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Introduction of Cornea /Anterior Segment OCT CASIA2

Features & Advantages

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- Faster scanning speed (50.000 A-scans/sec), Fourier Domain Swept Source
- Advanced imaging → much wider and much deeper
- High usability due to different perspectives and easier software
- New sales approach → also for cataract
- Higher resolution images
- Complete focus up to 13mm scanning depth!
- New applications for Glaucoma (automatic SS detection and analysation)
- Improvements for toric IOL fitting

Features & Advantages

SKYMED

- Same GUI as OA/EM/UD → easy to handle
- New report function → creates pdf just by one click, also export as pdf, jpg or DICOM
- Numbers of A/B-Scans (pixel) per measurement slices increased from 256 to 800! Much more points → higher resolution!
- Okulix available
- OA-2000 can be connected to software for standard & advanced IOL calculation
- Light source integrated in machine
- Touchscreen PC/Monitor

Advanced imaging

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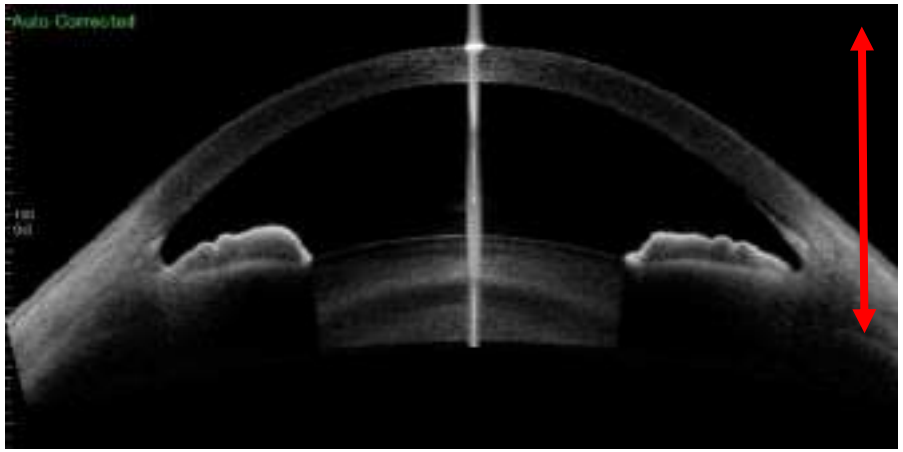
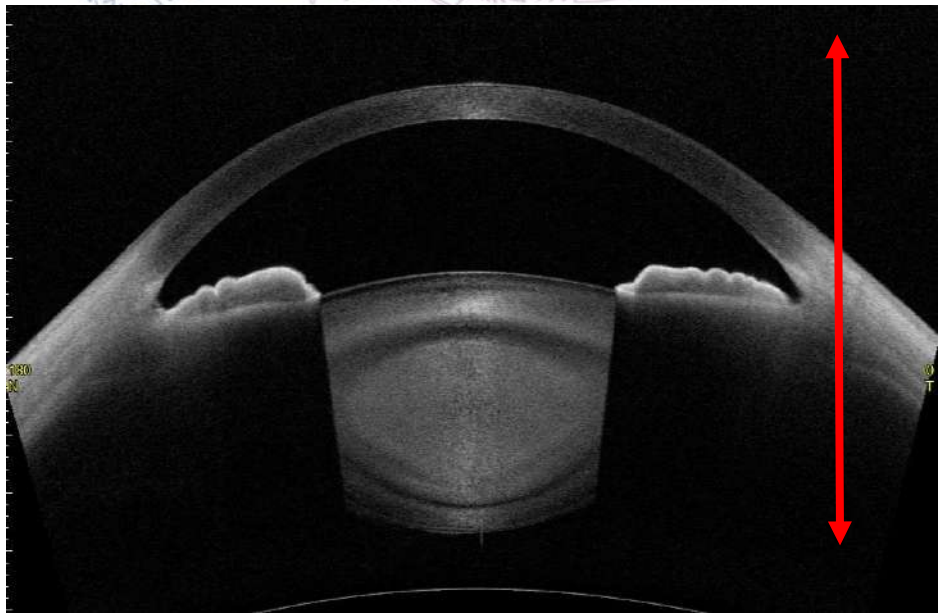
Deeper!

Scan the anterior cornea to posterior lens with just one shot



6mm(SS-1000, CASIA)

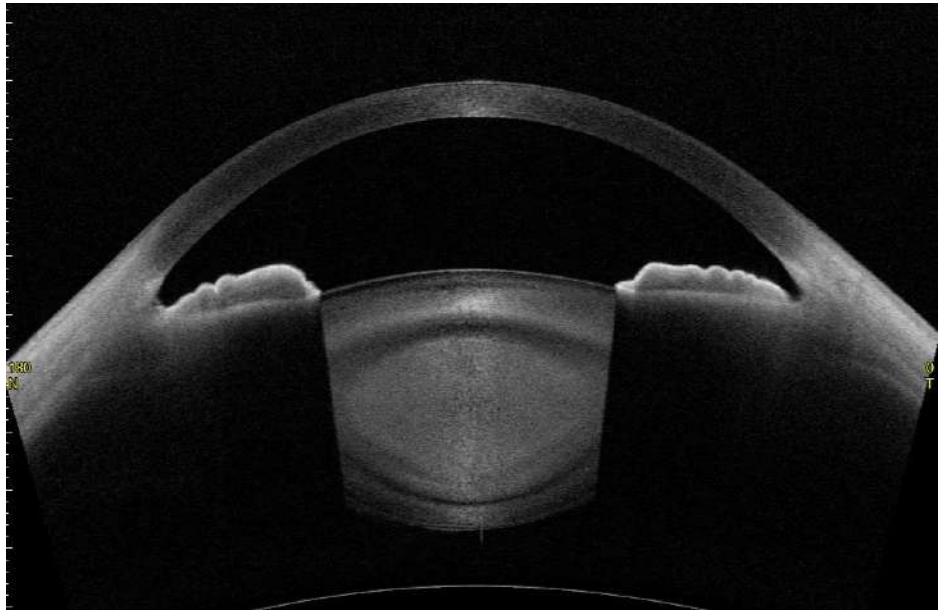


13mm(CASIA2)

We realized higher sensibility towards depth by improving light source of coherency functions

Advanced imaging

With this new capability there is no different focus needed → no positive or negative scan anymore, since we obtain the full area in one shot!
Advantage: all information in one scan type!



Advanced imaging

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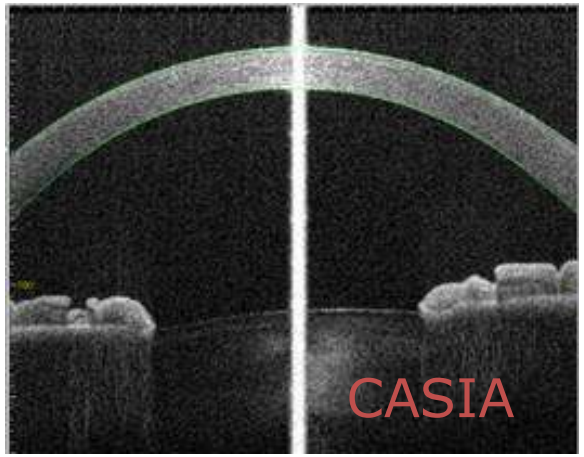
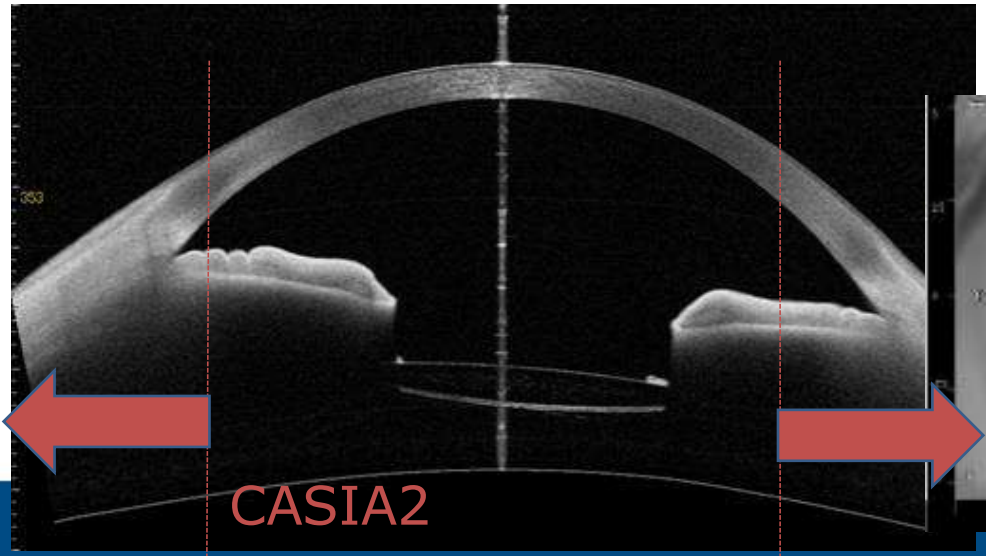
Wider!

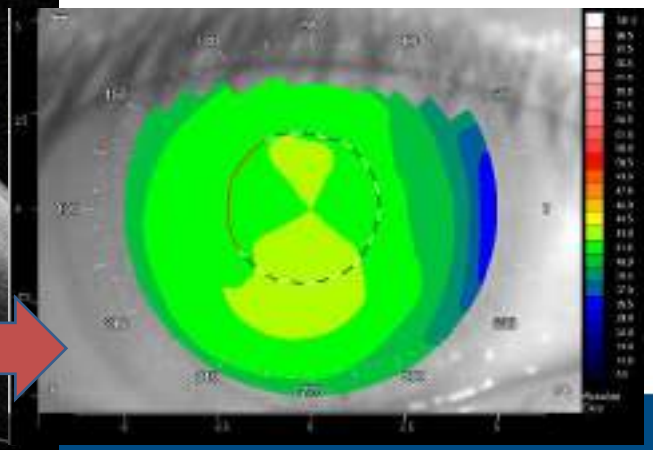


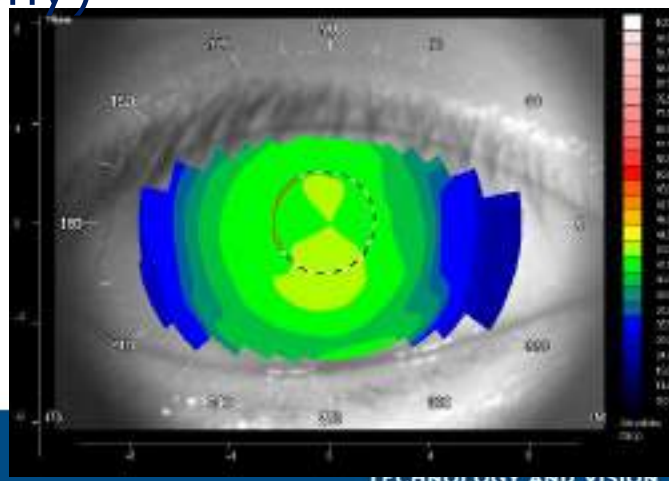
Captures images now around the angle as well in corneal topography mode

Possible to observe corneal topography, angle and IOL without switching measuring modes.



Measurement range: 10㎜→16㎜
(in corneal topography)





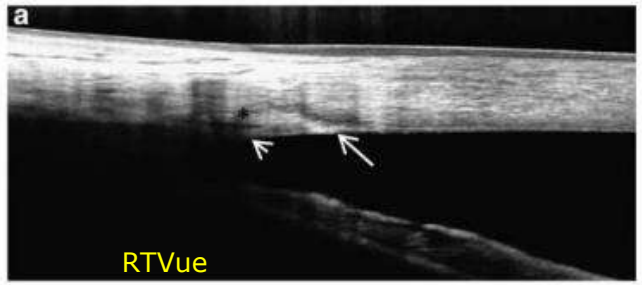
Clear images by near-infrared laser with wavelength of 1.3µm

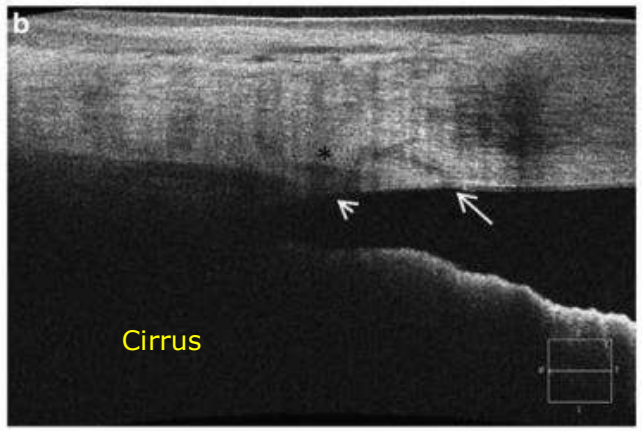
- 1.3µm wavelength laser makes highly sensible anterior segment OCT

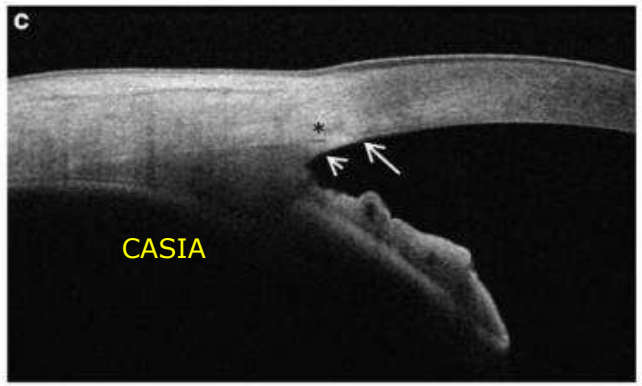
⇨ Longer wavelength leads to higher penetration

⇨ Penetrates even in corneal clouding, sclera and conjunctiva

Already used by CASIA







Anterior chamber angle imaging with OCT
CKS Leung and RN Weinreb
Eye (2011) 25, 261–267

