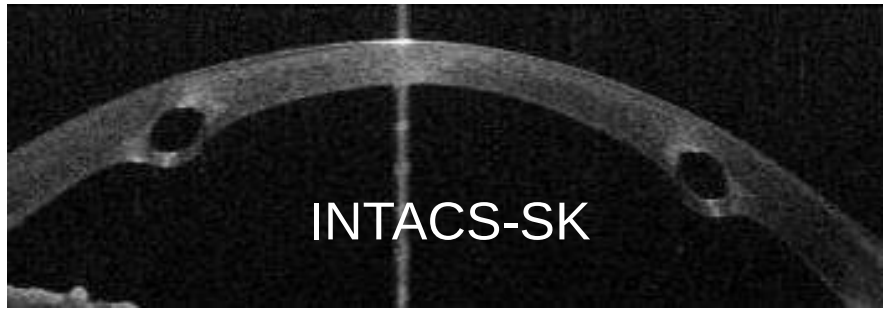
Optical zone 6 mm, elliptical form, significant flattening

Segment thickness: 0.21 mm, 0.3 mm, 0.35 mm, 0.4 mm, 0.45 mm, 0.5 mm

Beneficial in progressed KC with K≤70 dpt

Cornea





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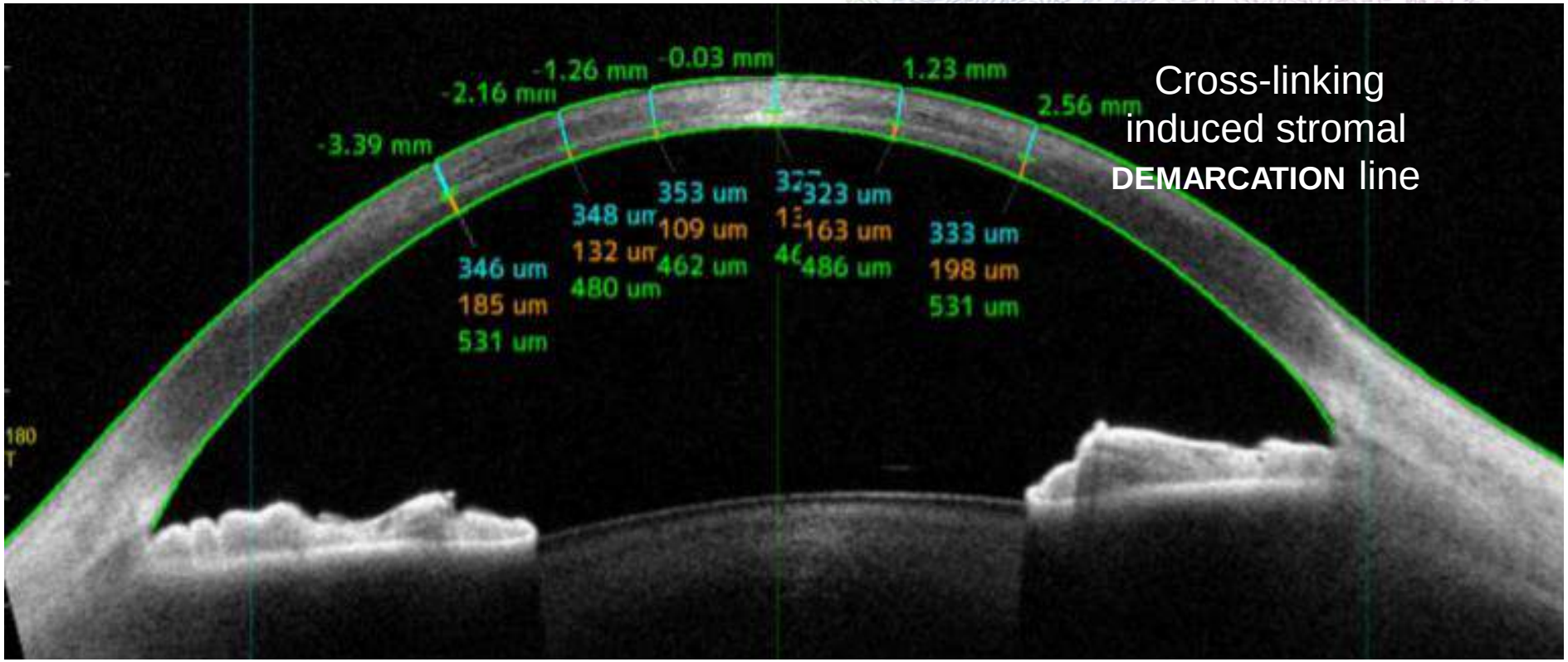
Cornea-related Information Pre And Post OP



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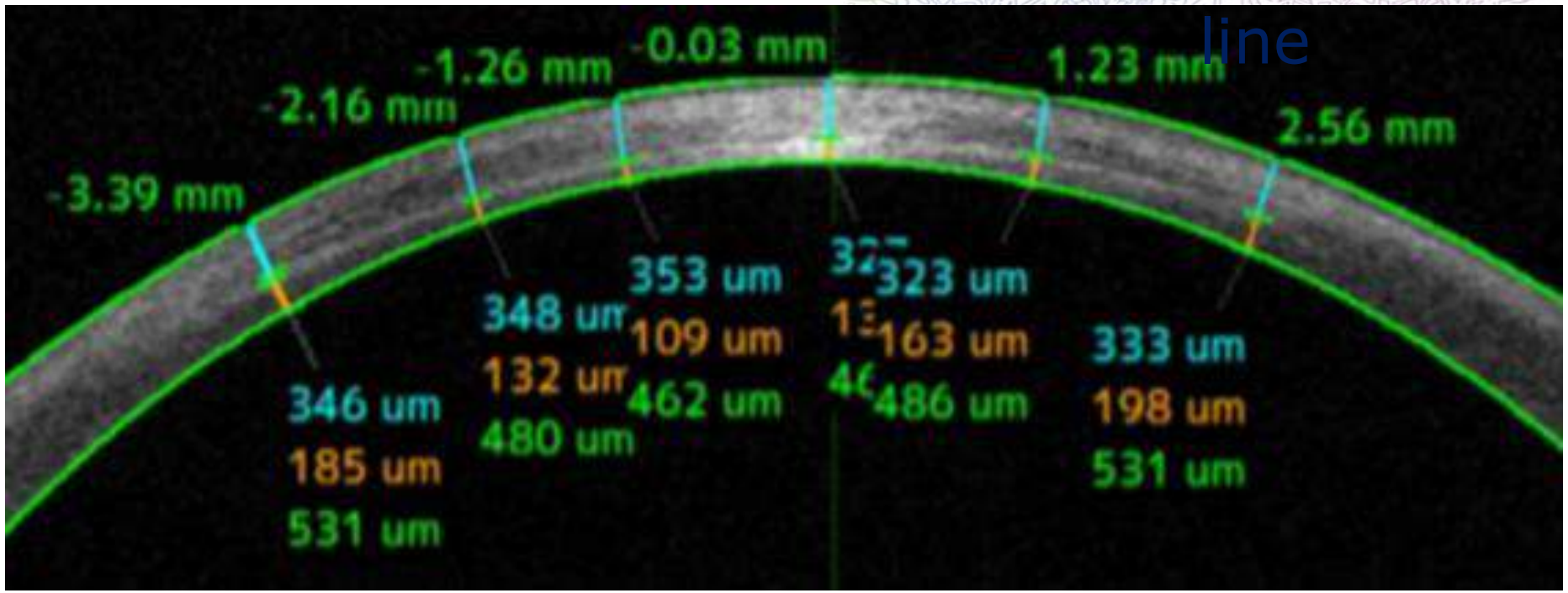
Cornea-related Information Pre And Post OP

Stromal
DEMARCATION
line



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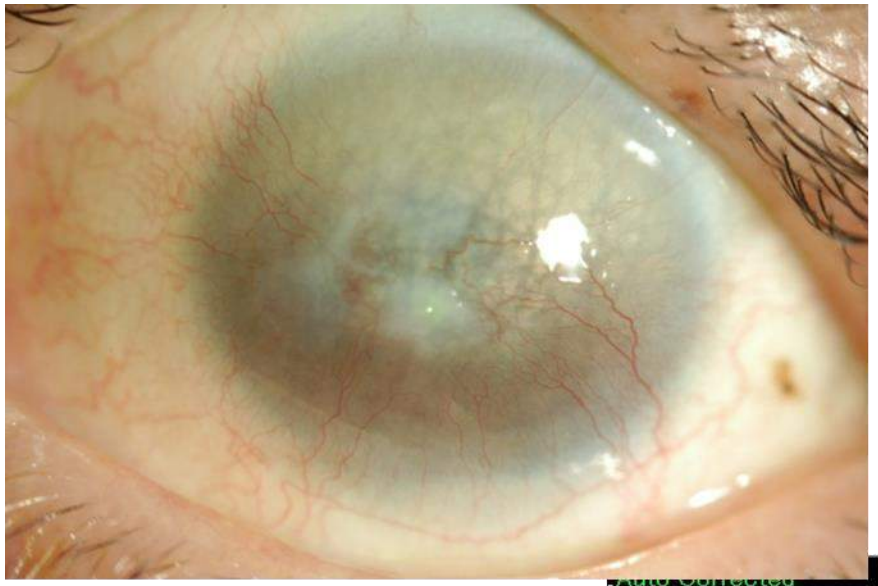
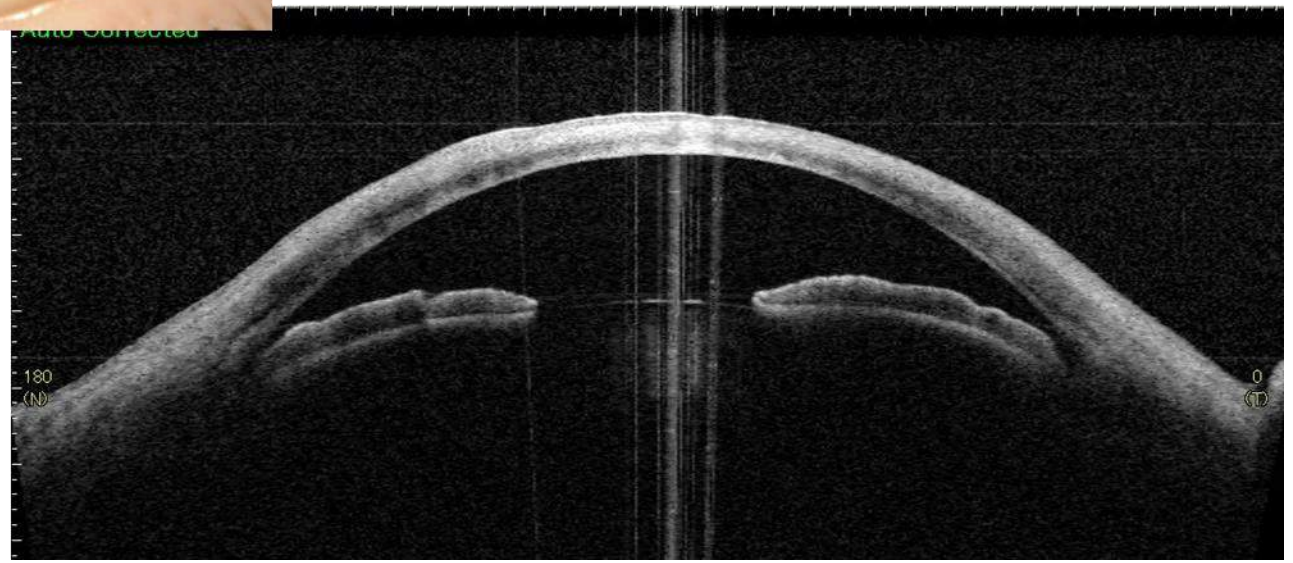
Measuring also in opaque tissues





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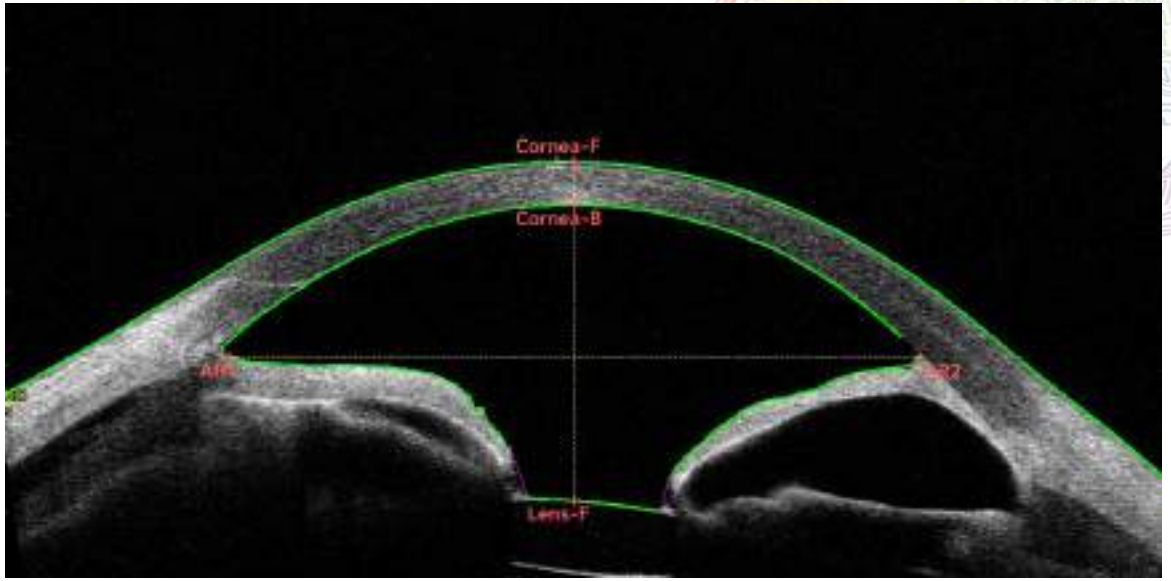
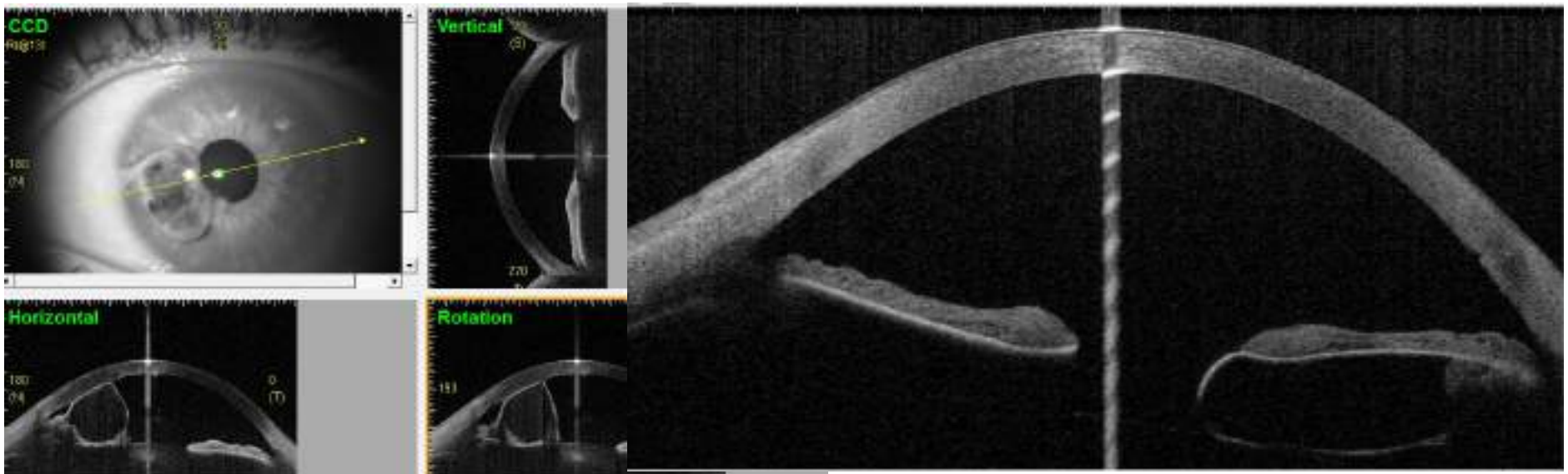
Ocular Oncology: Iris tumor, Iris bomb





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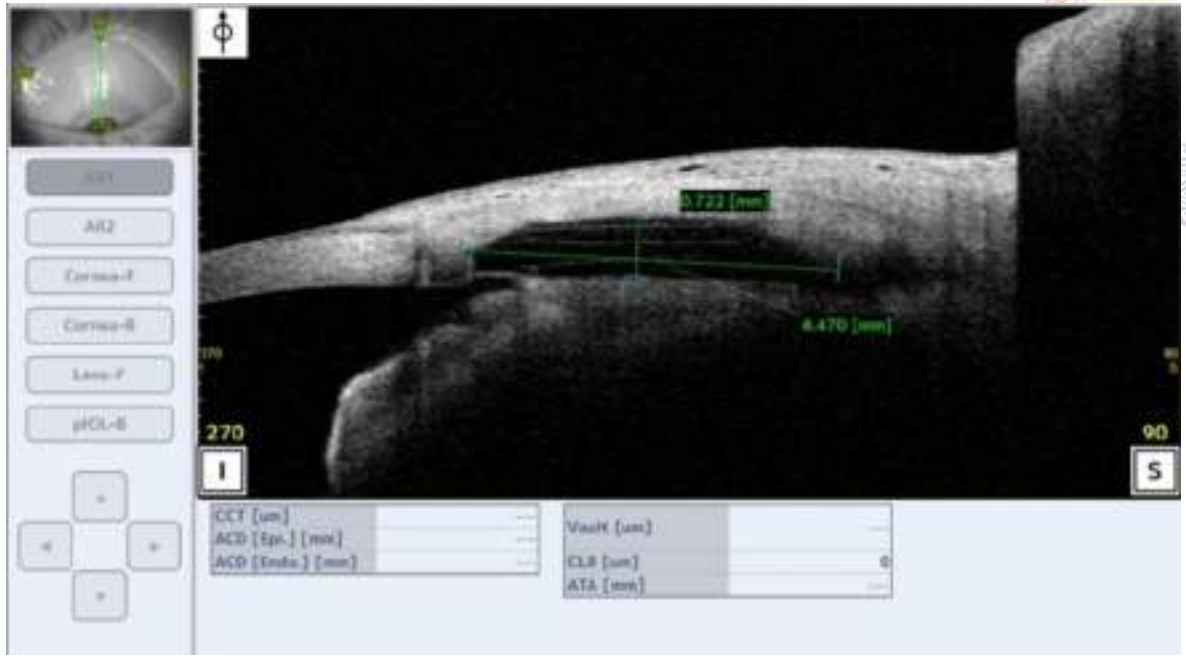
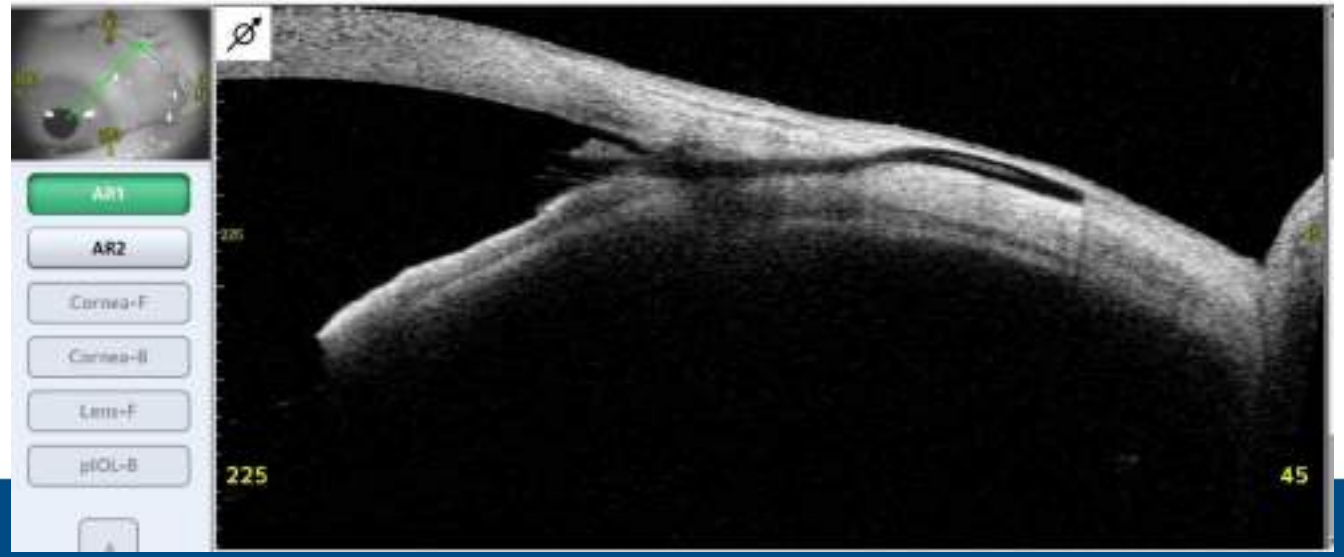
Glaucoma use for implants



Images in courtesy of Dr. Rodríguez Uña (IOFV, Oviedo)

Esnoper Clip &

Xen Implant 1 week post op



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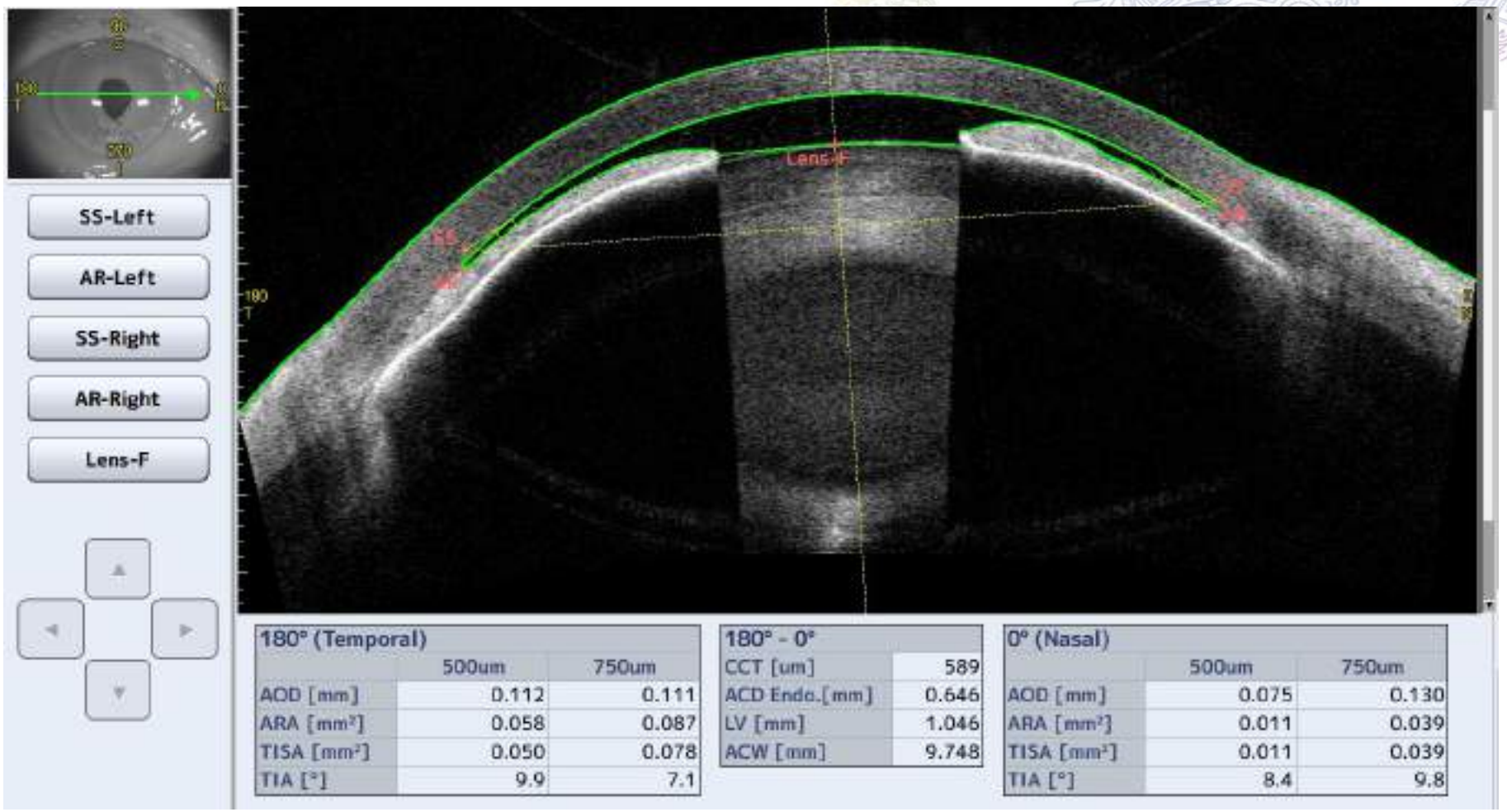
Automated 2D Analysis of parameters