Clinical images

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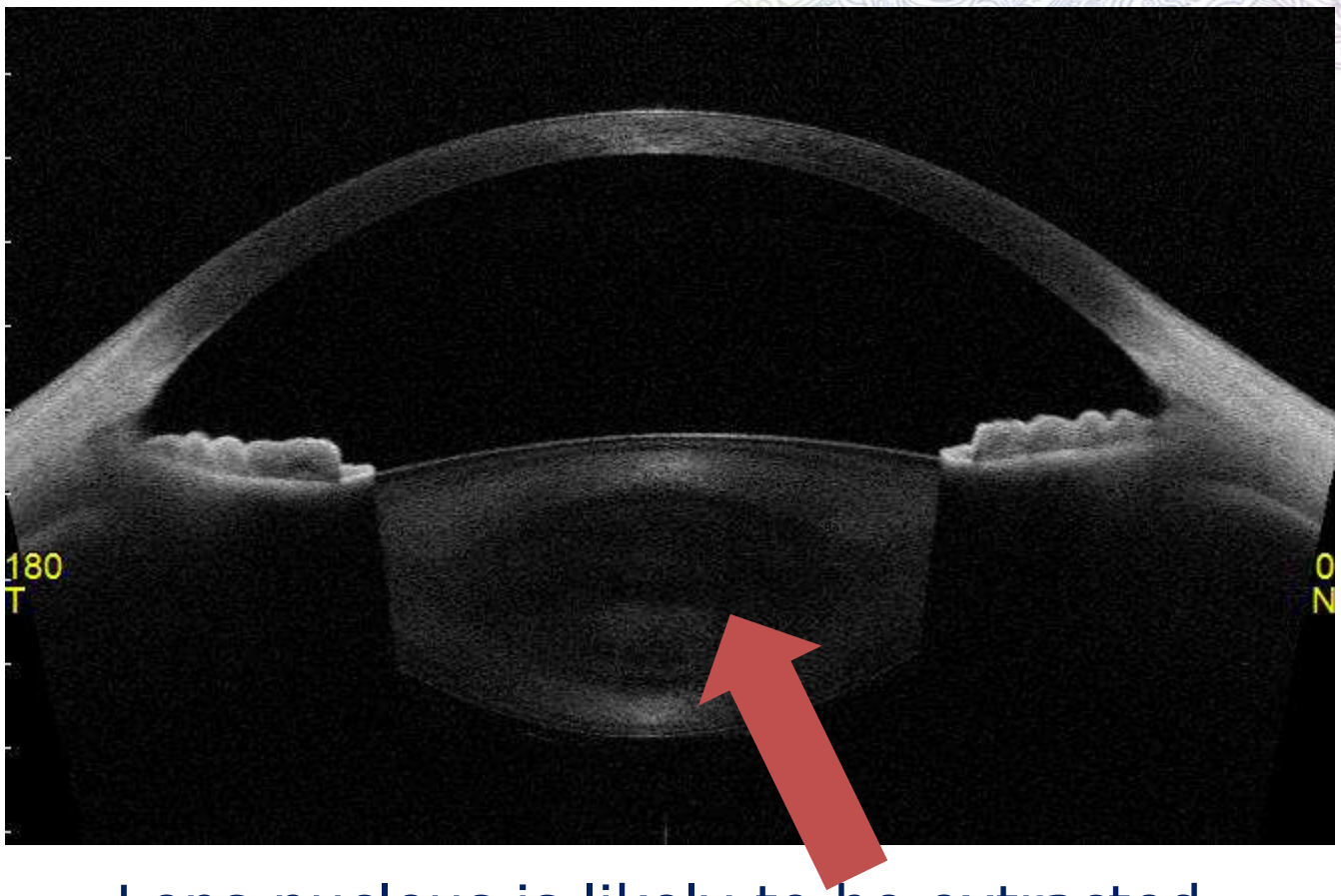
Sample of normal lens

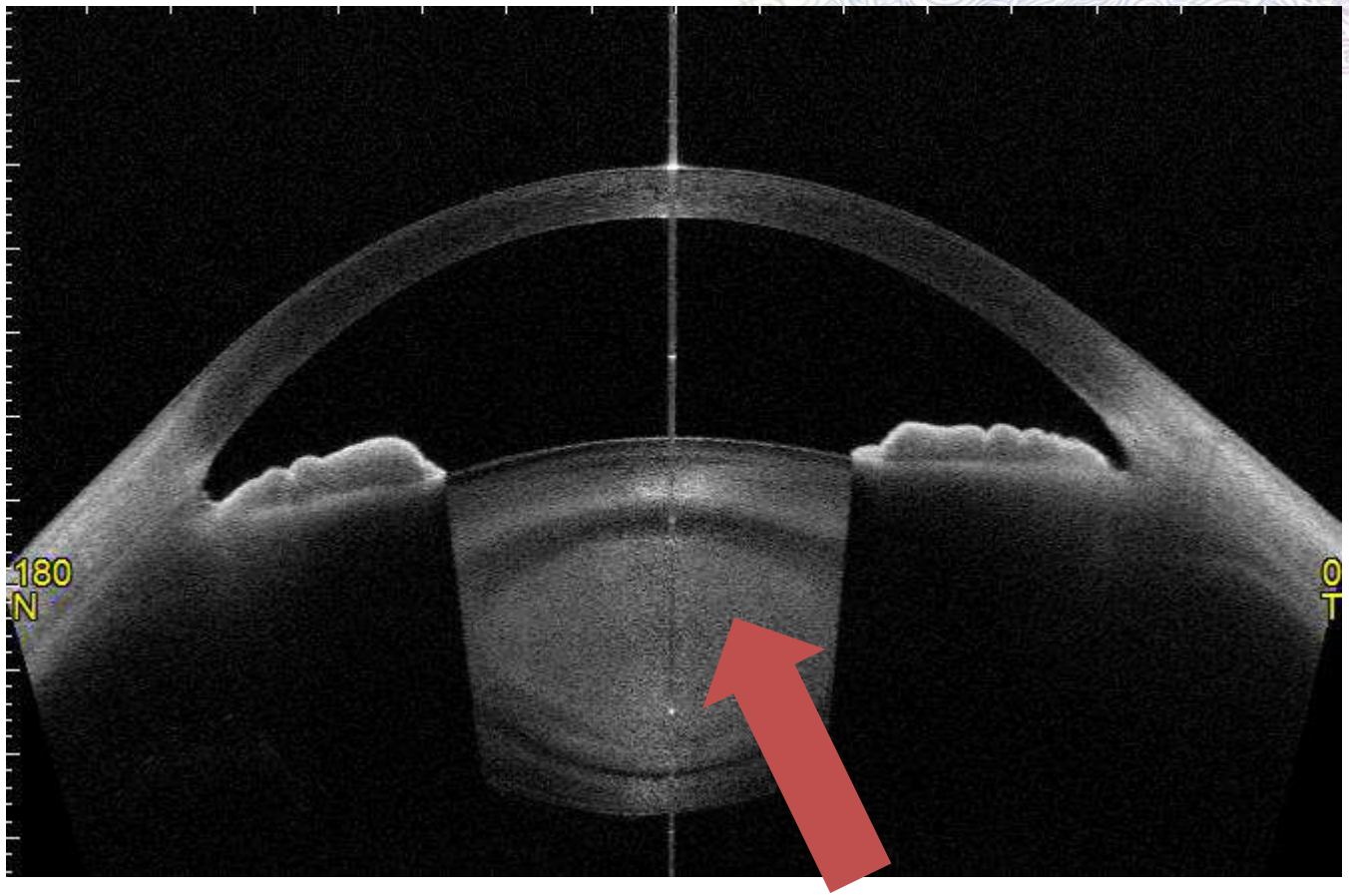


Lens nucleus is likely to be extracted
in a low-luminance state

Clinical images

SKYMED

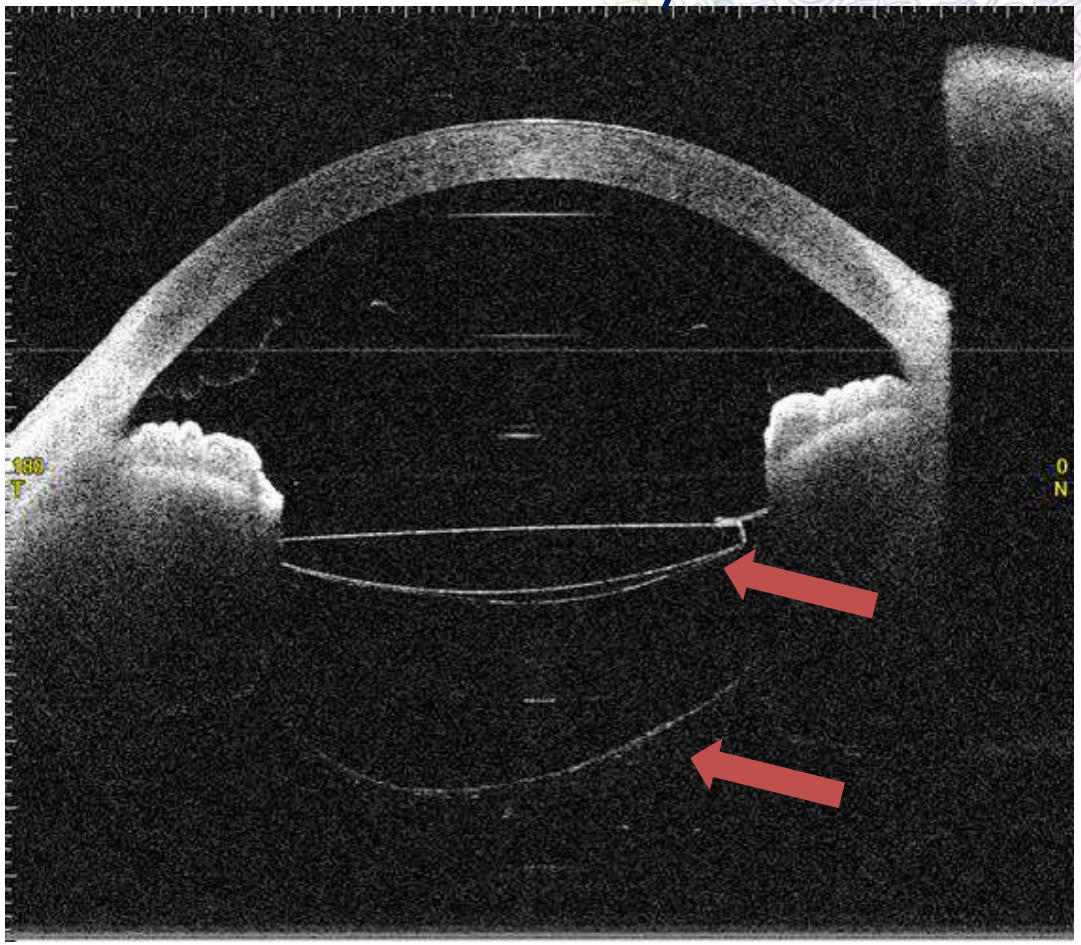
Sample of lens clouding by nuclear cataract



Observe clouding of lens nucleus

Clinical images

Sample of vitreous detachment of IOL inserted eye



Data presented by:
Dr. Yuta Ueno
University of
Tsukuba Hospital

Observe IOL and anterior vitreous detachment

Overview of Scan Types

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CASIA2 Testing Protocol and Scanning Type List (from version 1H)

Category	Testing Protocol Name	Scanning Type	Scanning Method	Scanning Area (mm) φ: diameter B: B Scan Width C: C Scan Width D: depth	A/B Scan (Pixel)	B/C Scan (number of images)	Duration (sec)	Purpose
General	Anterior Segment Screening	Corneal Map	Radial	φ16-D11	800	16	0,3	General
	Option Menu	AS H+V	Cross (H+V)	B16-D11	800	Overlayed Horizontal 8 Images / Vertical 8 Images	0,3	Corneal Shape Analysis Angle Analysis Anterior Chamber Analysis
		AS Global scan	Radial	φ16-D11	800	128	2,4	
Cataract	Pre-op	Lens Biometry	Radial	φ16-D14	800	16	0,3	Testing before Cataract surgery Corneal Shape Analysis Angle Analysis Lens Analysis IOL Choice
		Corneal Map	Radial	φ16-D11	800	16	0,3	
	Option Menu	Vitreous Raster	Raster H (Optional deg)	B12×C12-D14	400	256	2,4	
		AS H+V	Cross (H+V)	B16-D11	800	Overlayed Horizontal 8 Images / Vertical 8 Images	0,3	
		Lens H+V	Cross (H+V)	B16-D14	800	Overlayed Horizontal 8 Images / Vertical 8 Images	0,3	
		AS Global scan	Radial	φ16-D11	800	128	2,4	
		Lens Global scan	Radial	φ16-D14	800	128	2,4	
	Post-op	Corneal Map	Radial	φ16-D11	800	16	0,3	Testing after cataract surgery Corneal Shape Analysis Angle Analysis Observe and analysis IOL condition
	Option Menu	AS H+V	Cross (H+V)	B16-D11	800	Overlayed Horizontal 8 Pictures / Vertical 8 Pictures	0,3	
		Lens H+V	Cross (H+V)	B16-D14	800	Overlayed Horizontal 8 Pictures / Vertical 8 Pictures	0,3	
		AS Global scan	Radial	φ16-D11	800	128	2,4	
		Lens Global scan	Radial	φ16-D14	800	128	2,4	
Glaucoma	Detailed Angle	Global AC Analysis	Radial	φ16-D11	800	128	2,4	Glaucoma Narrow Angle Analysis Angle-closure Analysis
	Option Menu	Angle Analysis	Radial	φ16-D11	800	16	0,3	
		AS H+V	Cross (H+V)	B16-D11	800	Overlayed Horizontal 8 Images / Vertical 8 Images	0,3	
		AngleHD_N	Raster H (0 deg)	B8×C4-D11	800	64	1,2	
		AngleHD_T	Raster H (0 deg)	B8×C4-D11	800	64	1,2	
		AngleHD_S	Raster H (90 deg)	B8×C4-D11	800	64	1,2	
		AngleHD_I	Raster H (90 deg)	B8×C4-D11	800	64	1,2	
	Bleb	Bleb Raster	Raster H (Optional deg)	B12×C12-D11	400	256	2,4	Glaucoma Observe bleb condition
Custom	Optional naming	AS Single	Raster H (Voluntary deg)	B16-D11	800	Overlayed Horizontal 16 Images	0,3	Observe between cornea and anterior lens
		Lens Single	Raster H (Voluntary deg)	B16-D14	800	Overlayed Horizontal 16 Images	0,3	Observe between cornea and posterior lens
		AS Movie	Cross (H+V)	B16-D11	800	0	-	Observe between Iris and anterior lens by movie
		Lens Movie	Cross (H+V)	B16-D14	800	0	-	Observe all around lens by movie

Scanning type differs but scanning method is same.
CASIA2 obtains 8 images simultaneously.
CASIA2 obtains 16 images simultaneously.