180° (Temporal)	500um	750um
AOD [mm]	0.112	0.111
ARA [mm²]	0.058	0.087
TISA [mm³]	0.050	0.078
TIA [°]	9.9	7.1

180° - 0°	
CCT [um]	589
ACD Endo.[mm]	0.646
LV [mm]	1.046
ACW [mm]	9.748

0° (Nasal)	500um	750um
AOD [mm]	0.075	0.130
ARA [mm²]	0.011	0.039
TISA [mm³]	0.011	0.039
TIA [°]	8.4	9.8

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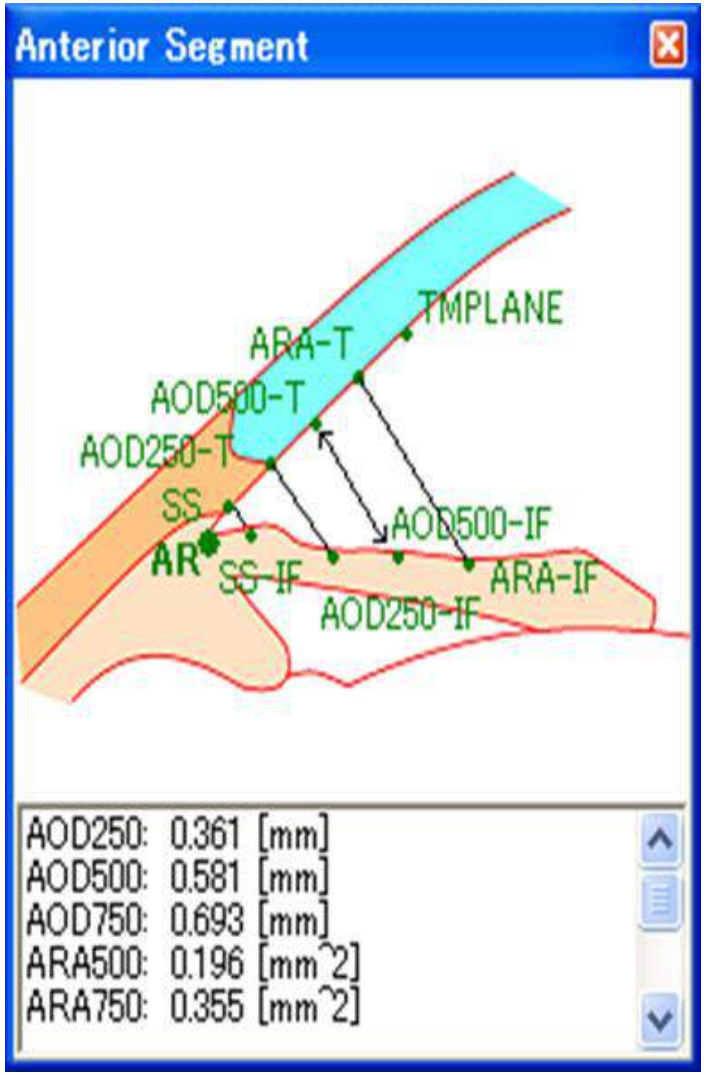
Automated ISO conform angle analysis



◆AOD：Angle Opening Distance
- AOD250: distance between AOD250-T ～ AOD250-IF
- AOD500: distance between AOD500-T ～ AOD500-IF
- AOD750: distance between ARA-T ～ ARA-IF

◆ARA：Angle Recess Area
- ARA250: dimension of angle recess side of AOD250-T ～ AOD250-IF
- ARA500: dimension of angle recess side of AOD500-T ～ AOD500-IF
- ARA750: dimension of angle recess side of ARA-T ～ ARA-IF

◆TISA：Trabecular Iris Space Area
- TISA250: dimension of angle recess side of AOD250-T ～ AOD250-IF
- TISA500: dimension of angle recess side of ARA500 – SS-T ～ SS-IF
- TISA750: dimension of angle recess side of ARA750 – SS-T ～ SS-IF

◆TIA:Trabecular Iris Angle
- TIA250: angle of AR between AR/AOD250-T/AOD250-IF
- TIA500: angle of AR between AR/AOD500-T/AOD500-IF
- TIA750: angle of AR between AR/ARA-T/ARA-IF

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Automated Glaucoma STAR360°

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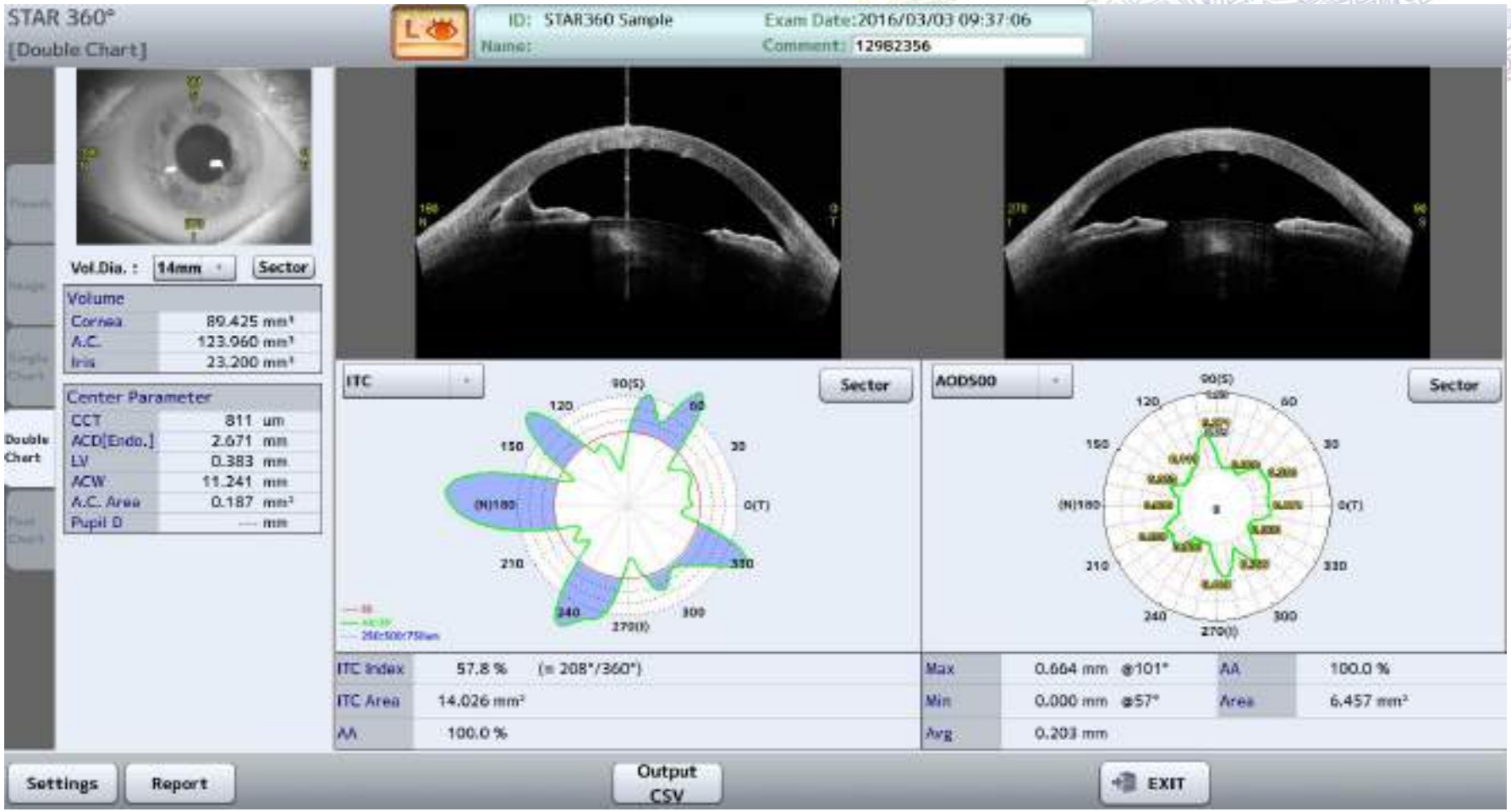
Automated Iso conform Volume & graphic display of **all** parameters



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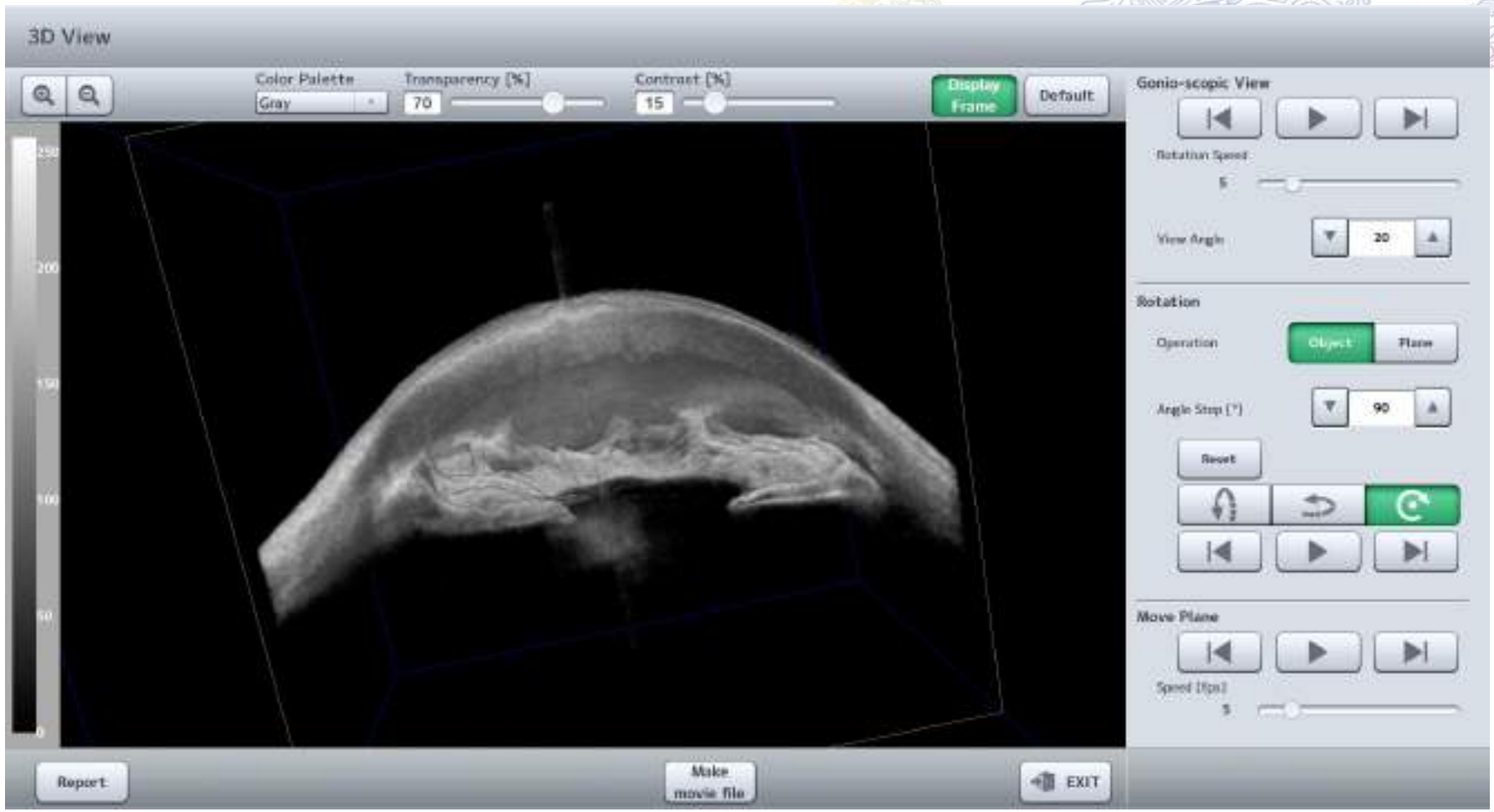
3D Imaging



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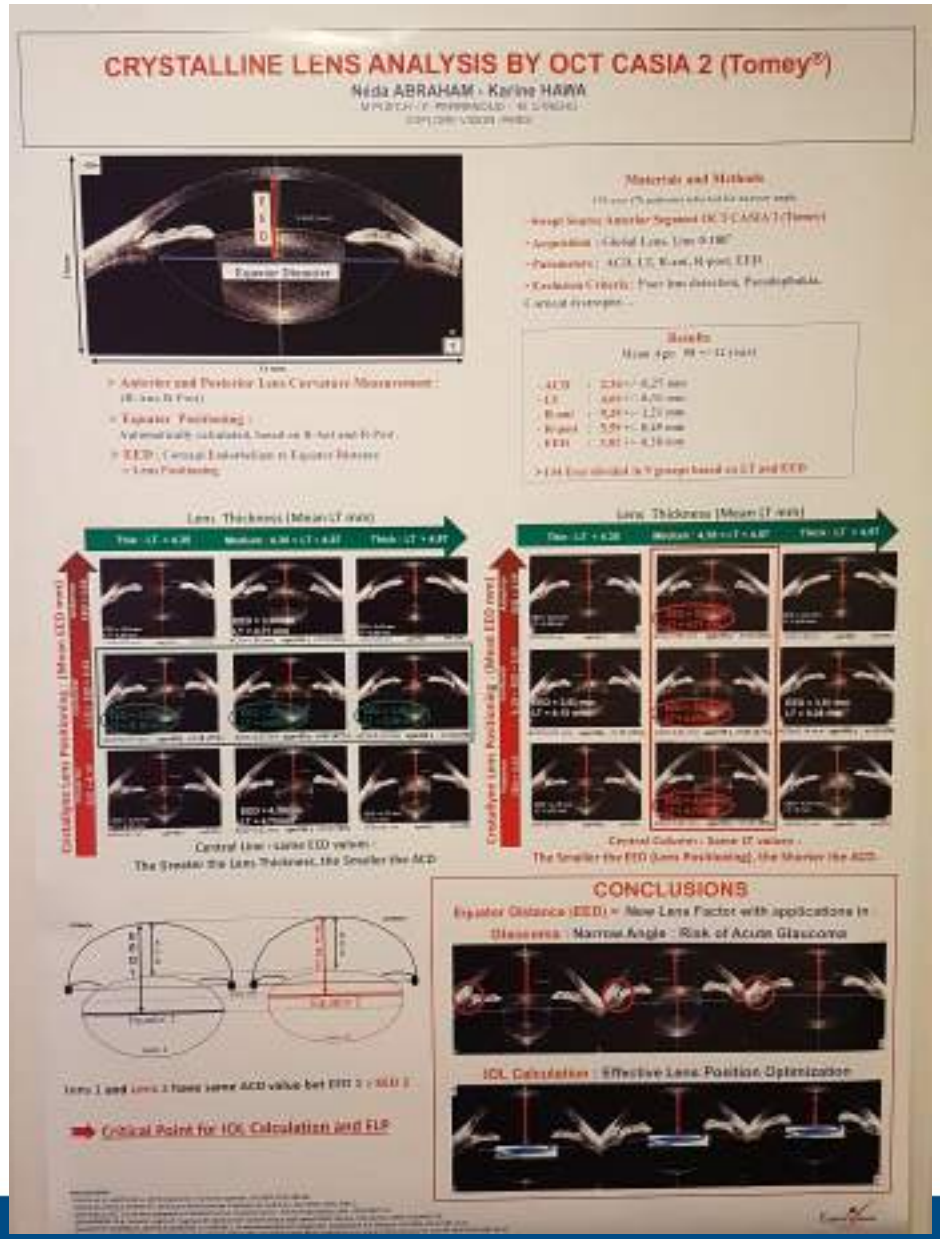
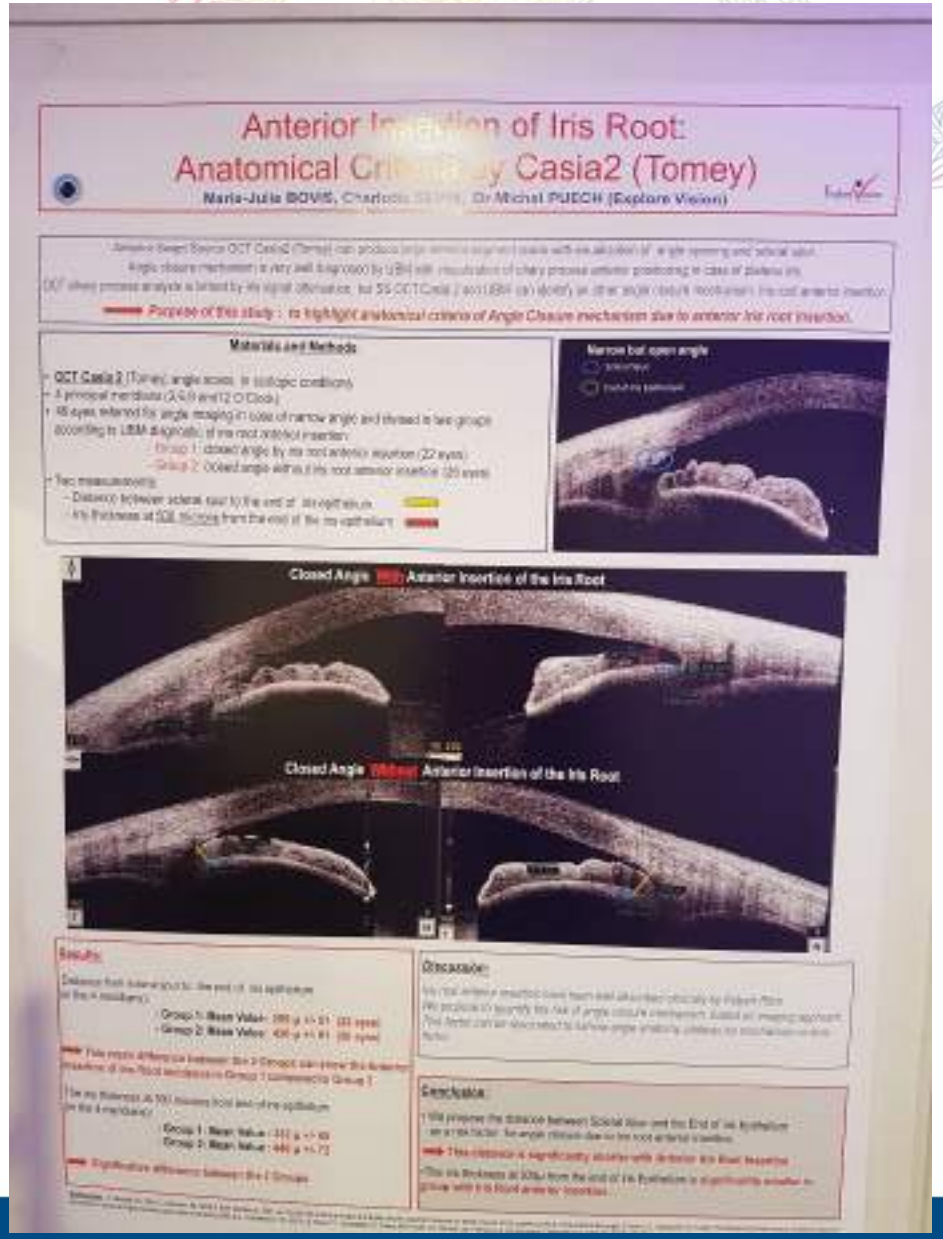
New approaches with CASIA2





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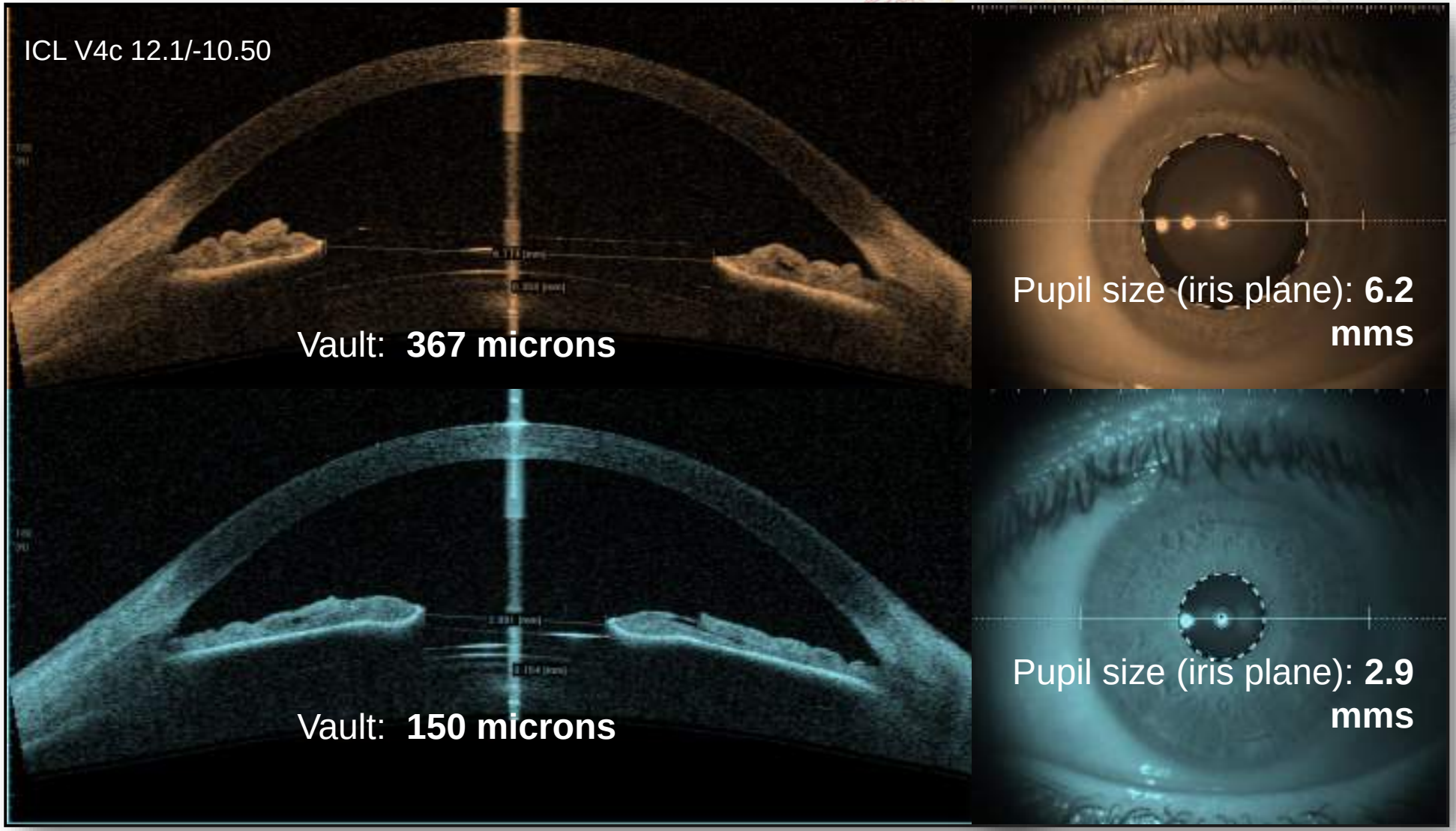
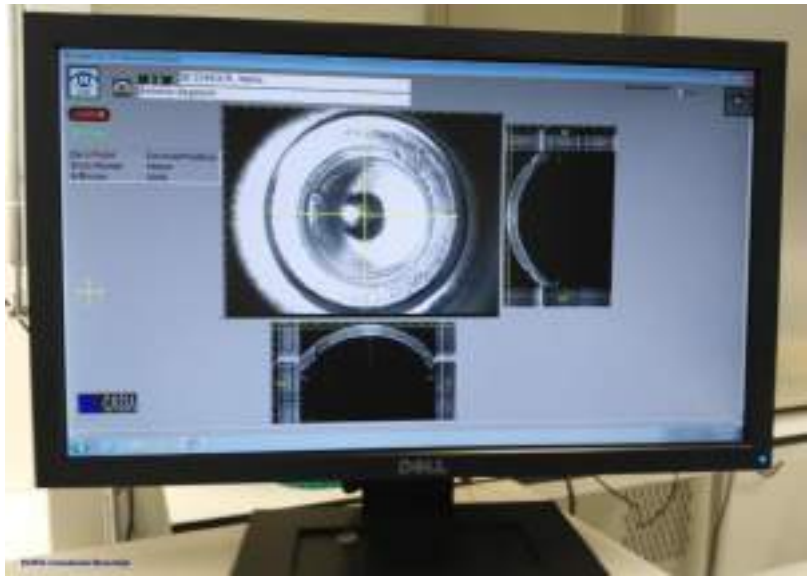
Light-induced vaulting changes of ICL