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Overview of Scan Types

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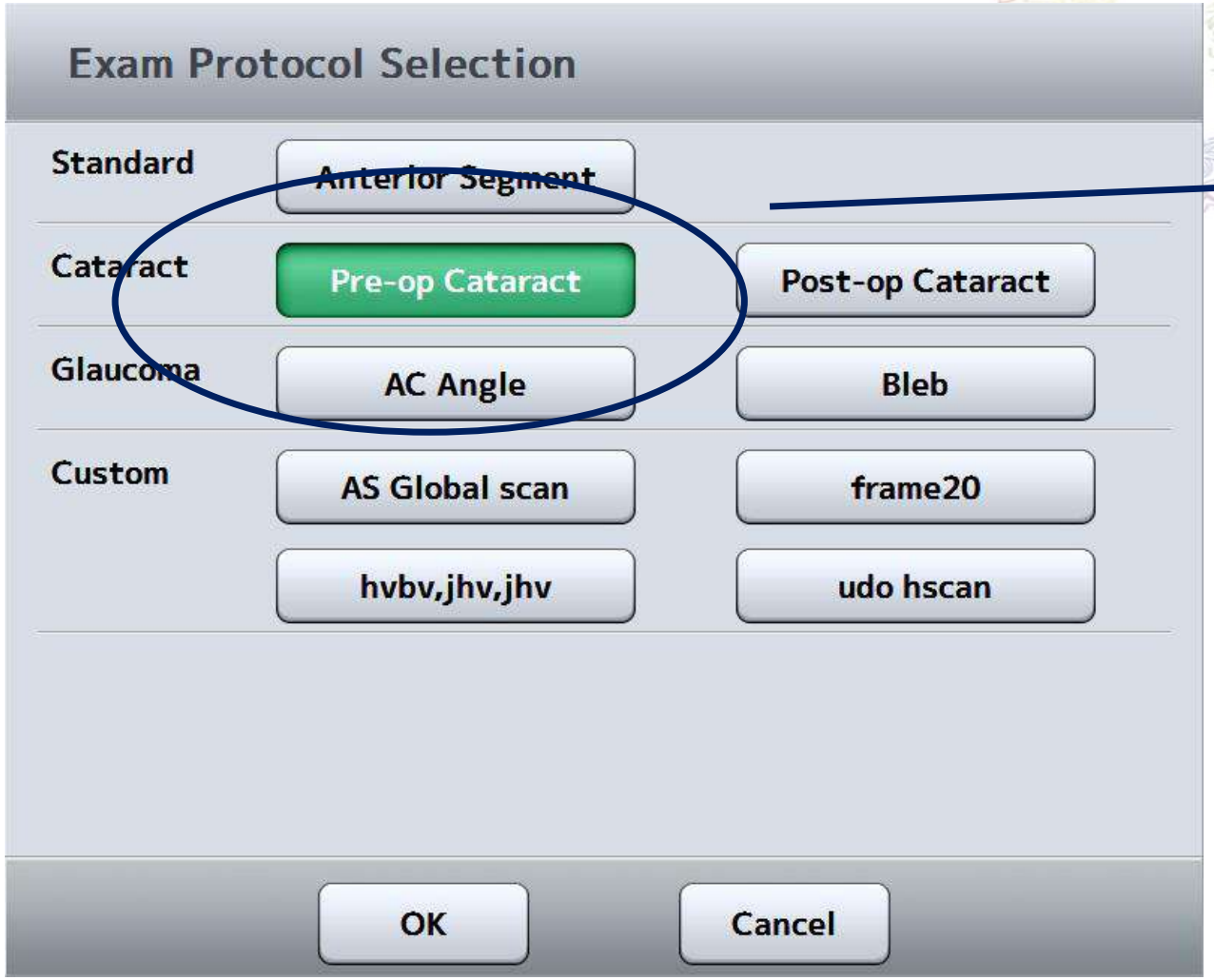

Overview of Scan Types

- What is new?
- → if we scan in one direction only as: H&V, then CASIA2 takes 8 images in 0.3 seconds and overlays them in order to validate data!
- Standard anterior segment screening only with 16 scans → time only 0.3 seconds
- For more scans in one exam you need to choose “AS Global Scan” exam protocol

CASIA2 – Medical Condition & Testing Protocol

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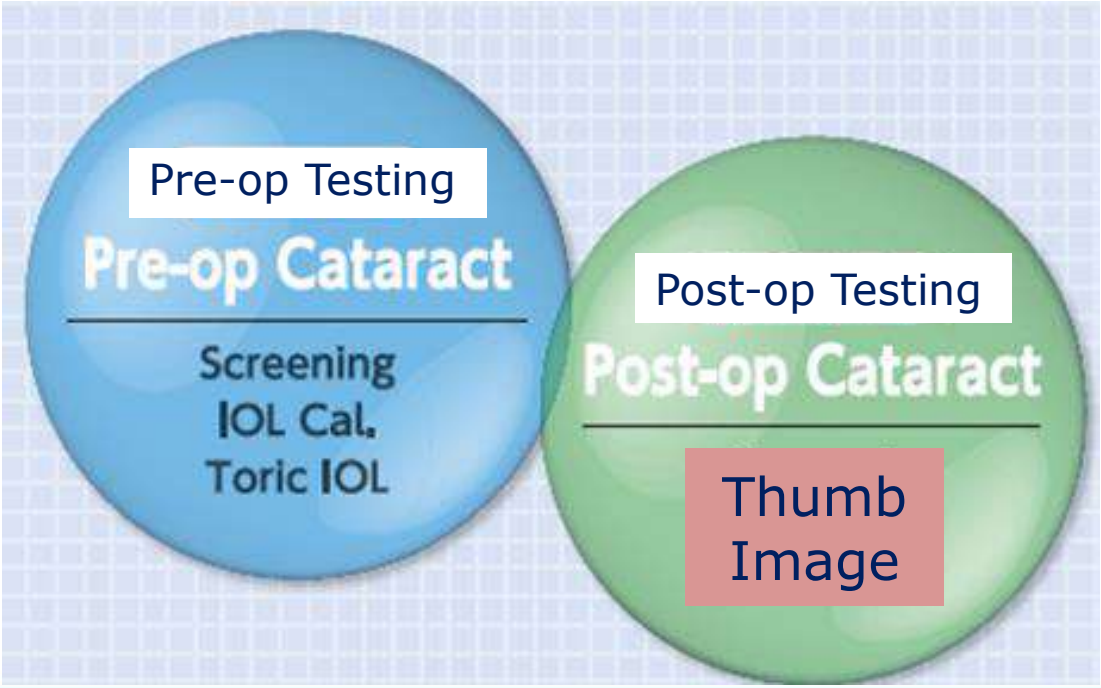
Medical Condition	Exam Protocol
Corneal diseases Angle observation	Anterior segment screening
Cataract	Pre-op testing Post-op testing
Glaucoma	Anterior segment screening Detailed angle testing Bleb testing

Applications also for cataract surgery

Testing application for cataract surgery: CICS

CICS stands for **CASIA IOL Cataract Surgery**

Analysis application of Pre-op & Post-op testing
for supporting cataract surgery efficiently



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Application – for Cataract

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Testing before cataract surgery

Measurement: 1. Lens Biometry 1x measurement
2. Corneal Map 3x measurements

Purpose: 1. Anterior segment capturing from cornea to posterior lens
2. Measure corneal refractive power for IOL power calc. and corneal shape analysis

Testing after cataract surgery

Measurement: Corneal Map 1x measurement

Purpose: 1. Analyze corneal shape and tilt of IOL, decentration after surgery
2. Changes of expansion degree of angle

Applications – for cataract surgery

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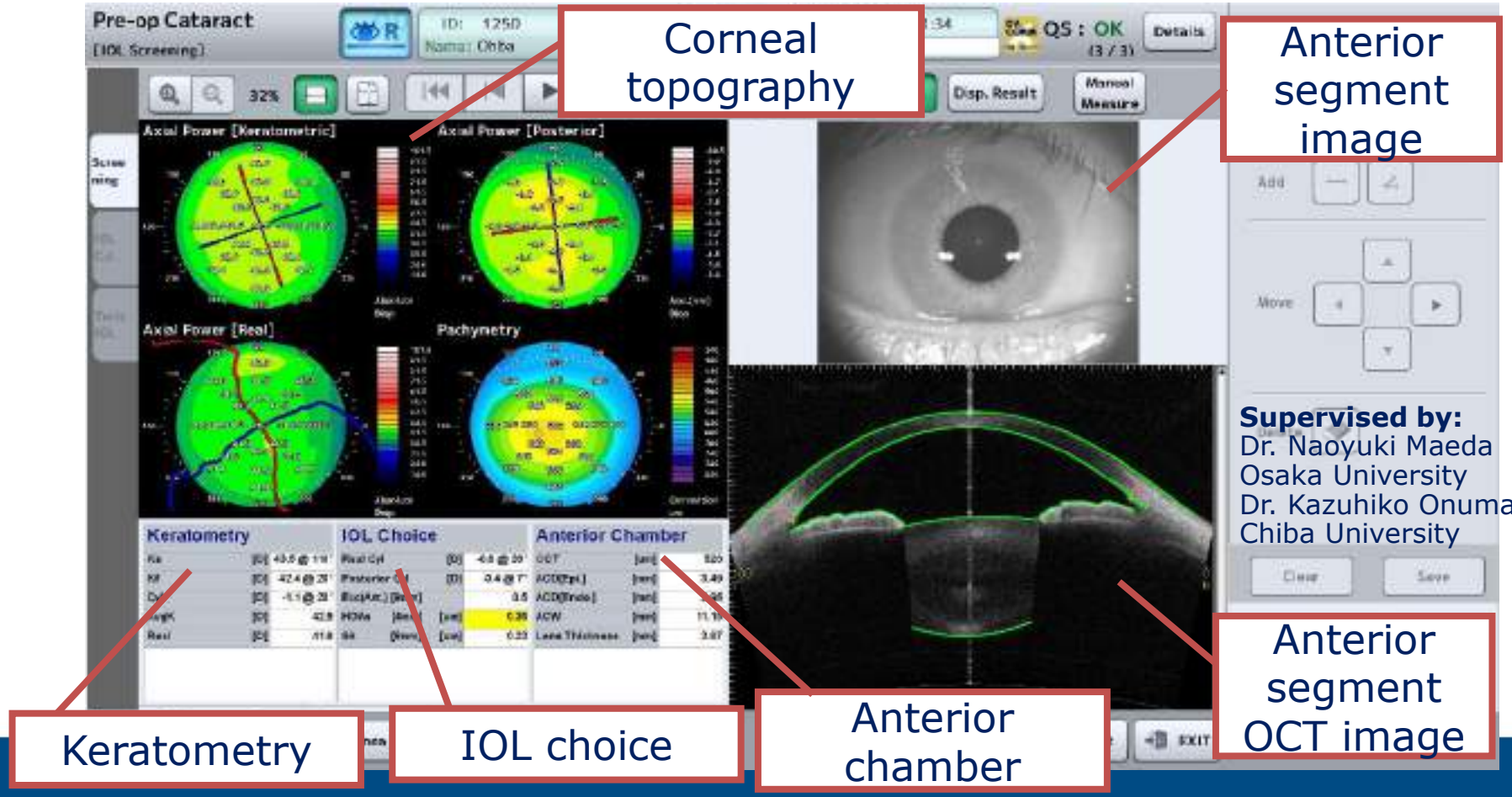
Pre-op Testing: Screening function

- Application to evaluate premium IOL (Toric IOL and multi-focal IOL)
- Possible to select appropriate lens for a patient



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Pre-op Testing

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Lens shape analysis

- Automatically measures radius of curvature, lens thickness and tilt of lens (in respective to the visual axis)

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Pre-op Testing: IOL Cal. function and combination with the OA-2000

- Connect our new CASIA2 to our Optical Biometer OA-2000
- Automatically obtain axial length value and corneal refractive power
- Compare power calculation and several calculation methods including premium IOL with Okulix or other Raytracing formulas

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Applications – for cataract surgery

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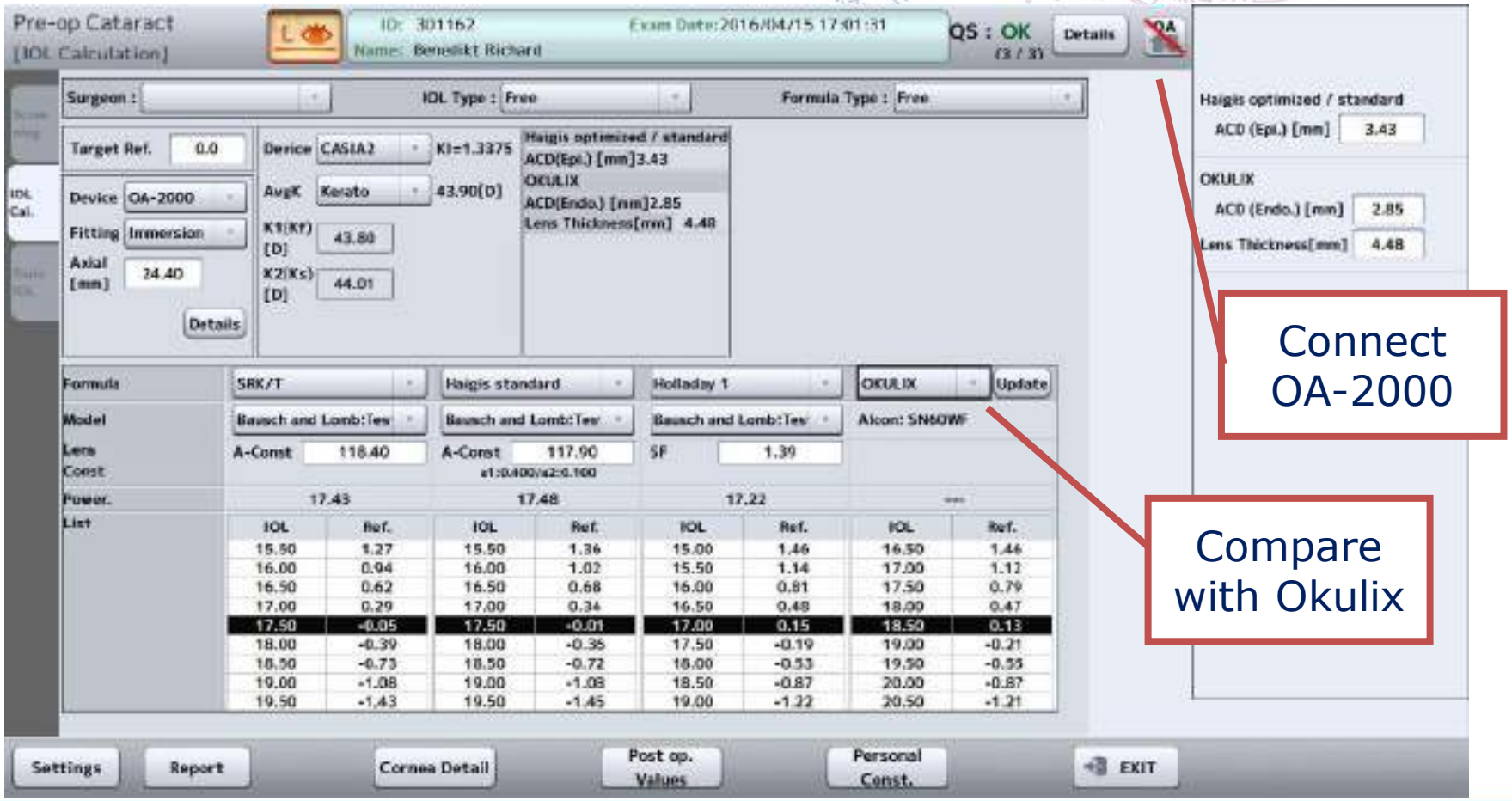
IOL Calculation