Pictures from Dr Felix Gonzalez-Lopez

Euro corneabank Beverwijk (CASIA1)
Topo of a Cornea



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Casia2 in cornea banking

- **Measurement under sterile conditions in the culture flask**
- **Measurement of corneal characteristics**, e.g. front & back surface radius, asphericity, thickness profile
- **Screening for scars**, opacities, situations after trauma, refractive surgery, pterygium surgery etc.
- **Avoidance of ‚surprises‘** after keratoplasty, measurement complimentary to the normal slit lamp control and endothelial measurement…
- **Qualification for elective PK**, or restricted to DALK, DMEK/DSAEK or á chaud PK

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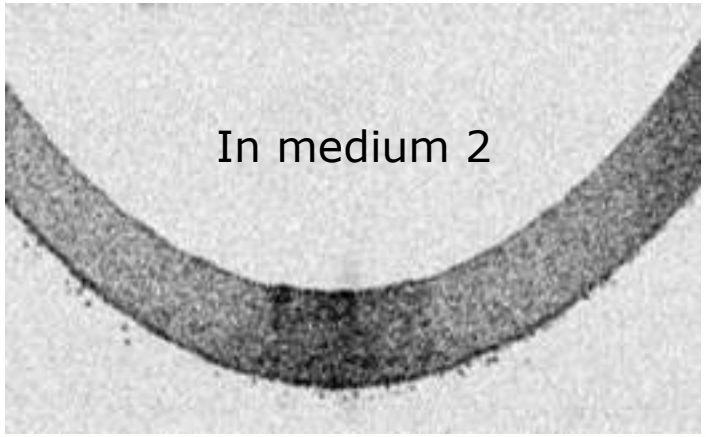
Casia2 in cornea banking

- Normal procedure: cultured in medium 1 after processing

- Transfer to medium 2 (with dextrane) 1 or 2 days prior to keratoplasty for dehydration



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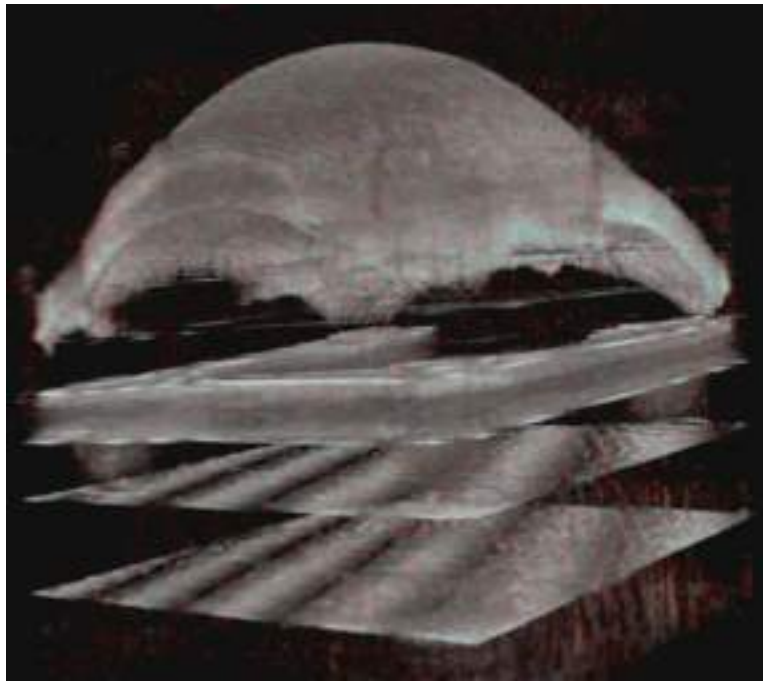
Casia2 in cornea banking



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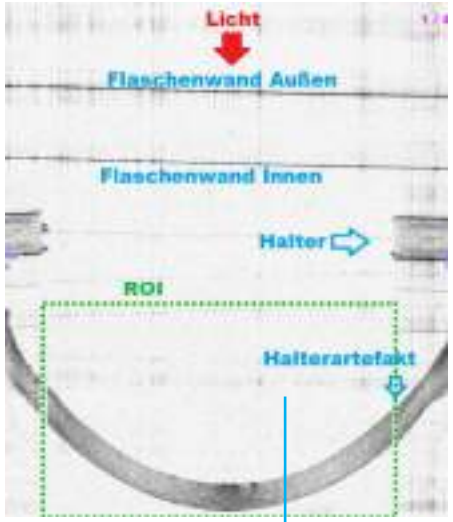
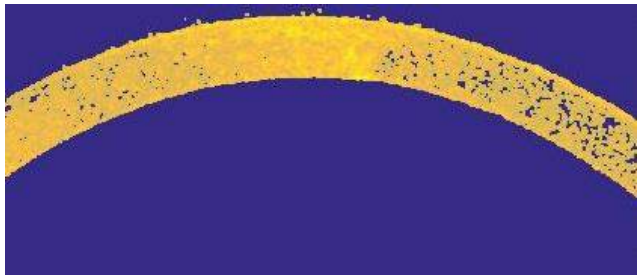
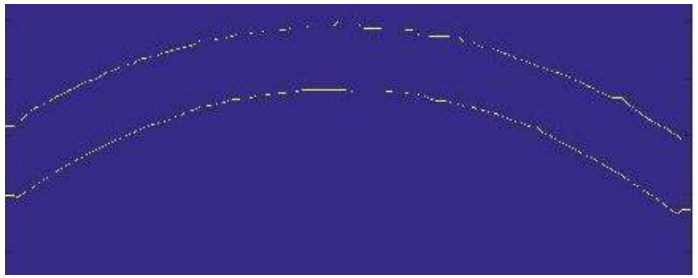
Casia2 in cornea banking

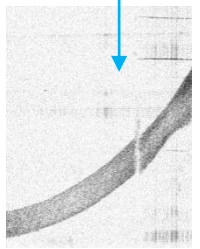
Program start → Preprocessing → Fit & Raytracing → CCT & curvature calculation → Data output

- Data import to MATLAB
- Region of Interest for elimination of artifacts
- Extract background noise (Median-Filter)
- Adapt contrast and brightness
- Opening (erosion and dilatation)
- eliminate central reflex (Purkinje I)
- Fill missing regions (Tophat transformation)
- Edge detection









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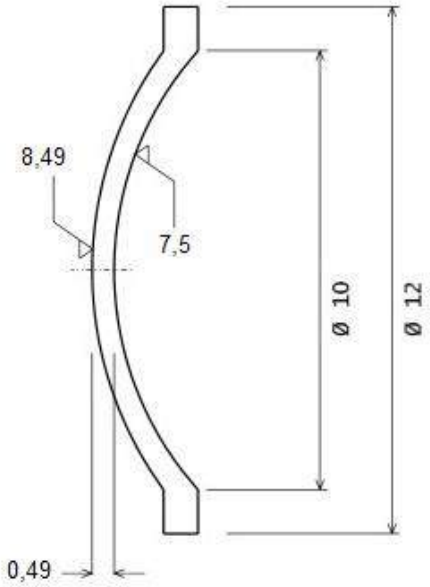
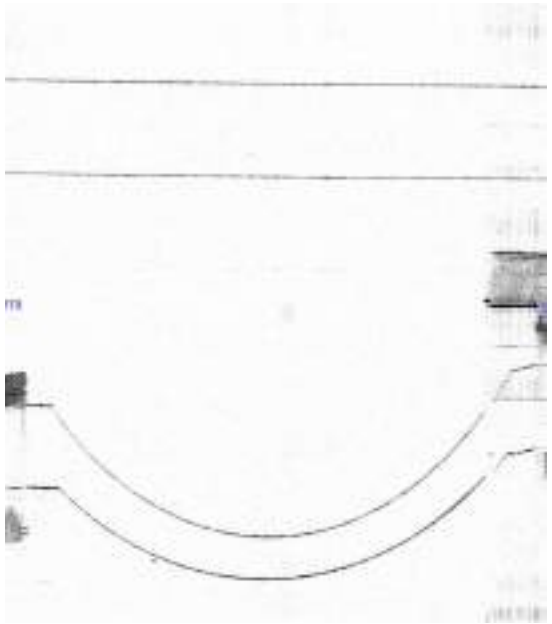
Casia2 in cornea banking

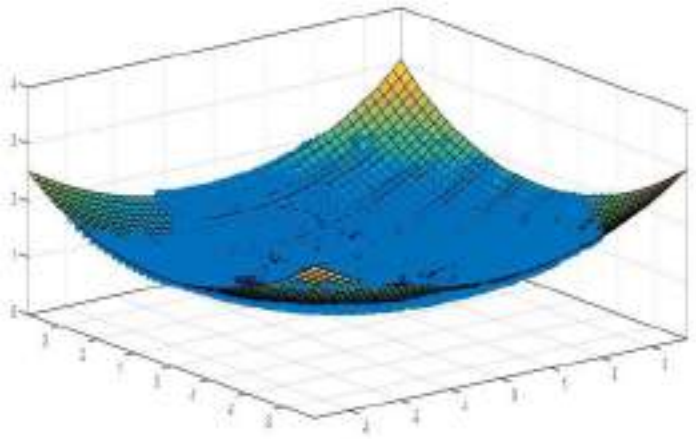
Fit & raytracing:

- Determination of back & front surface
- Iterative biconic fit, floating and rotating parametric biconic surface
- Inverse raytracing correction of the front surface (to eliminate optical distortions
- Calculation of thickness profile

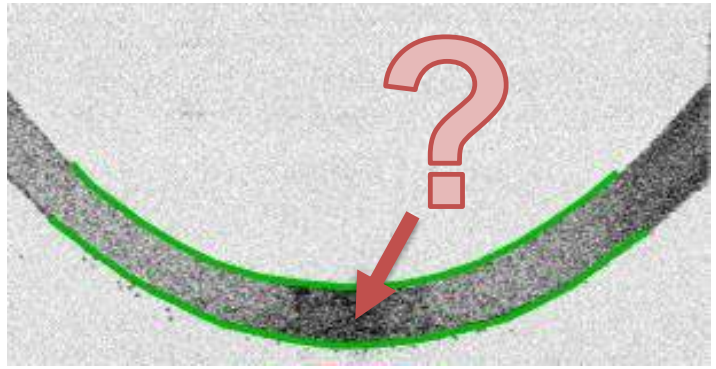




Our measurement and calibration phantom Universität des Saarlandes:



Around 200 eye bank corneas are measured!
Goal: screening 100% sample size (~ 500/yr in Homburg)



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Changes and updates with just one year

- Enhanced Topo Analysis
- Improved Corneal Analysis
- PreOp Cataract sheet adjustments incl new parameters & Barrett
- New Toric Screen incl Barrett Toric
- CSV output and report function improvements
- Lens Analysis → Lens and IOL Trace in one screen added

Changes and updates with just one year

- New parameters for topography available (Kmax)
- Toric IOL axis measured and shown on Lens Analysis screen
- For Bleb/ Raster → Enface/Rotation function
- Synchronization of parameters between IOL Cal. and Toric
- PreOp Cataract Settings with coloured threshold
- WtW can be used for IOL calculation
- Summary Report (IOL calculation)
- PostOp → new IOL scan function

PreOp Cataract Sheet adjustments

- Barrett formula Universal II and True K was added free of charge!