- IOL calc. with standard formulas & Okulix
- connect our OA-2000 to import axial length data or input manually



Applications – for cataract surgery

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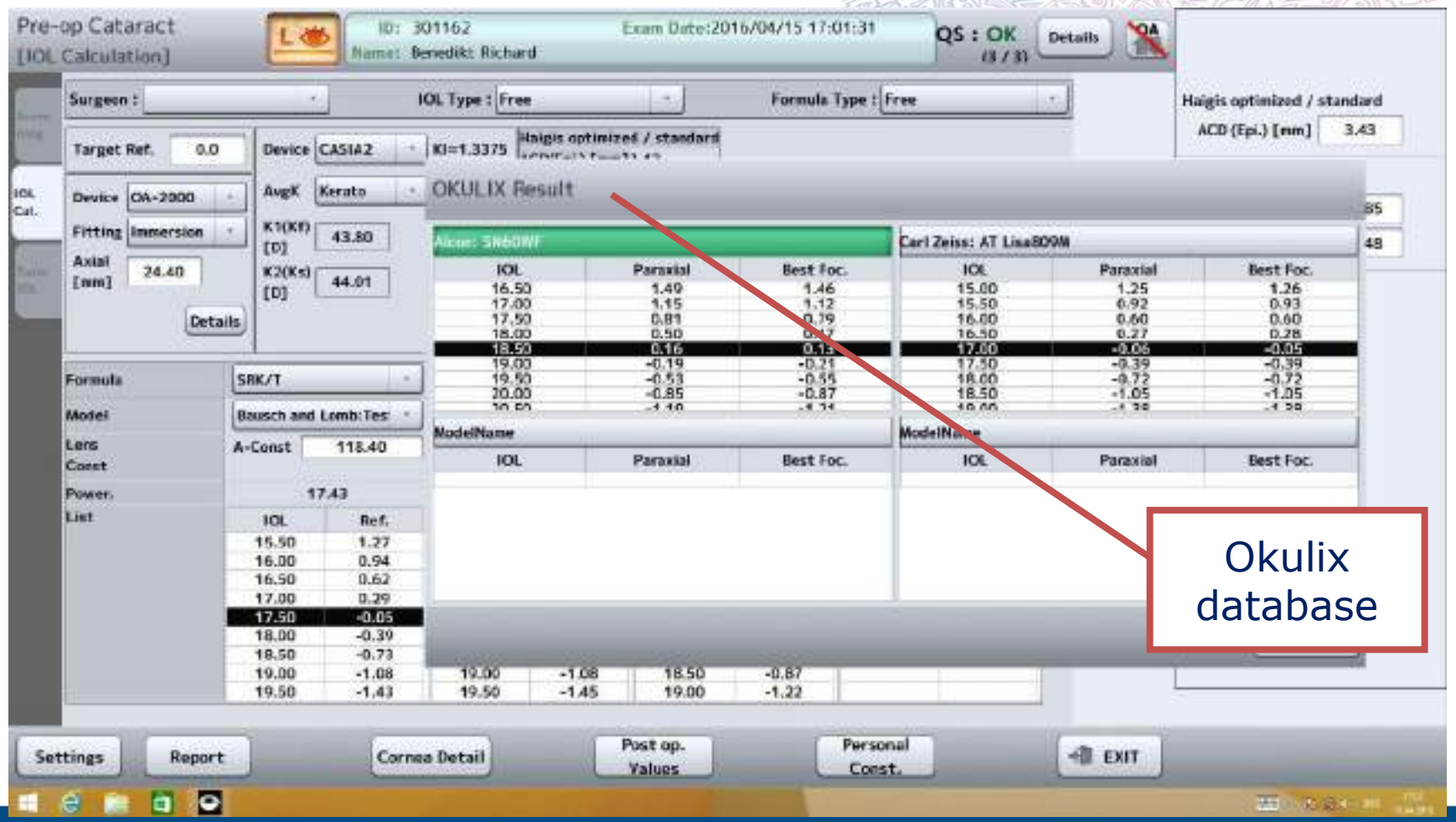
IOL Calculation

- use Okulix as your favourite IOL tool



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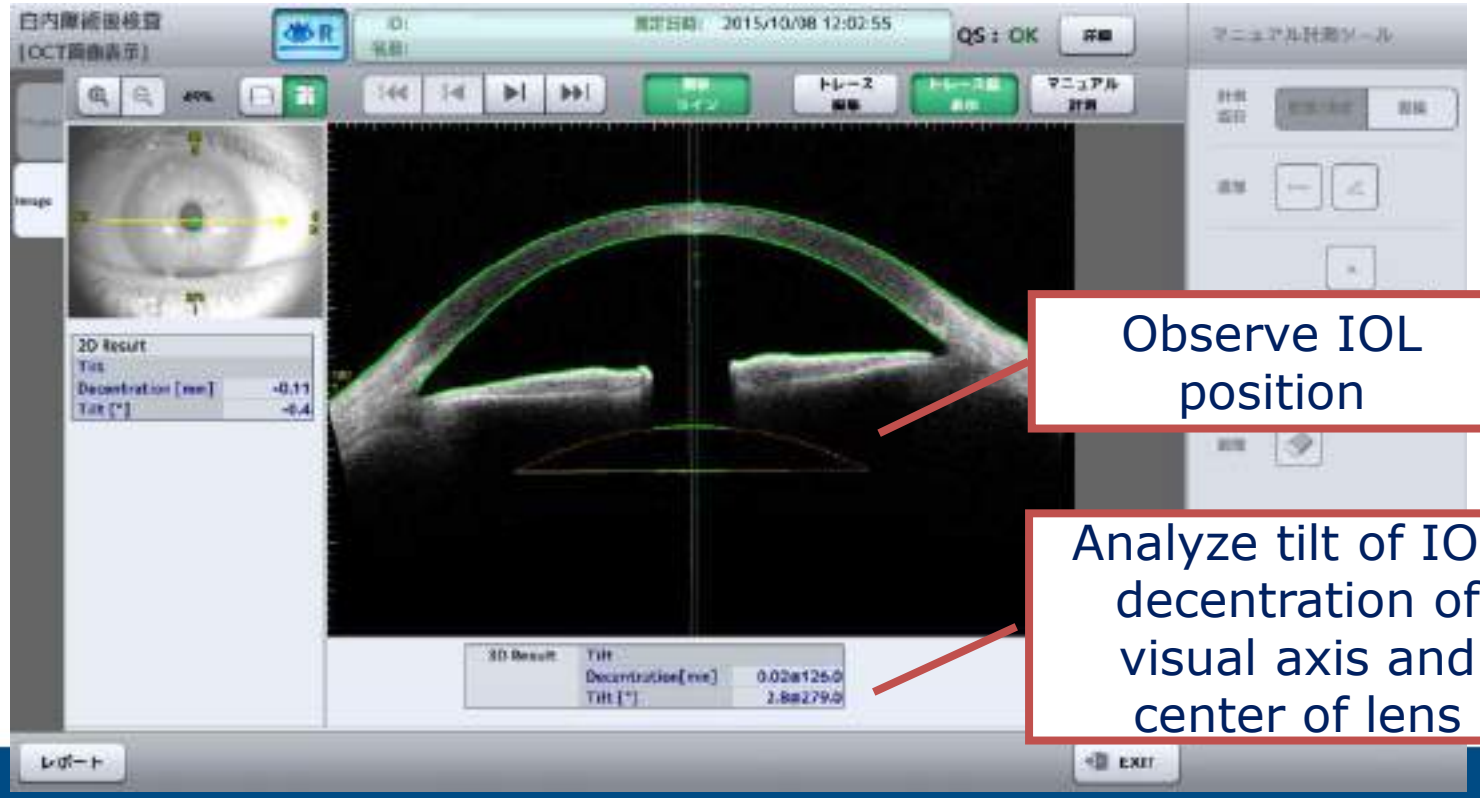
Applications – after cataract surgery

Display tilt and decentration of IOL

- Observe IOL conditions after cataract surgery
- Quantitative analysis: tilt of lens & distance between visual axis and center of lens

(especially effective for sewn cases)



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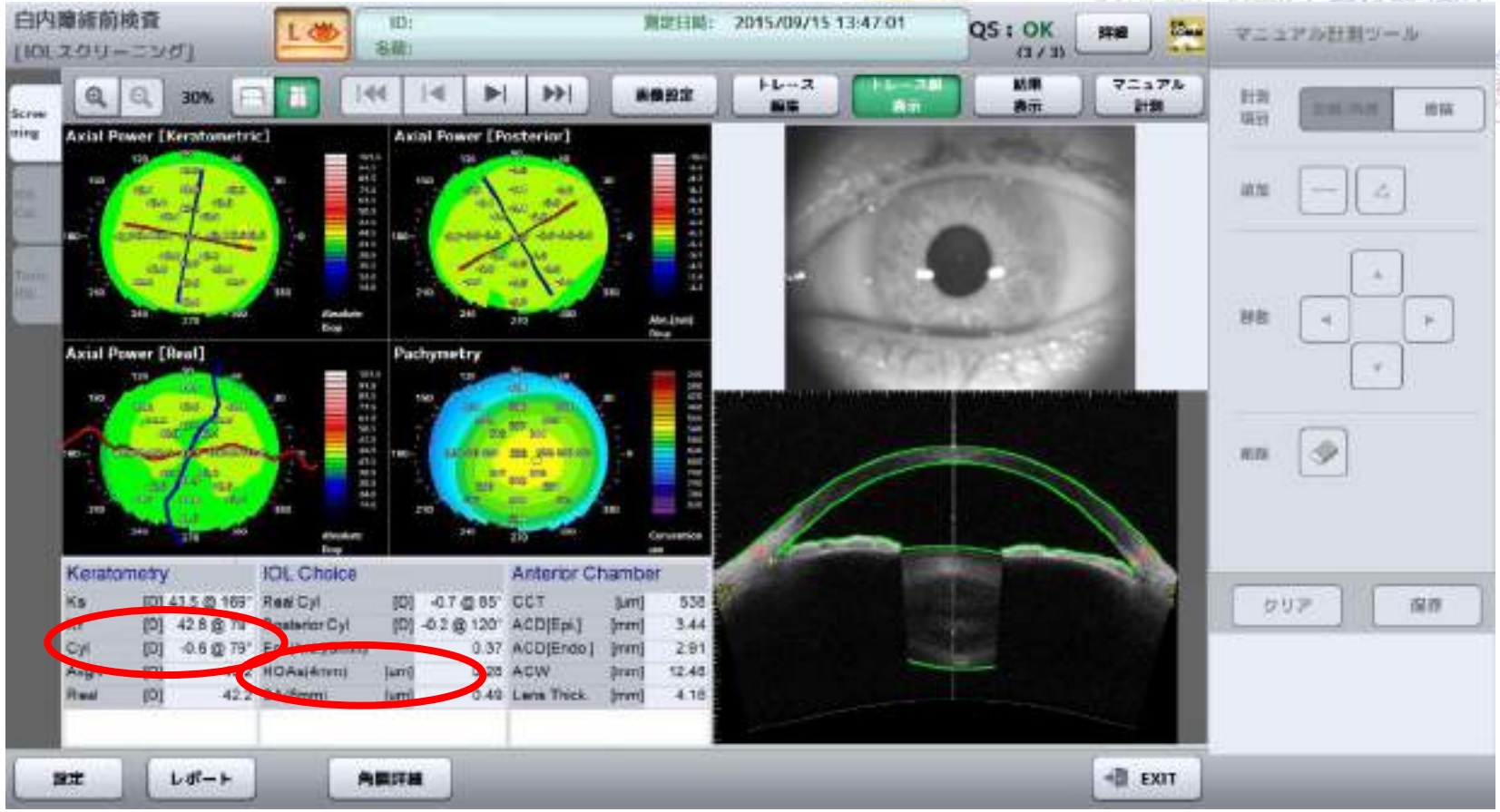
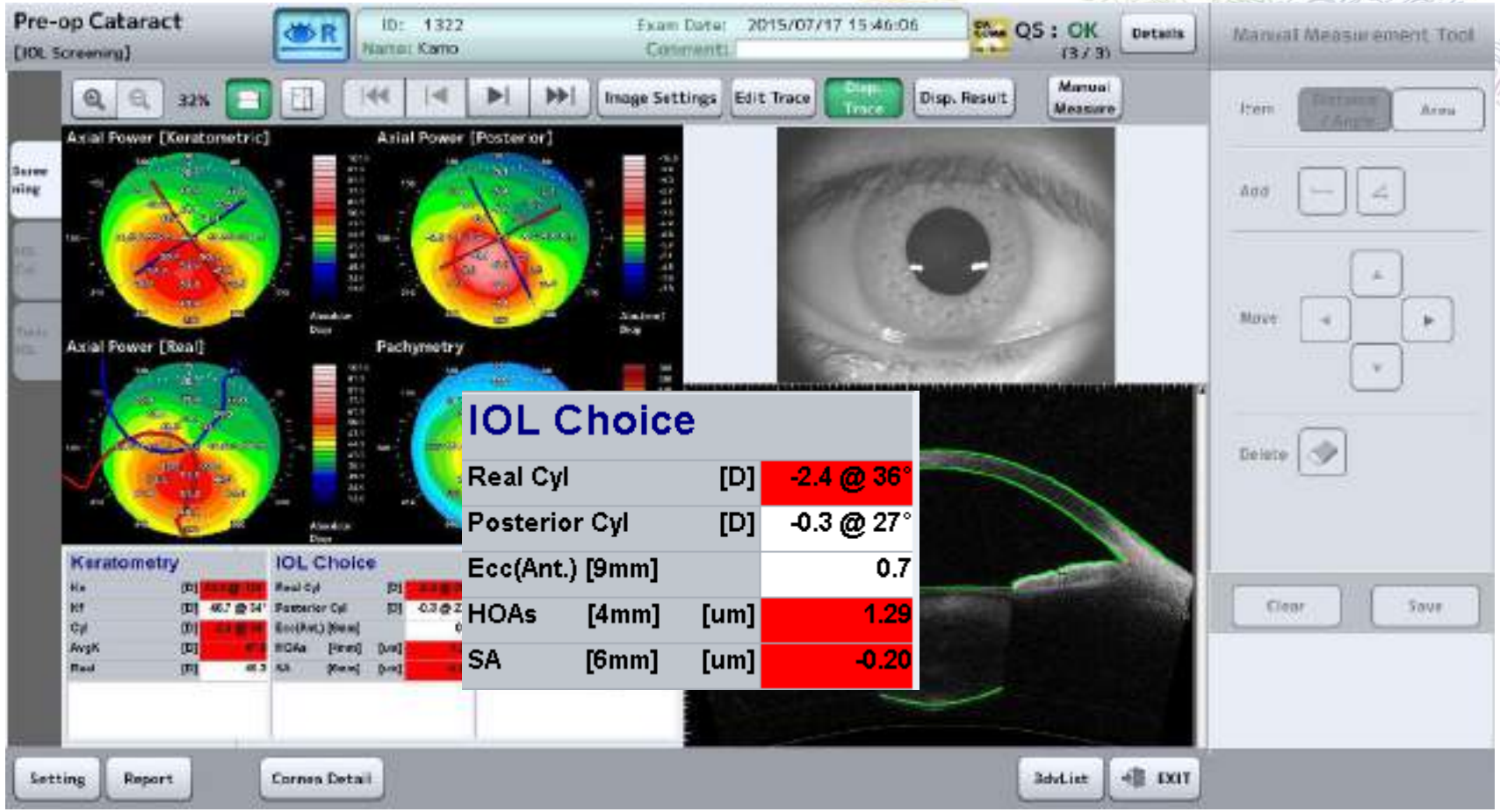
Pre-op Testing:
Sample of Screening function