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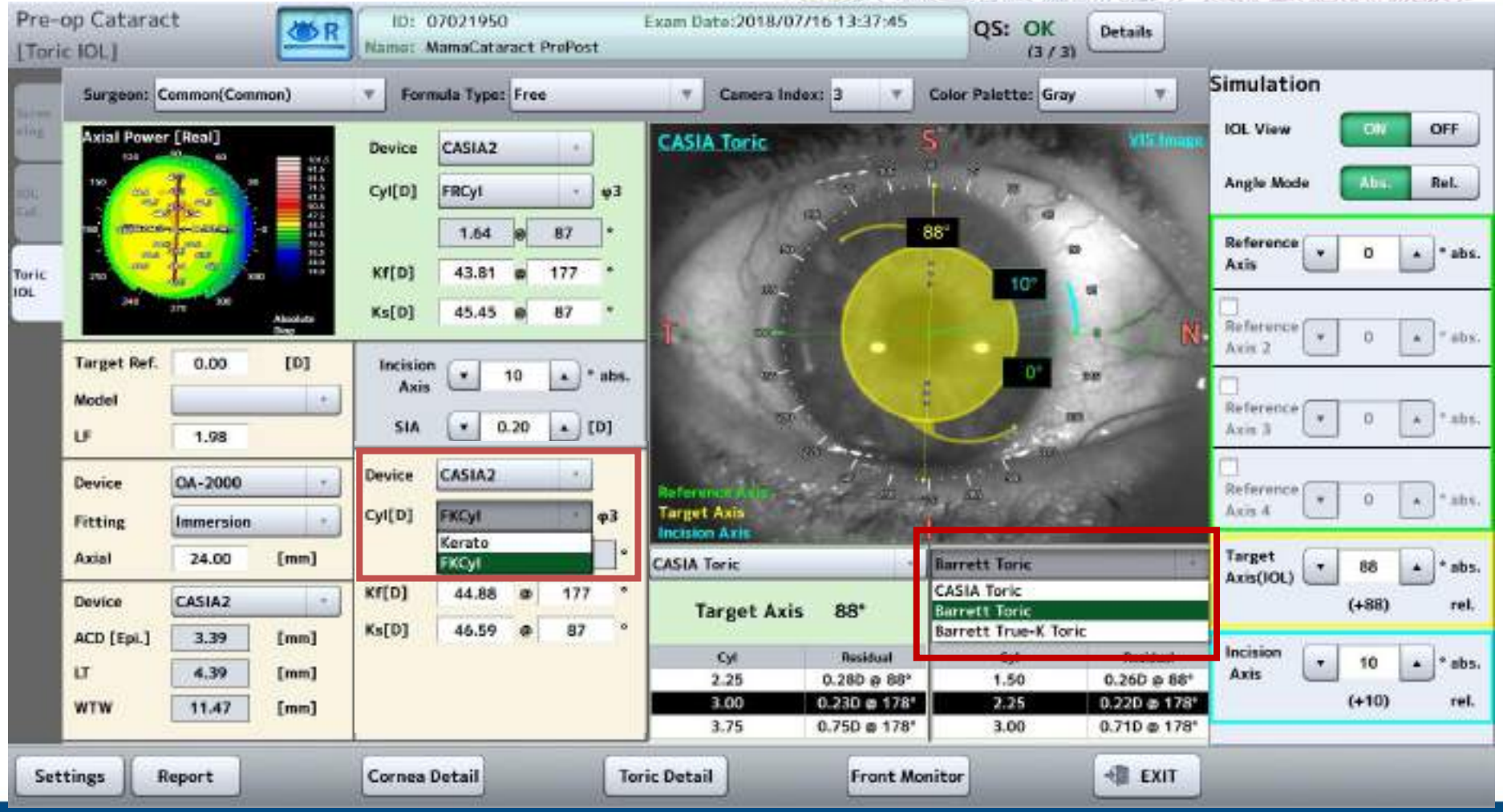
New Toric Screen incl Barrett Toric

- Two different Toric Calculators → can be adjusted up to doctors wish



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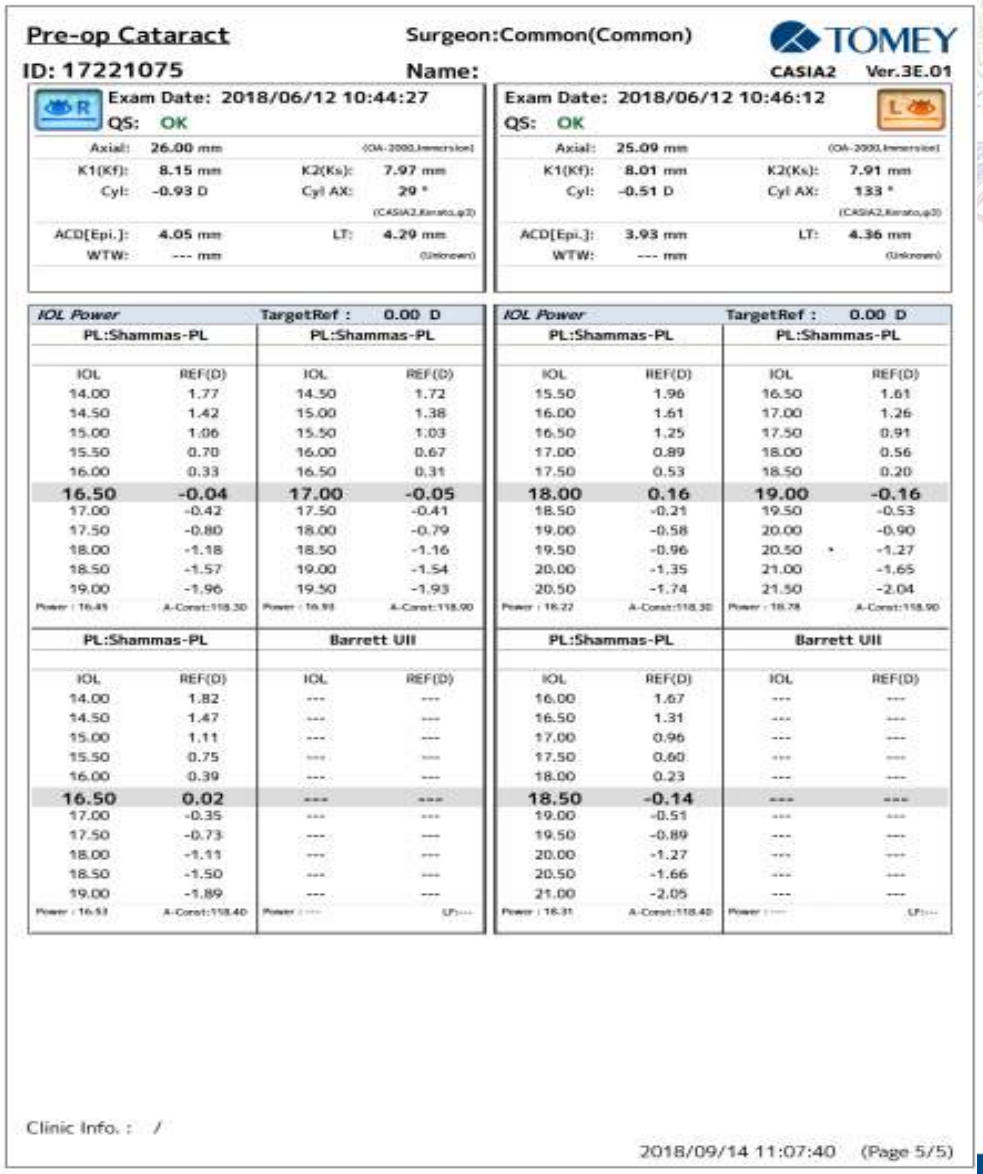
Pre-Op Cataract Summary Report



Pre-op Cataract Surgeon:Common(Common) TOMEY

ID: 17221075 Name: CASIA2 Ver.3E.01

R		L	
Exam Date: 2018/06/12 10:44:27		Exam Date: 2018/06/12 10:46:12	
QS: OK		QS: OK	
Axial: 26.00 mm	(OA-2000,Immersion)	Axial: 25.09 mm	(OA-2000,Immersion)
K1(Kf): 8.15 mm	K2(Ks): 7.97 mm	K1(Kf): 8.01 mm	K2(Ks): 7.91 mm
Cyl: -0.93 D	Cyl AX: 29 °	Cyl: -0.51 D	Cyl AX: 133 °
	(CASIA2,Keratio,φ3)		(CASIA2,Keratio,φ3)
ACD[Epi.]: 4.05 mm	LT: 4.29 mm	ACD[Epi.]: 3.93 mm	LT: 4.36 mm
WTW: --- mm	(Unknown)	WTW: --- mm	(Unknown)

IOL Power TargetRef : 0.00 D

PL:Shammas-PL		PL:Shammas-PL	
IOL	REF(D)	IOL	REF(D)
14.00	1.77	14.50	1.72
14.50	1.42	15.00	1.38
15.00	1.06	15.50	1.03
15.50	0.70	16.00	0.67
16.00	0.33	16.50	0.31
16.50	**-0.04**	**17.00**	**-0.05**
17.00	-0.42	17.50	-0.41
17.50	-0.80	18.00	-0.79
18.00	-1.18	18.50	-1.16
18.50	-1.57	19.00	-1.54
19.00	-1.96	19.50	-1.93
Power : 16.45	A-Const:118.30	Power : 16.93	A-Const:118.00

PL:Shammas-PL		Barrett UII	
IOL	REF(D)	IOL	REF(D)
14.00	1.82	---	---
14.50	1.47	---	---
15.00	1.11	---	---
15.50	0.75	---	---
16.00	0.39	---	---
16.50	**0.02**	**---**	**---**
17.00	-0.35	---	---
17.50	-0.73	---	---
18.00	-1.11	---	---
18.50	-1.50	---	---
19.00	-1.89	---	---
Power : 16.53	A-Const:118.40	Power : ---	LT:---

IOL Power TargetRef : 0.00 D

PL:Shammas-PL		PL:Shammas-PL	
IOL	REF(D)	IOL	REF(D)
15.50	1.96	16.50	1.61
16.00	1.61	17.00	1.26
16.50	1.25	17.50	0.91
17.00	0.89	18.00	0.56
17.50	0.53	18.50	0.20
18.00	**0.16**	**19.00**	**-0.16**
18.50	-0.21	19.50	-0.53
19.00	-0.58	20.00	-0.90
19.50	-0.96	20.50	-1.27
20.00	-1.35	21.00	-1.65
20.50	-1.74	21.50	-2.04
Power : 16.22	A-Const:118.30	Power : 16.78	A-Const:118.90

PL:Shammas-PL		Barrett UII	
IOL	REF(D)	IOL	REF(D)
16.00	1.67	---	---
16.50	1.31	---	---
17.00	0.96	---	---
17.50	0.60	---	---
18.00	0.23	---	---
18.50	**-0.14**	**---**	**---**
19.00	-0.51	---	---
19.50	-0.89	---	---
20.00	-1.27	---	---
20.50	-1.66	---	---
21.00	-2.05	---	---
Power : 16.31	A-Const:118.40	Power : ---	LT:---

Clinic Info. : /

2018/09/14 11:07:40 (Page 5/5)

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CSV Output and report function improvements