Low values of CYL and HOAs (higher order abberations)
→ Multifocal IOL is applicable (e.g. normal eye)

Pre-op Testing:
Sample of Screening function



High values of HOAs and SA (spherical abberration)
→Premium IOL is not available (e.g. Keratoconus)

Pre-op Testing

Toric IOL function

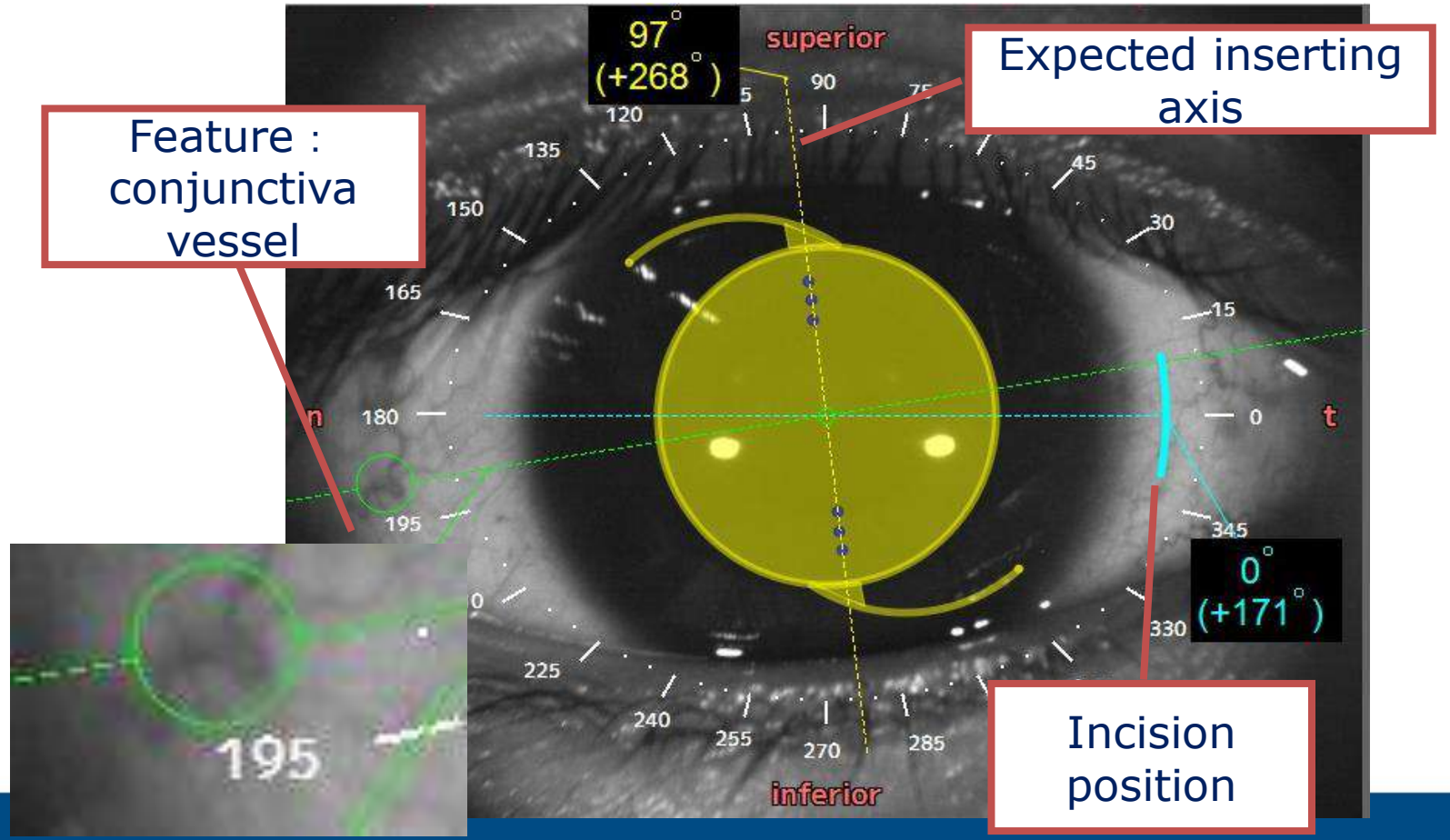
・Application to determine astigmatism power and model of IOL

・Calculation without using calculator on the web

Pre-op Testing

Axis Registration

- Display sample axis featuring standard position of ink and vessel
- Display incision position and expected inserted axis



Application – Corneal topography

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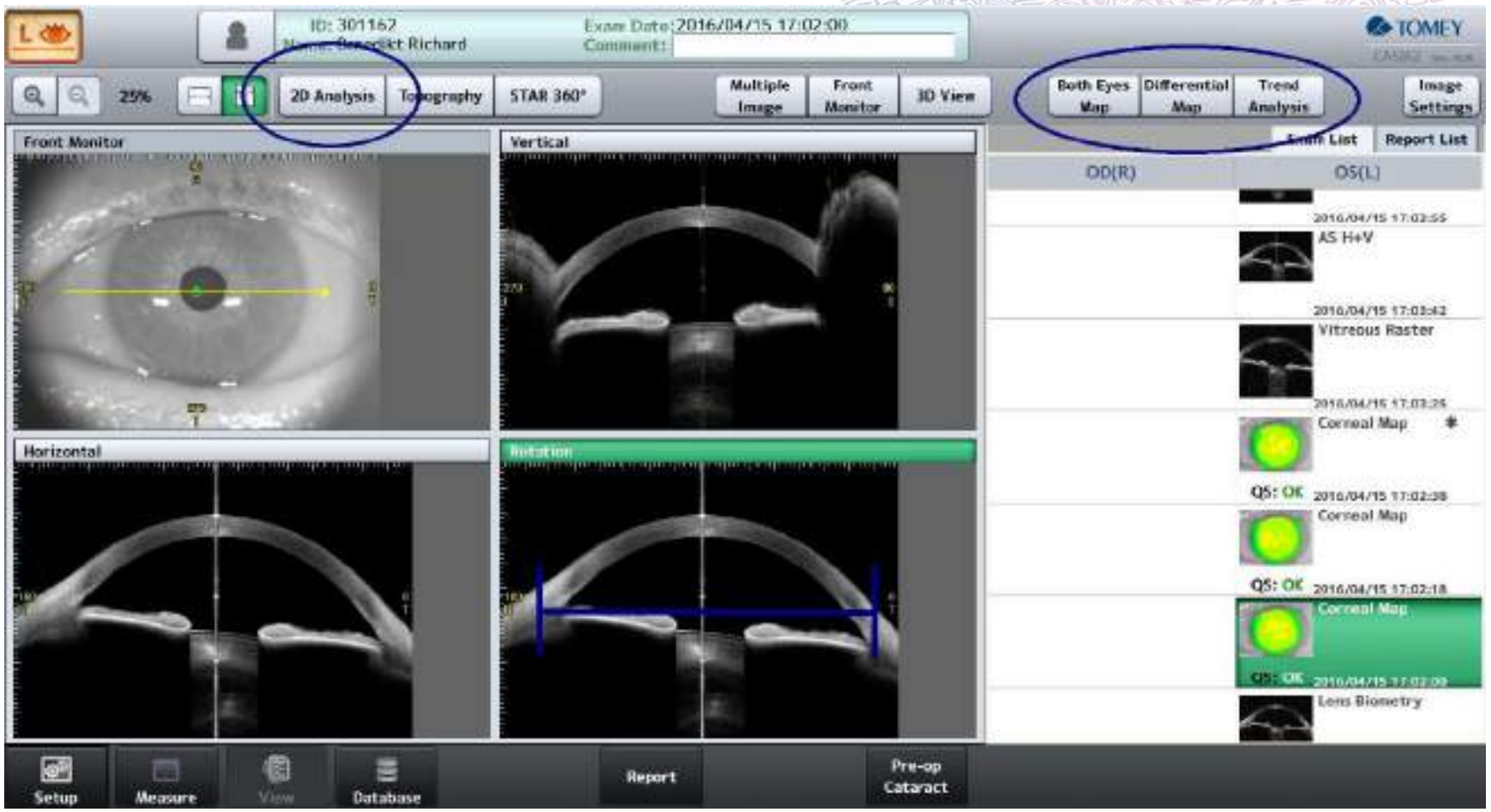
Topo mode: wider area (also 16mm) →
2D Analysis also for angle calculation!



Application – Corneal topography

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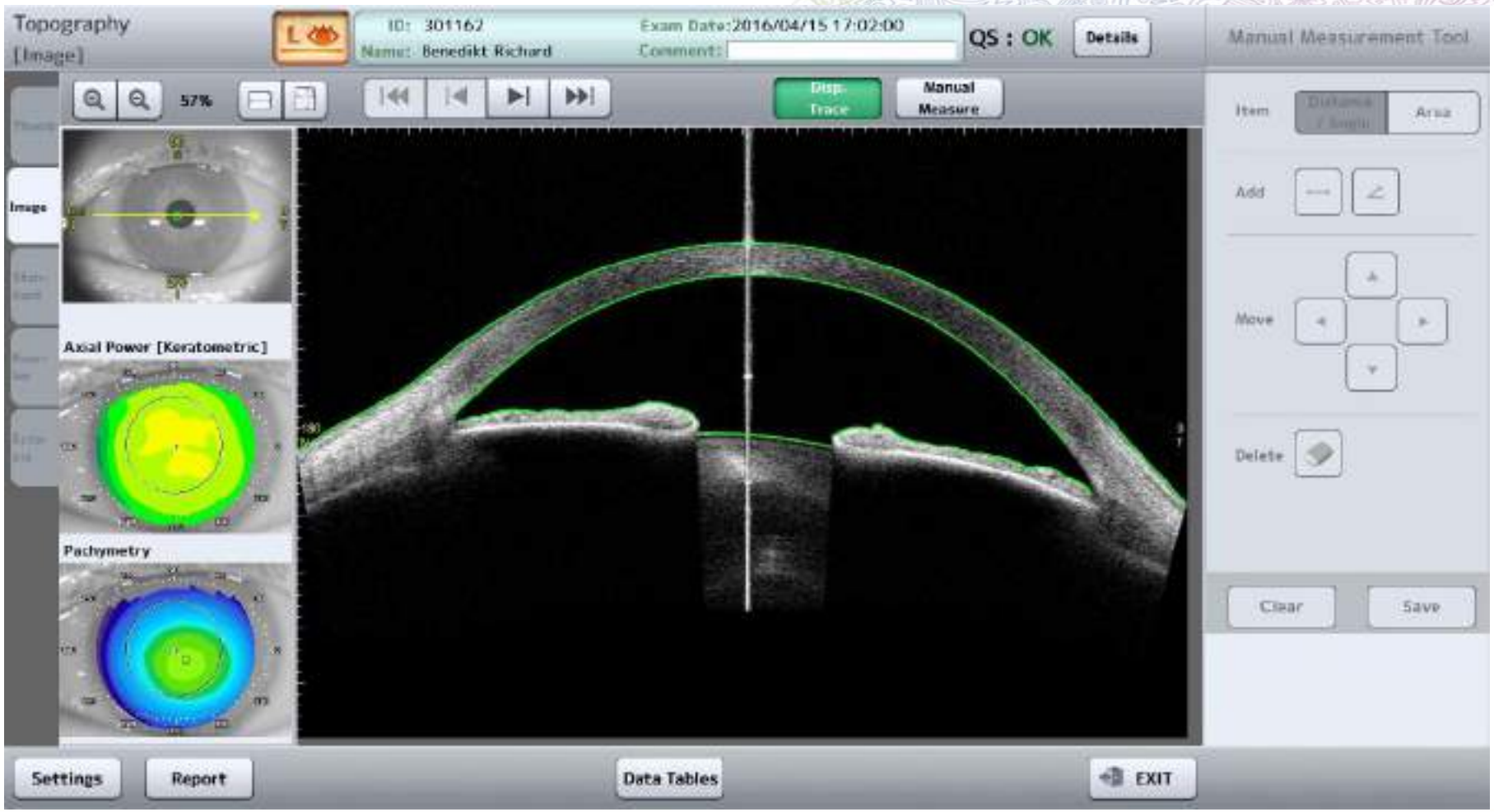
Topography Analysis also with 16 scans