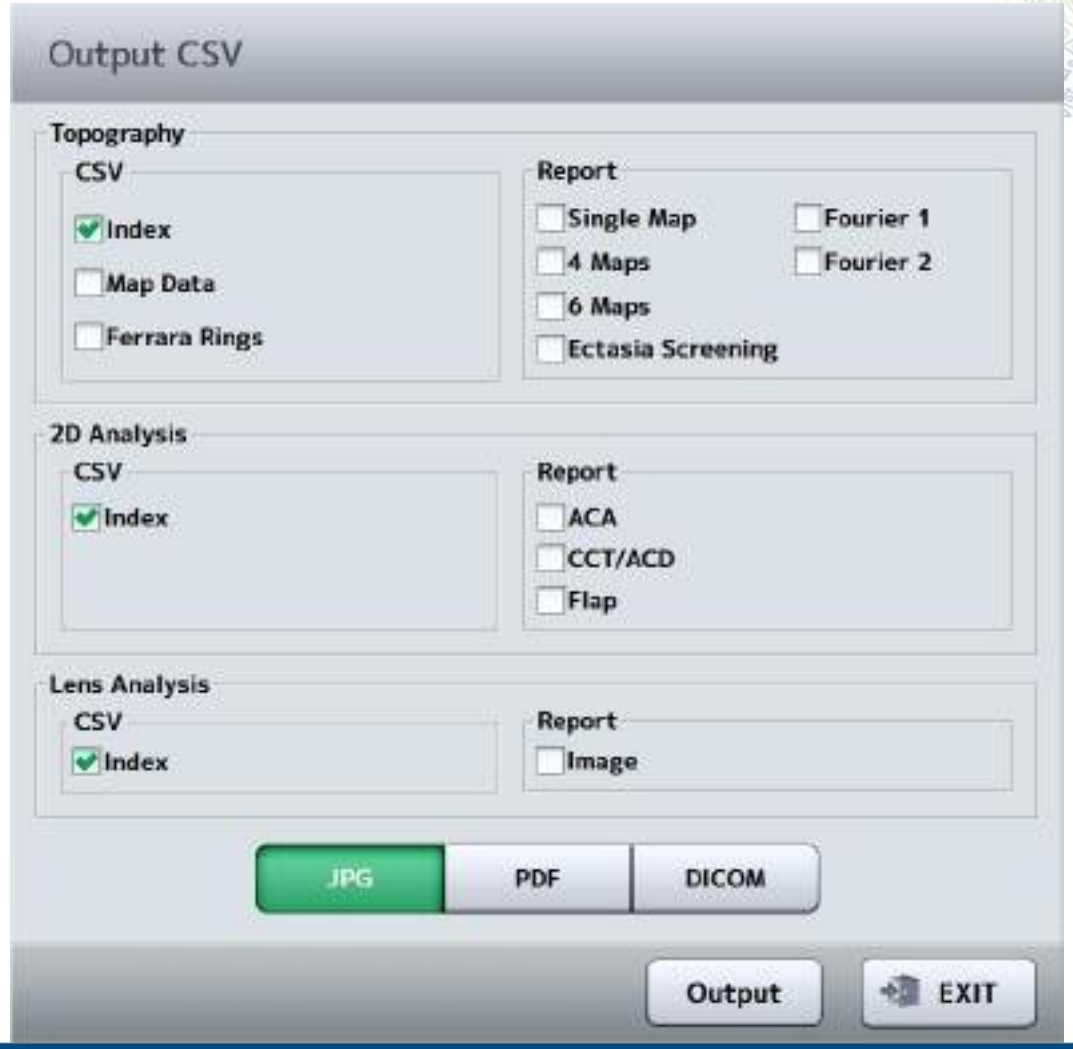
We have changed a lot of “report” functions, since so many doctors were not as happy with the limited report possibilities.

Since the CASIA2 is also used for studies and research, CSV output is essential and needed to be improved.

The reporting itself was already very good, but not to be individualized. Now, with new software starting from version 3D the reporting is much easier, since the user can define the report settings and is able to generate more reports with simply one click

CSV Output and report function improvements

- CSV adjustments with Output CSV button



Just by ticking these boxes you can generate CSV.files as well as „reports" – either as jpg, pdf or dicom

→ With this function ALL patient data can be exported at once, or one patient can be exported at once.

→ Much smoother for studies or just for patient recording

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CSV Output and report function improvements

- Report function from the measurements are now individual and more reports at once can be retrieved

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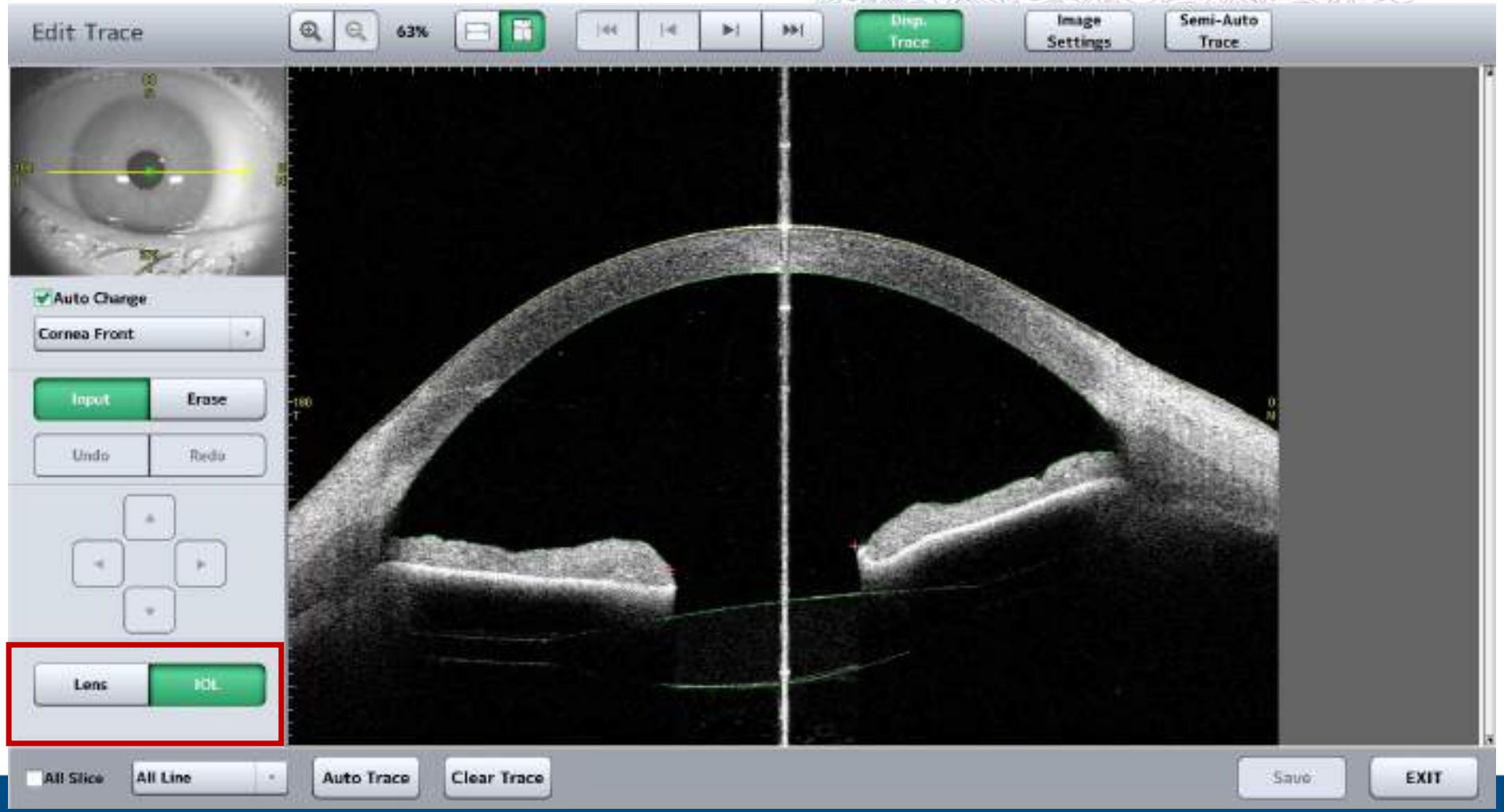
Lens Analysis → Lens and IOL Trace in one screen added

In edit mode the trace of lens can now be easily switched between crystalline lens and IOL



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New parameters displayed in topo

Ver3D

Keratometric		
Ks	45.3 D	@ 96°
Kf	44.5 D	@ 6°
CYL	-0.7 D	@ 6°
AvgK	44.9 D	
AA (10mm)	100.0 %	
ACCP	45.2 D	
Ecc (9.0mm)	0.43	

Posterior		
Ks	-6.3 D	@ 93°
Kf	-6.0 D	@ 3°
CYL	-0.3 D	@ 93°
AvgK	-6.2 D	
AA (10mm)	100.0 %	
Ecc (9.0mm)	0.53	

Real		
Ks	44.2 D	@ 98°
Kf	43.7 D	@ 8°
CYL	-0.5 D	@ 8°
AvgK	44.0 D	
AA (10mm)	100.0 %	
ACCP	44.3 D	

Pachymetry	
Apex	513 um
Thinnest	507 um (0.2 mm, -0.6 mm)
Pupil D	3.25 mm (0.1 mm, 0.1 mm)
ACD [Endo.]	2.85 mm
ESI	0 %

Ver3E

Keratometric		
Ks	45.3 D	@ 96°
Kf	44.5 D	@ 6°
CYL	-0.7 D	@ 6°
AvgK	44.9 D	
KMax(10mm)	47.2 D	
Ecc (9.0mm)	0.43	
ACCP	45.2 D	

Posterior		
Ks	-6.3 D	@ 93°
Kf	-6.0 D	@ 3°
CYL	-0.3 D	@ 93°
AvgK	-6.2 D	
KMax(10mm)	-6.4 D	
ACCP	-6.2 D	

Real		
Ks	44.2 D	@ 98°
Kf	43.7 D	@ 8°
CYL	-0.5 D	@ 8°
AvgK	44.0 D	
HOAs (4mm)	0.39 um	
KMax(10mm)	46.5 D	

Pachymetry	
Apex	513 um
Thinnest	507 um (0.2 mm, -0.6 mm)
Pupil D	3.25 mm (0.1 mm, 0.1 mm)
ACD [Endo.]	2.85 mm
ESI	0 %

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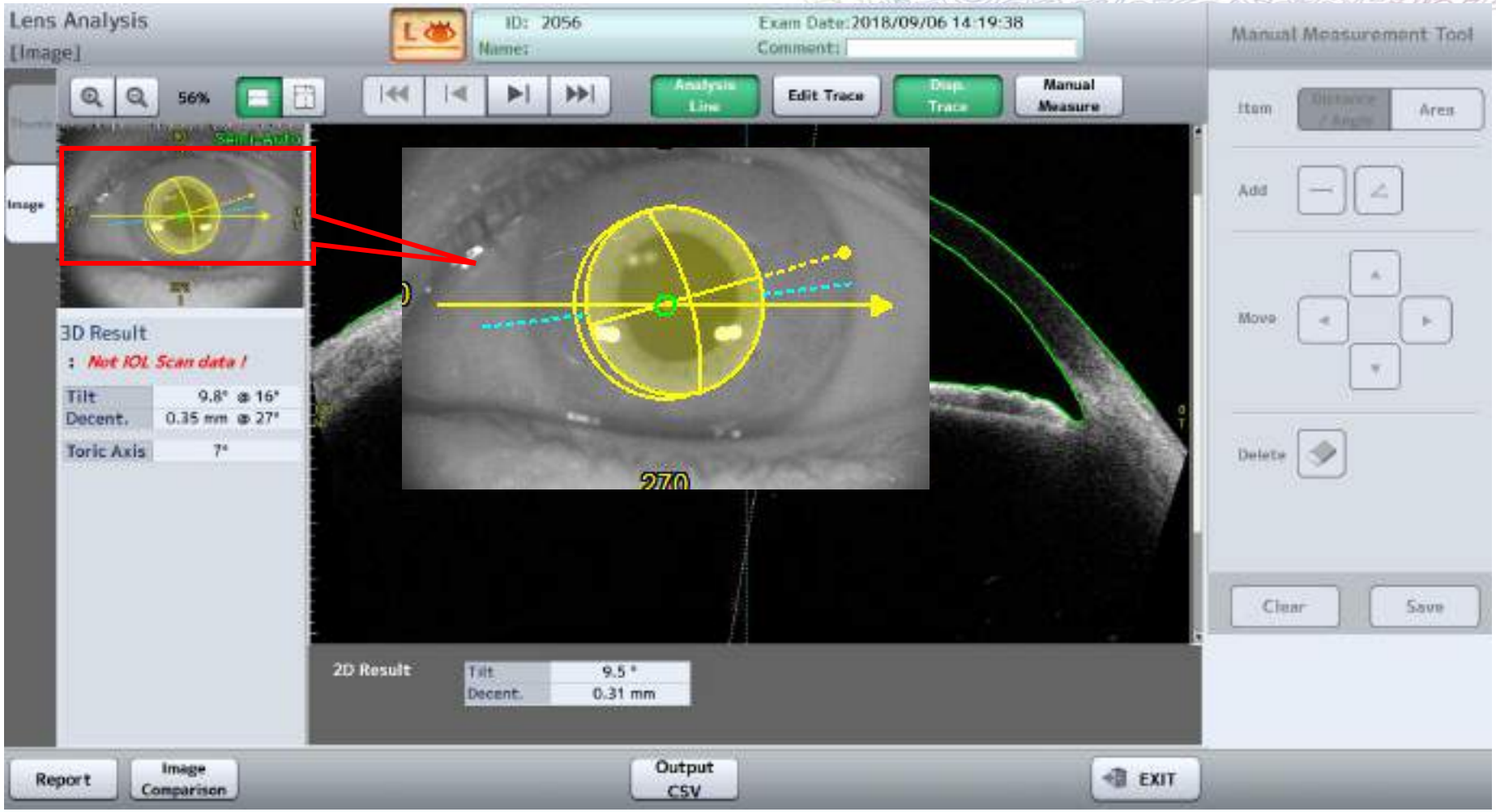
Toric axis marks measured and shown afterwards