Application – Corneal topography

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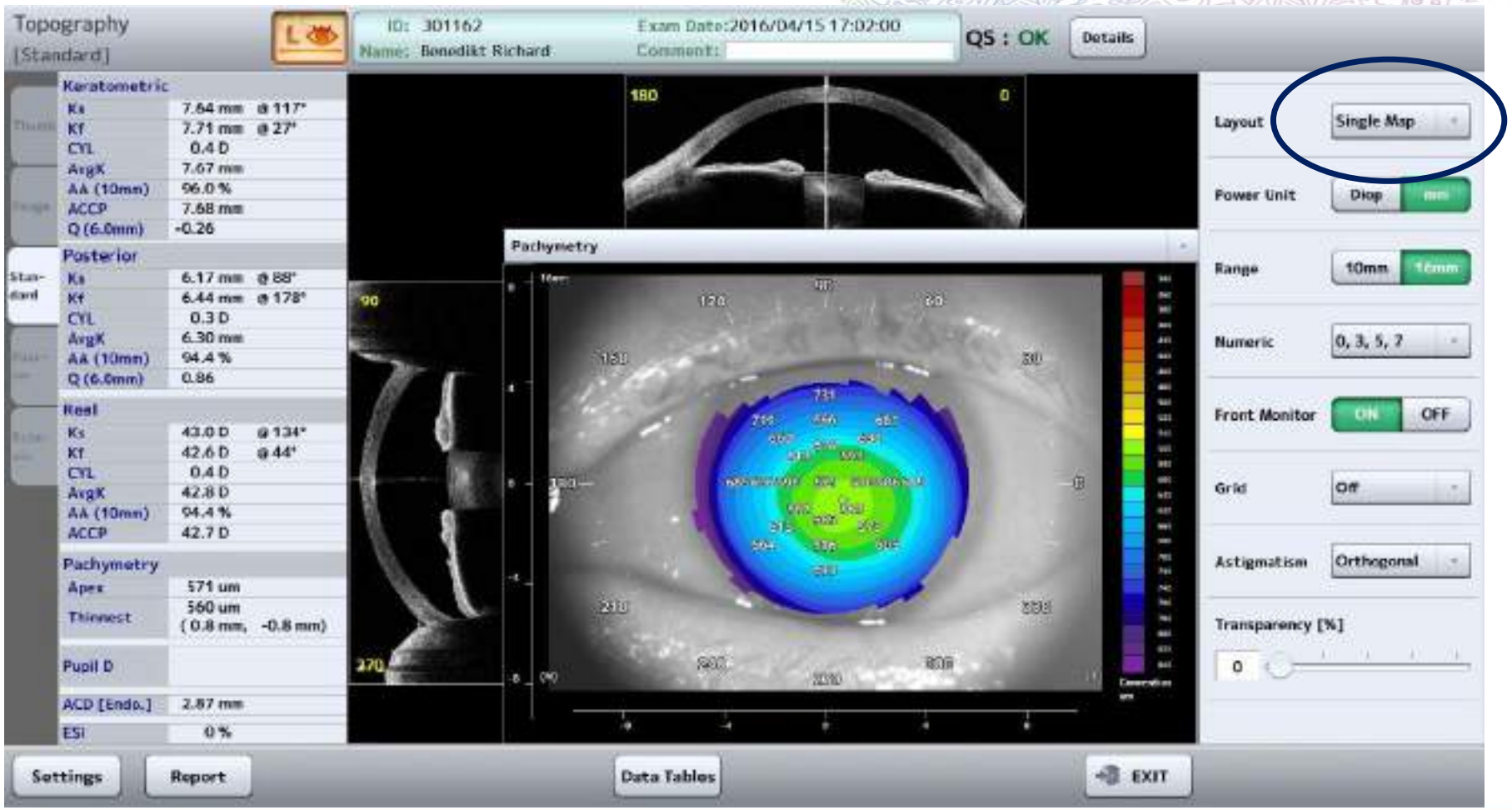
Topo mode: choose layout by one click, eg. Single map or four maps



Application – Corneal topography

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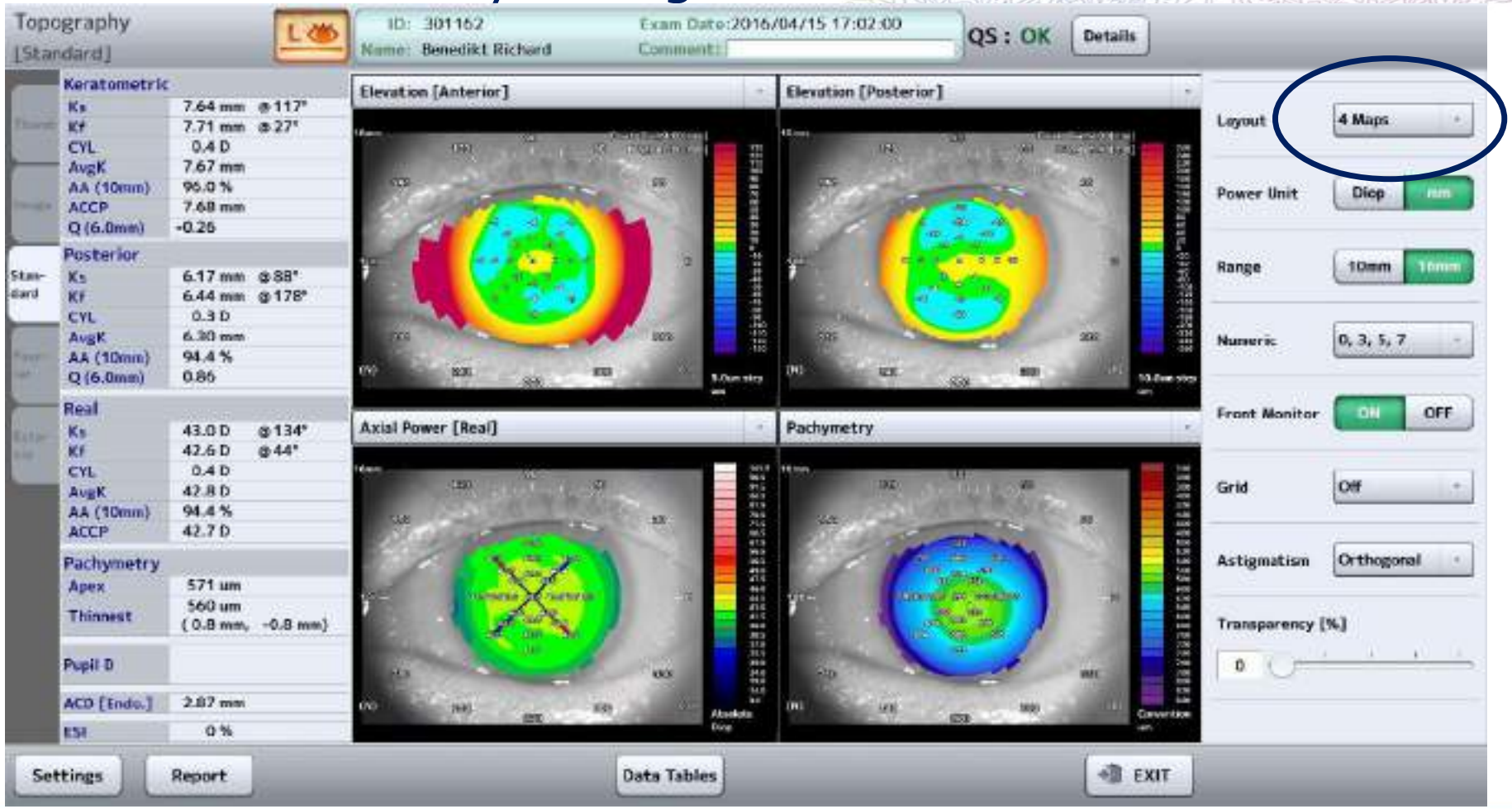
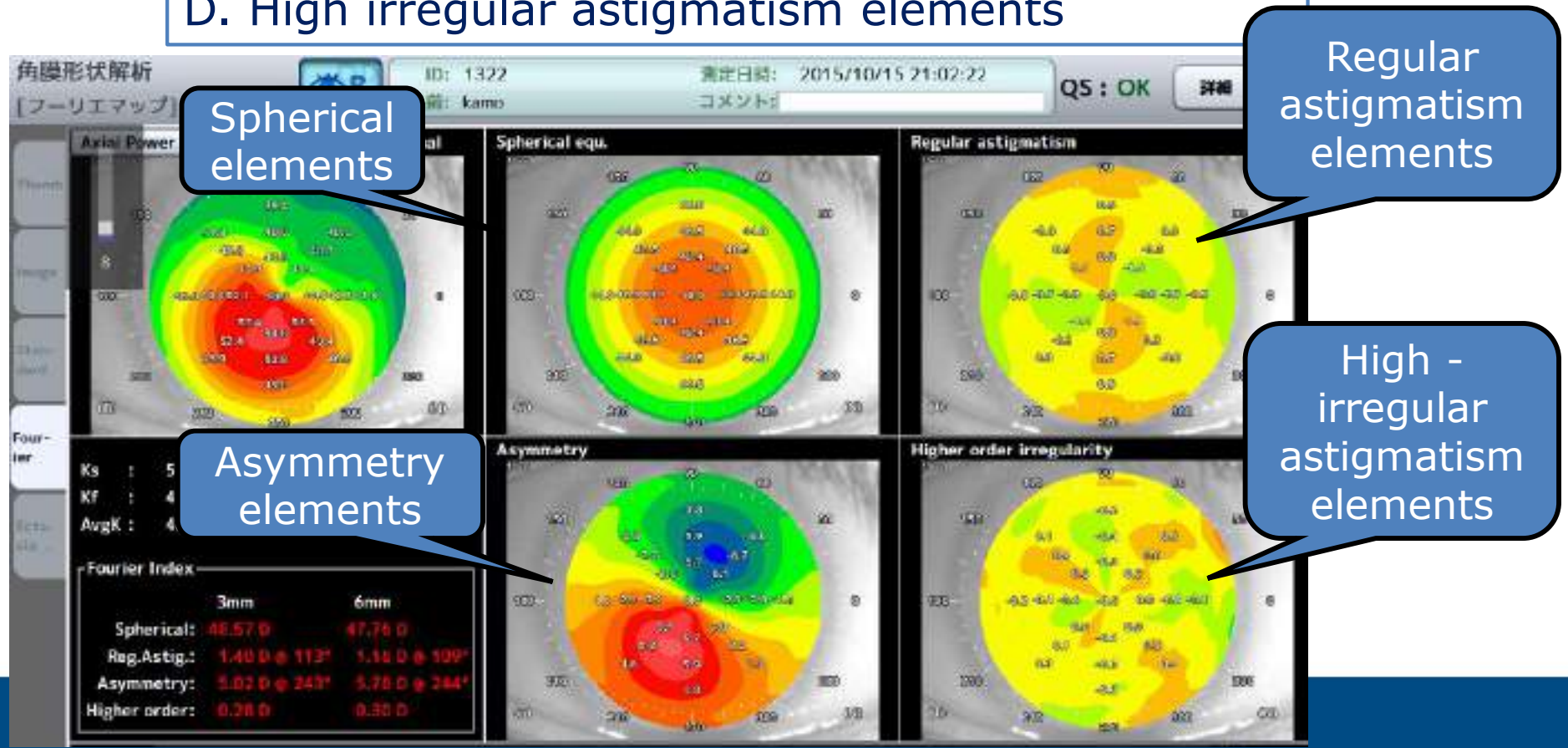
Topo mode: layout classic with four maps (which can be individually changed as well



Application – Corneal topography and shape

Fourier analysis: Evaluation of corneal shape as follows

A. Spherical elements
B. Regular astigmatism elements
C. Asymmetry elements
D. High irregular astigmatism elements



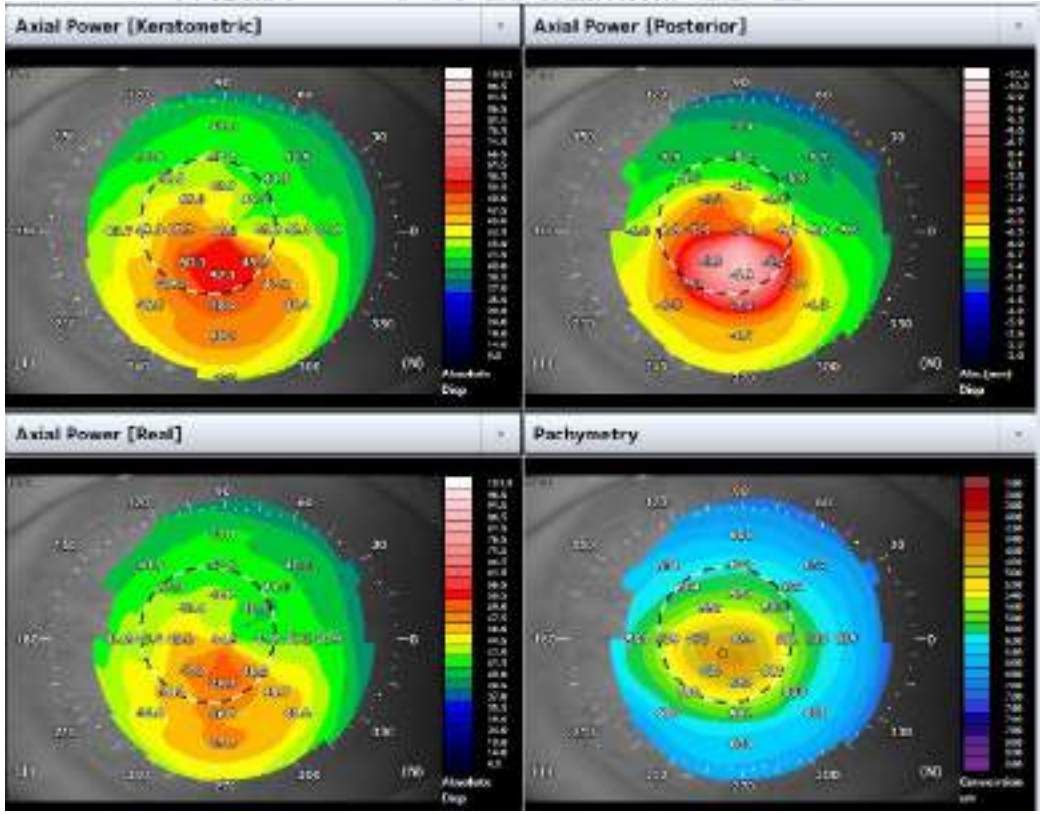
Application – Corneal topography and shape