- Toric IOL axis shown on Lens Analysis screen → new software coming with Q.S. for improvements



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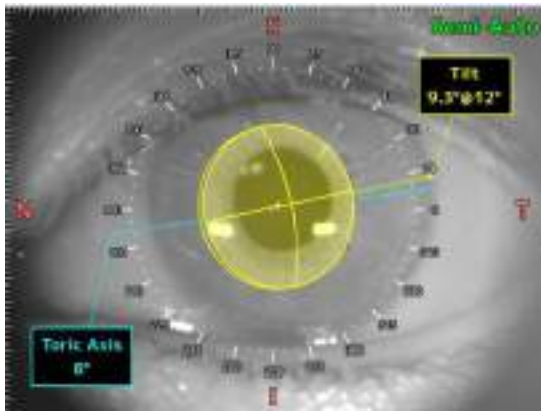
Toric axis marks measured and shown afterwards

- Post Op mode: dark room environment is recommended
- Analysis is done in 4mm → mydriasis is not needed (normally)
- Tolerance (after study from Japan) is around +/- 4° compared to slit image
- Used as a screening tool to determine quickly, if there is a big shift in axis

QS : OK			
Pupil: OK			
Pupil Diameter	: 4.55mm	(≧4.00)	OK
Motion: OK			
Valid averaged images	: 8/8	(≧6)	OK
Valid B-scan images	: 32/32	(≧28)	OK



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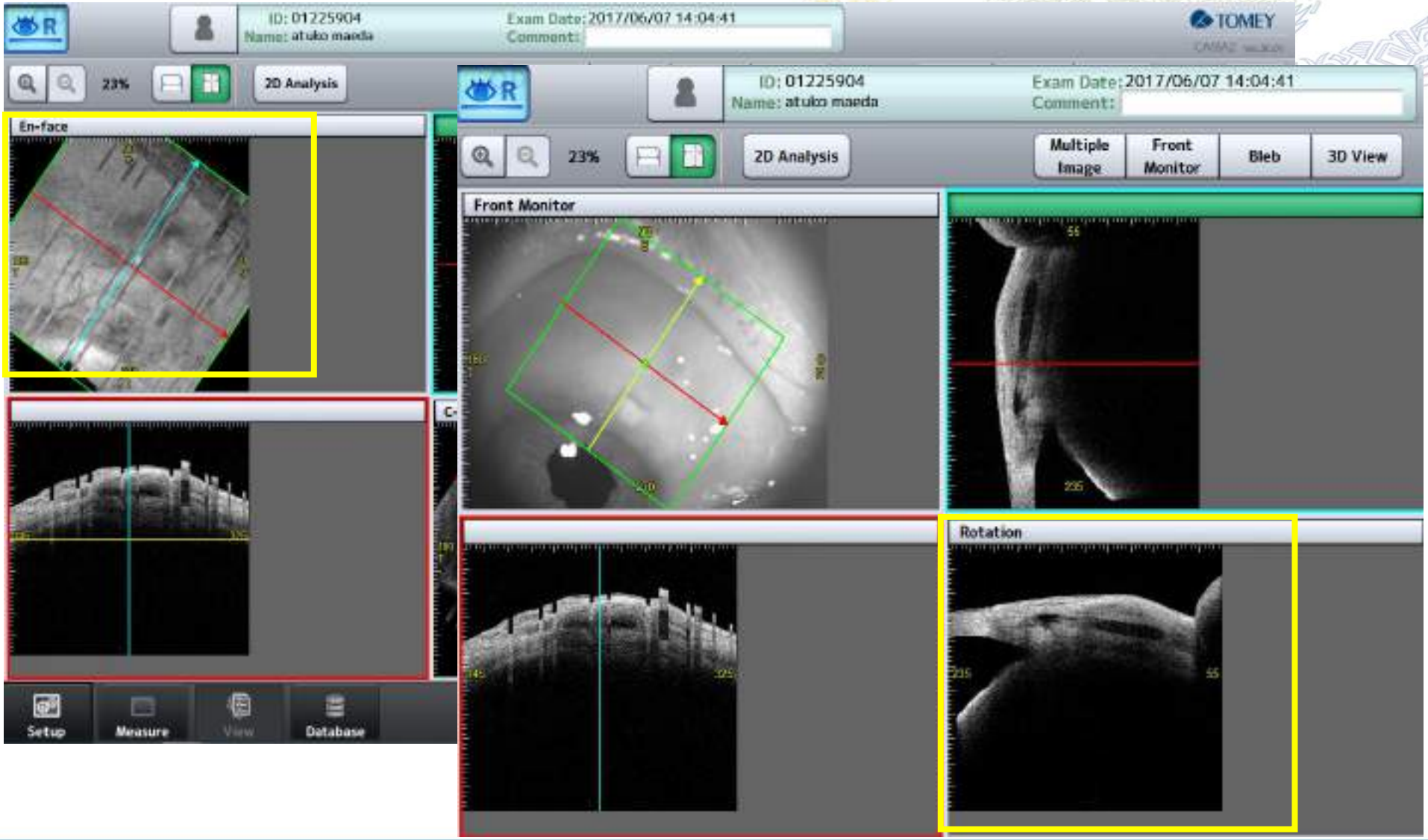
Bleb/Raster Scan → Enface & Rotation



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CASIA2 – Benefits

- Non-invasive and non-contact testing

  ⇒Patient-friendly

- Much faster scanning speed ⇒ Patient-friendly and also Doctor-friendly
- Testing by optometrists

  ⇒Doctor-friendly

- Illustration to patients using images by OCT

  ⇒Greater satisfaction

- Several Indexes

  (angle analysis, ACD, corneal shape)

  ⇒Effective for screening and observation

CASIA2 – Benefits

- 1.3μm wavelength leads to high penetration
  - ⇒Visualize narrow angle clearly
  - ⇒Extract bleb deeply
  - ⇒Deeper scanning penetration
- Several applications for anterior segment
  - ⇒Auto-analysis all around the angle

  (360° with auto SS detection)
  - ⇒Calculation of bleb cubic content
  - ⇒Corneal shape analysis function
  - ⇒Applications for cataract surgery

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CASIA2 – Benefits

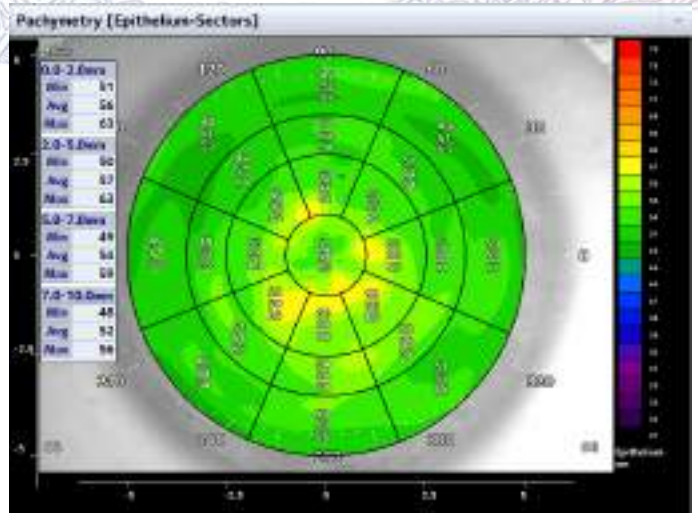
- Contiunous improvement of software
- Nice new plans for CASIA2
- Lots of experience in anterior

Segment OCT

- Viewer Station w/o costs
- Software updates w/o costs
- Perfect local support with our skilled distributors
- Connection to our OA-2000
- Mesurement delegable to nurse or technician because of the EASE of USE

CASIA2 – Future Outlooks

- Epithelium thickness map (in segmentation) coming within 2019
- Licensed DICOM version
- Improved WtW measurement
- ICL nomogram → already released for Asian market since the nomograms were established by two japanese doctors: Dr. Nakamura & Dr. Shimizu



For european validation the device is currently in Madrid with Dr. Felix Gonzalez-Lopez

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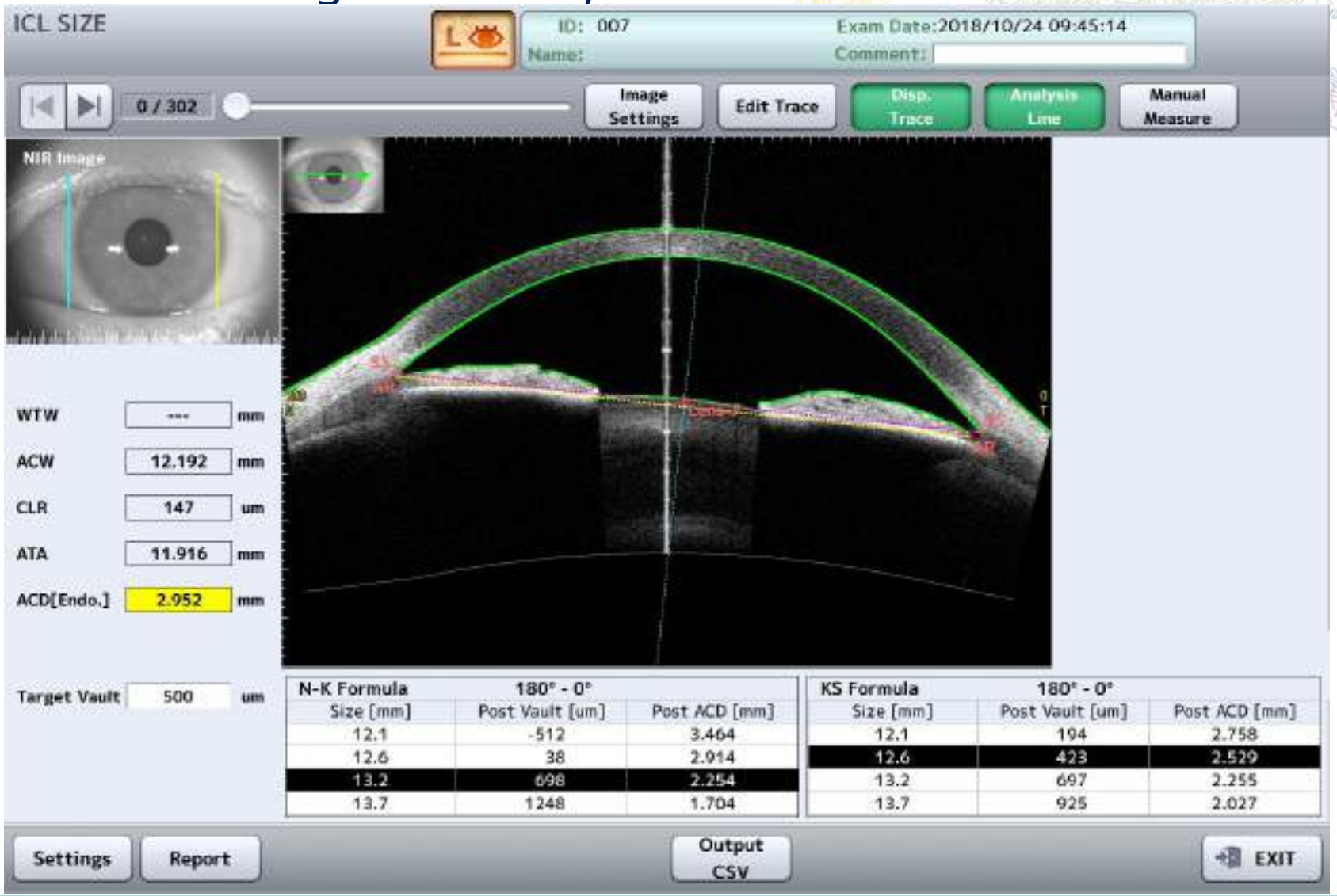
CASIA2 – Future Outlooks

- ICL Sizing software, how it looks like:



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CASIA2 covers everything you need for anterior segment diagnostics

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