Target:

Corneal diseases and post-LASIK eyes

Purpose:

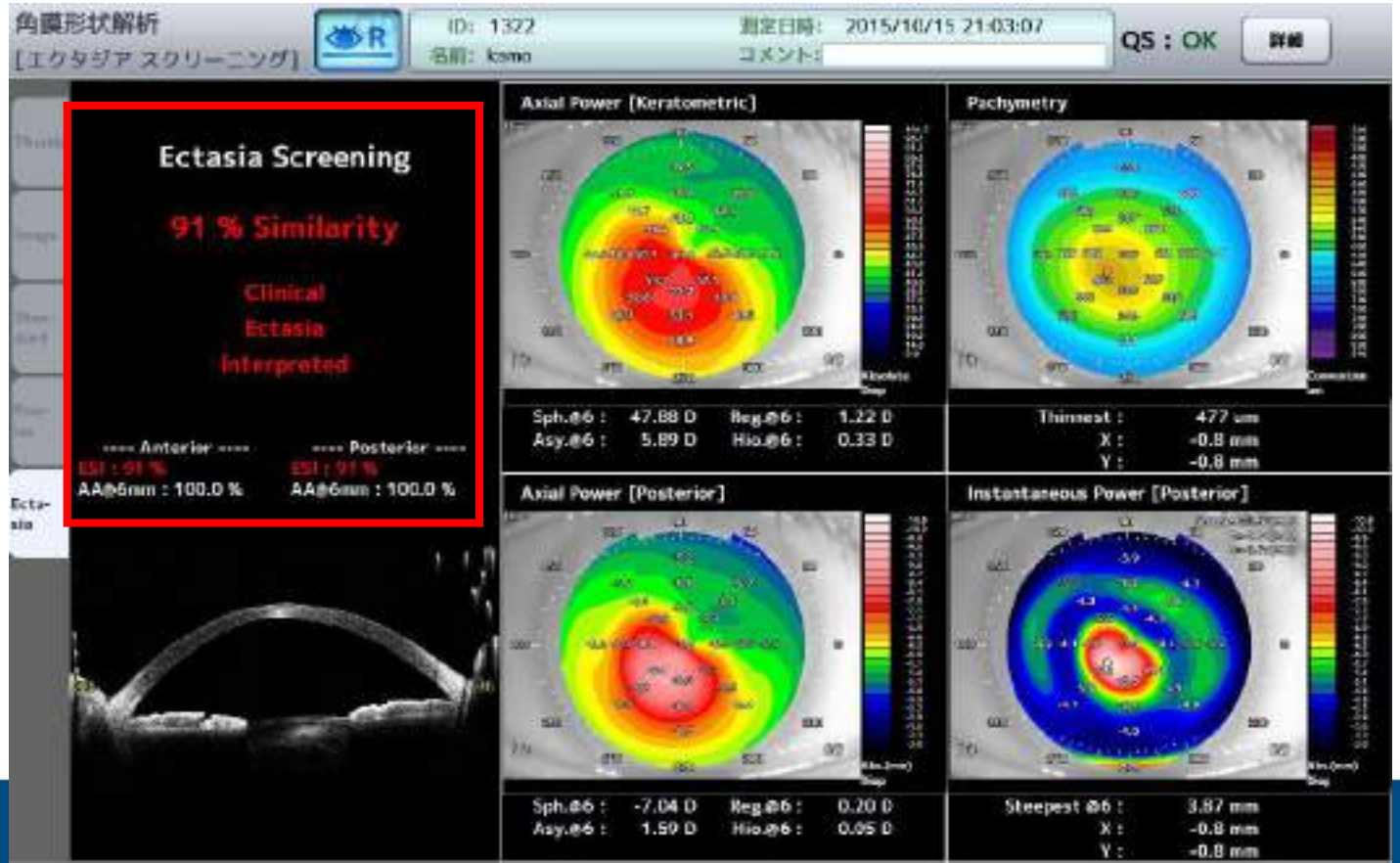
1. Check condition of corneal shape before/ after surgery
2. Check corneal irregular astigmatism toward patients with low VA
3. Check fitting problem of contact lens



Application – Corneal topography and shape

Ectasia screening

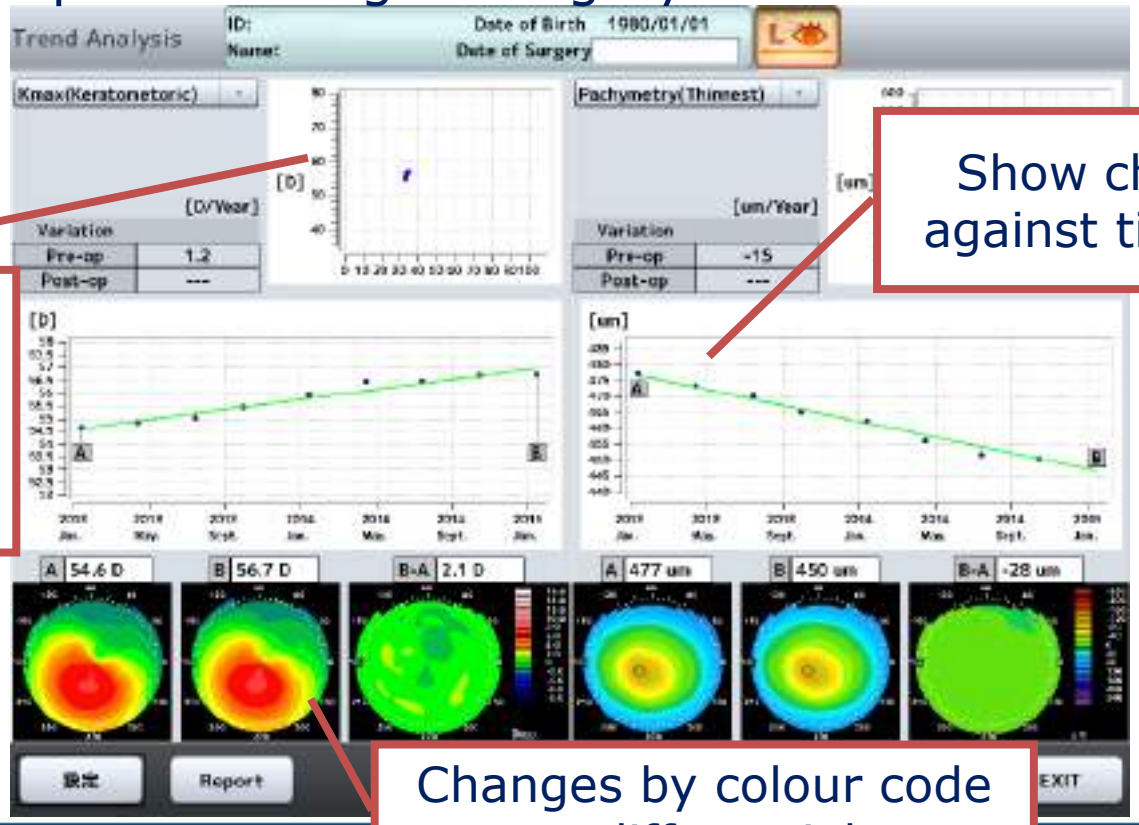
Detects Ectasia patterns such as keratoconus and pellucid marginal corneal degeneration



NEW applications

Trend analysis

- Display chronological changes of several parameters of corneal shape
- Useful when observing chronological changes of keratoconus and judging appropriate timing of surgery



Show changes against age axis

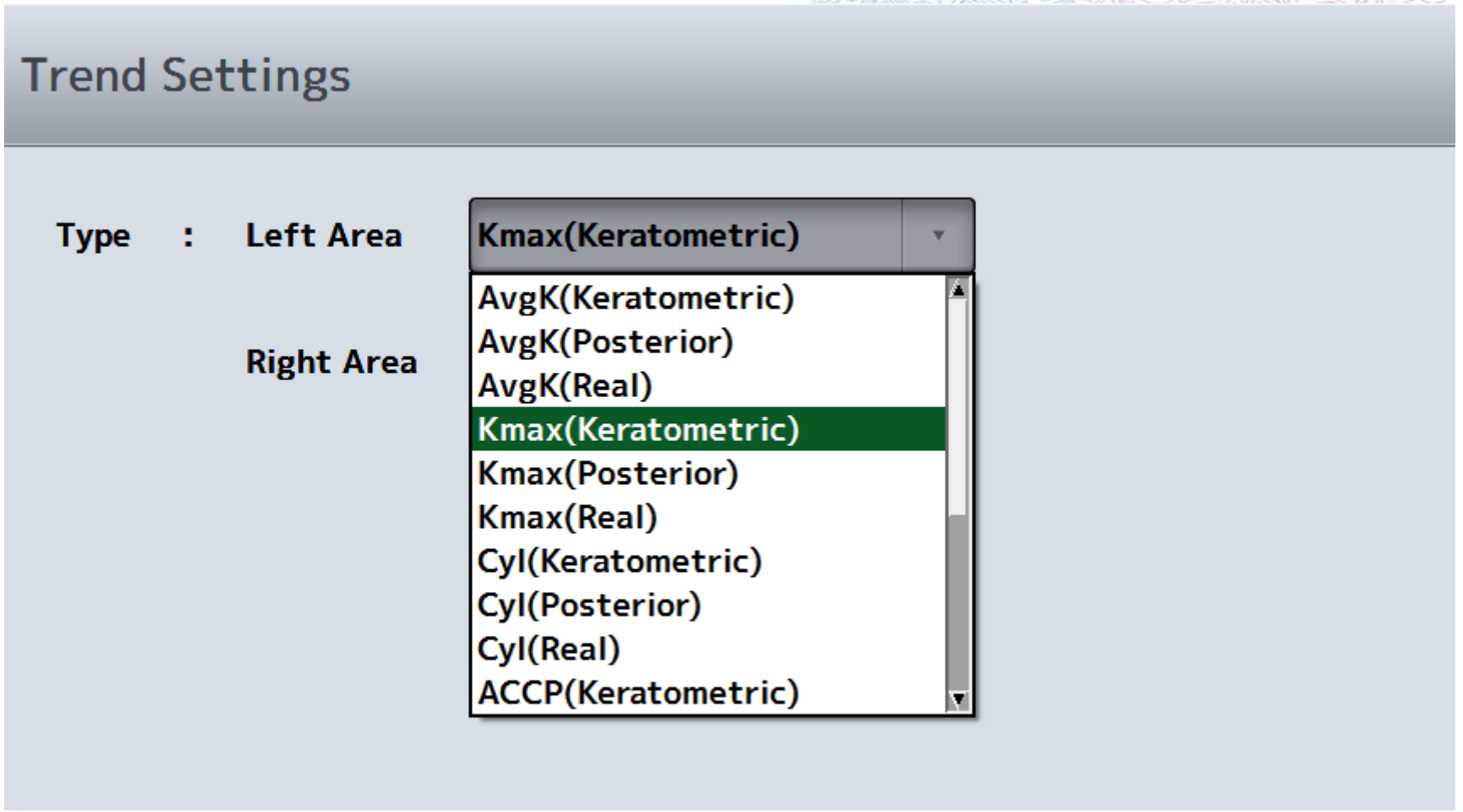
Show changes against time axis

Changes by colour code map – differential map

NEW applications

Trend analysis

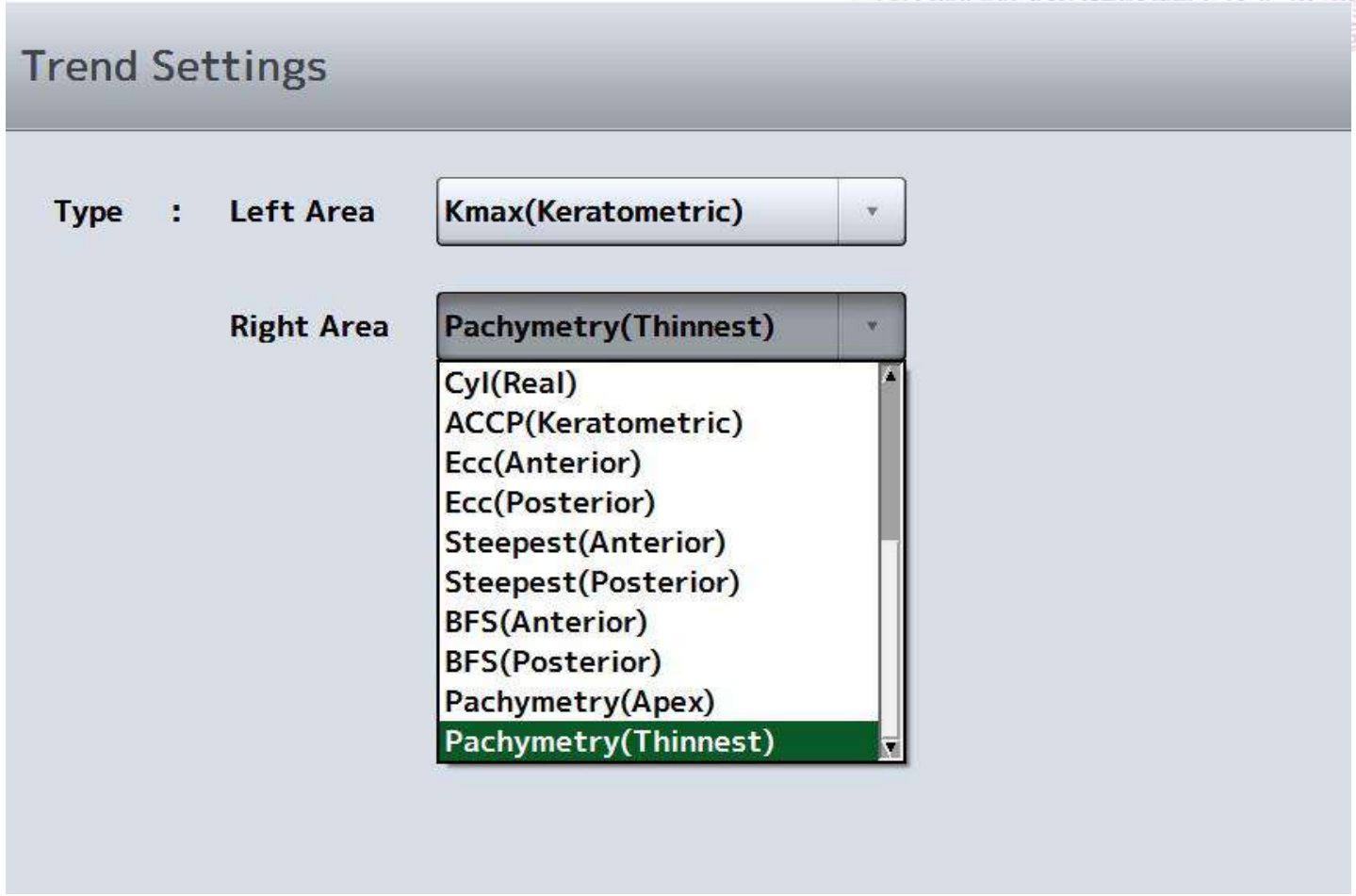
- Choose what you like to check for “trend analysis”



NEW applications

Trend analysis

- Choose what you like to check for “trend analysis”



More applications

Known applications from CASIA:

- Corneal shape analysis
  - Ferrara Ring Data export
  - Data Tables export
- Anterior segment analysis
  - Angle analysis (automatic
  - ACD/CCT → PIOL
  - Corneal flap thickness
  - manual distance/angle measurement
- Bleb analysis → Horizontal/Vertical scans
- Movie

More applications – for Glaucoma

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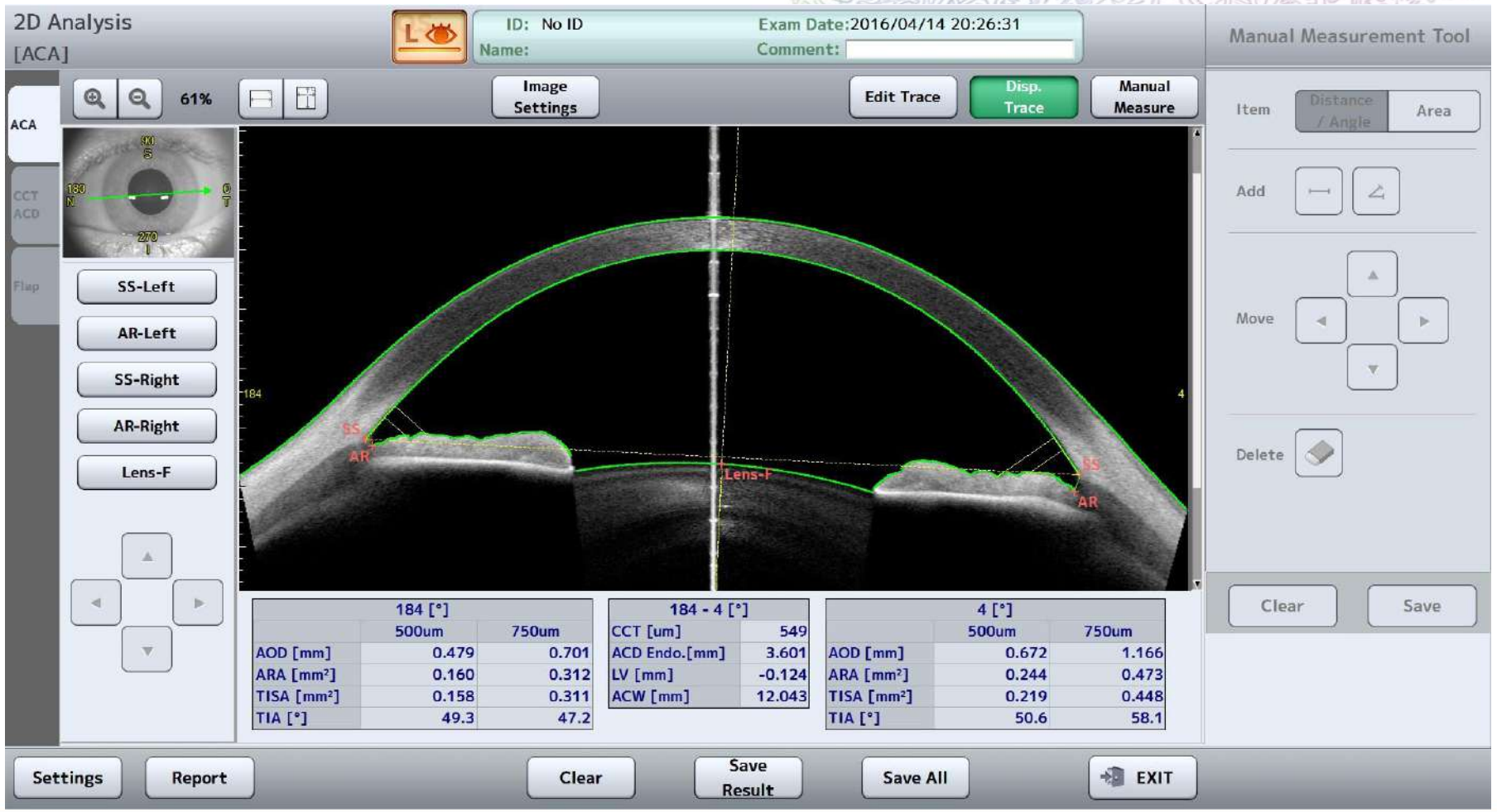
NEW: Automatic detection of SS
→ Automatic calculation of angle



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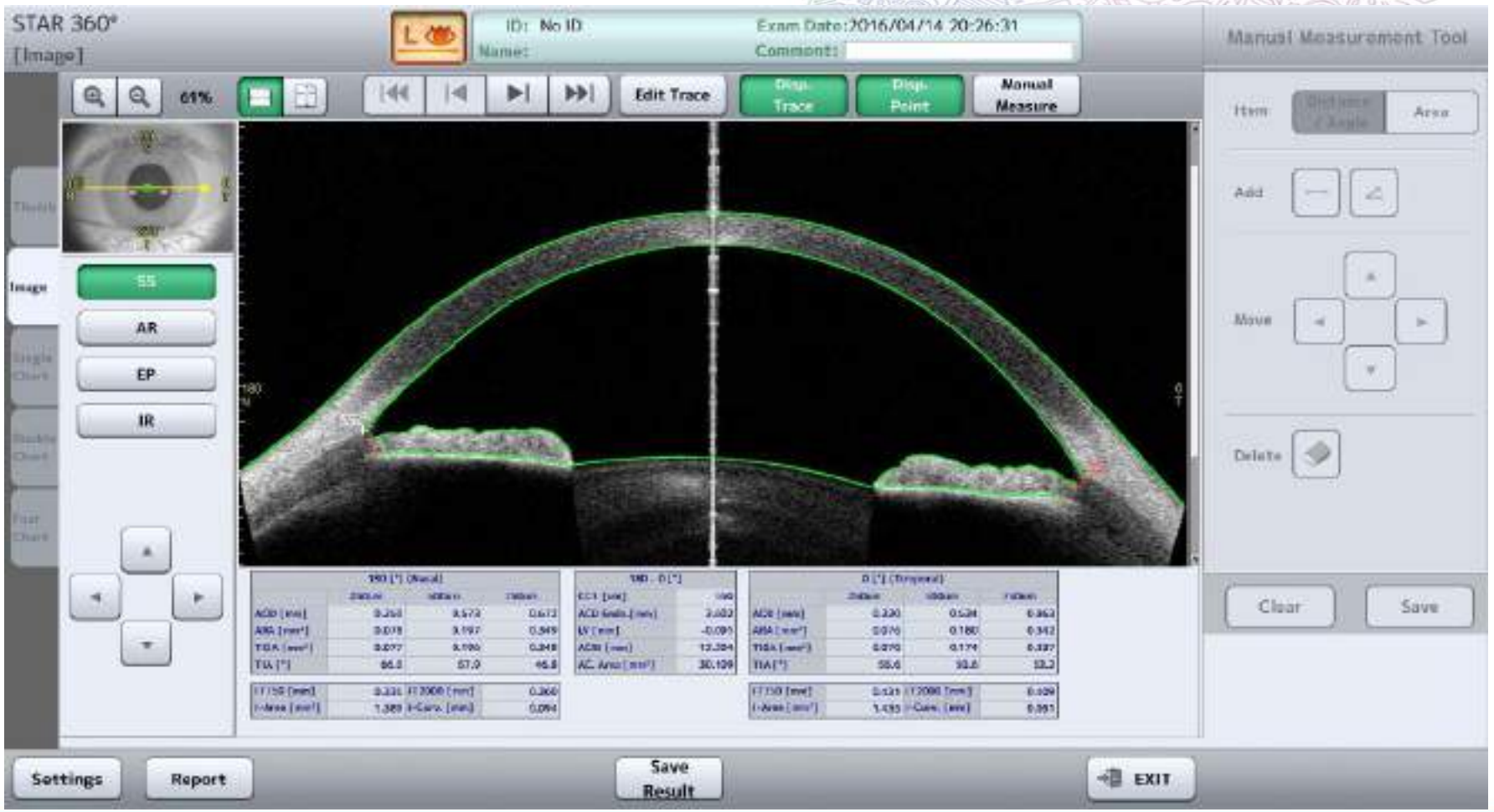
More applications – for Glaucoma

NEW: STAR 360°

→ Automatic SS detection and ITC analysis



More applications – for Glaucoma

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NEW: STAR 360°

→ lots of data and values, by clicking on them they will be visible

More applications – for Glaucoma

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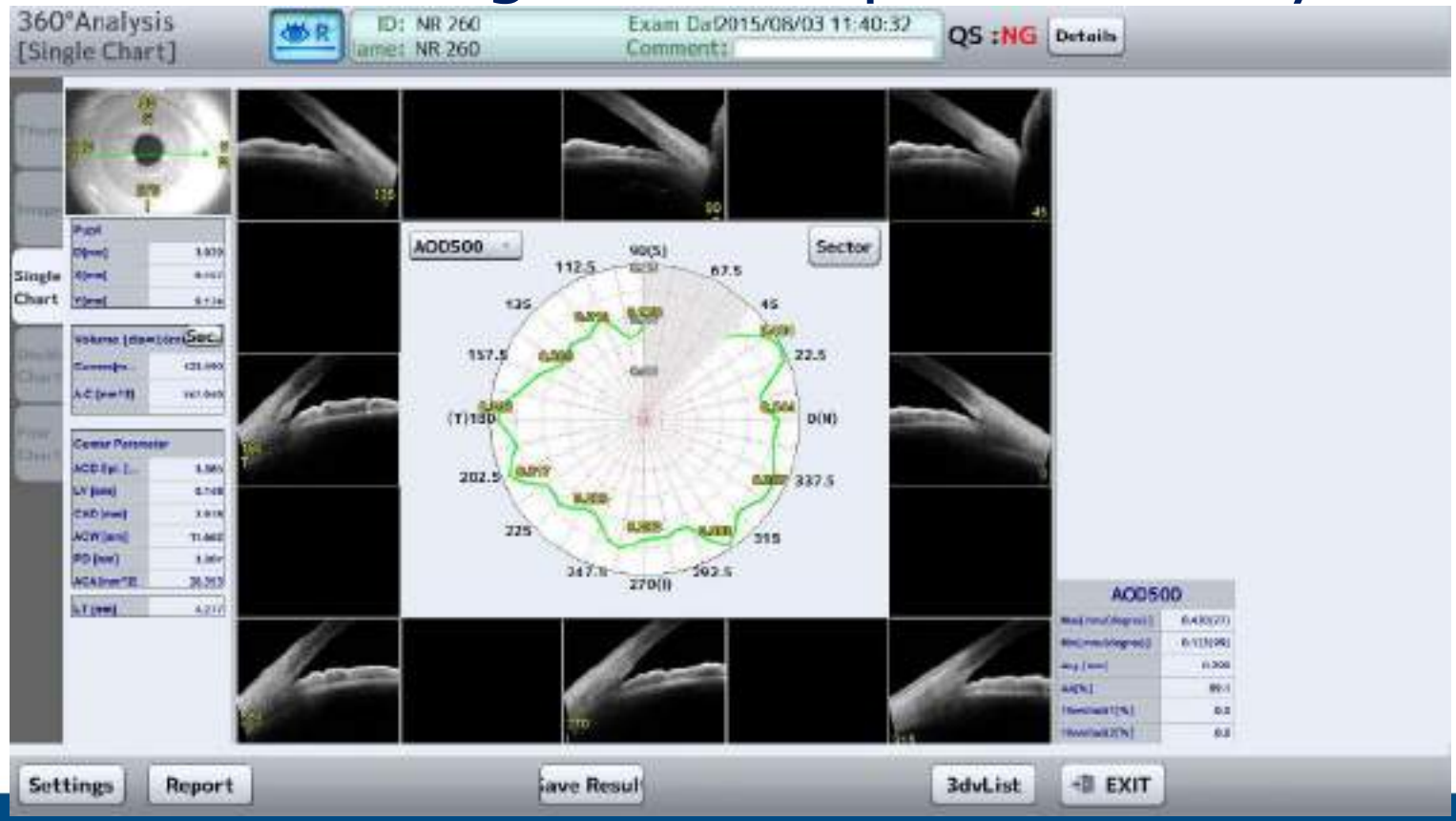
NEW: Angle analysis (360°)

ITC done automatically

→Evaluate angle index quantitatively



More applications – for Glaucoma

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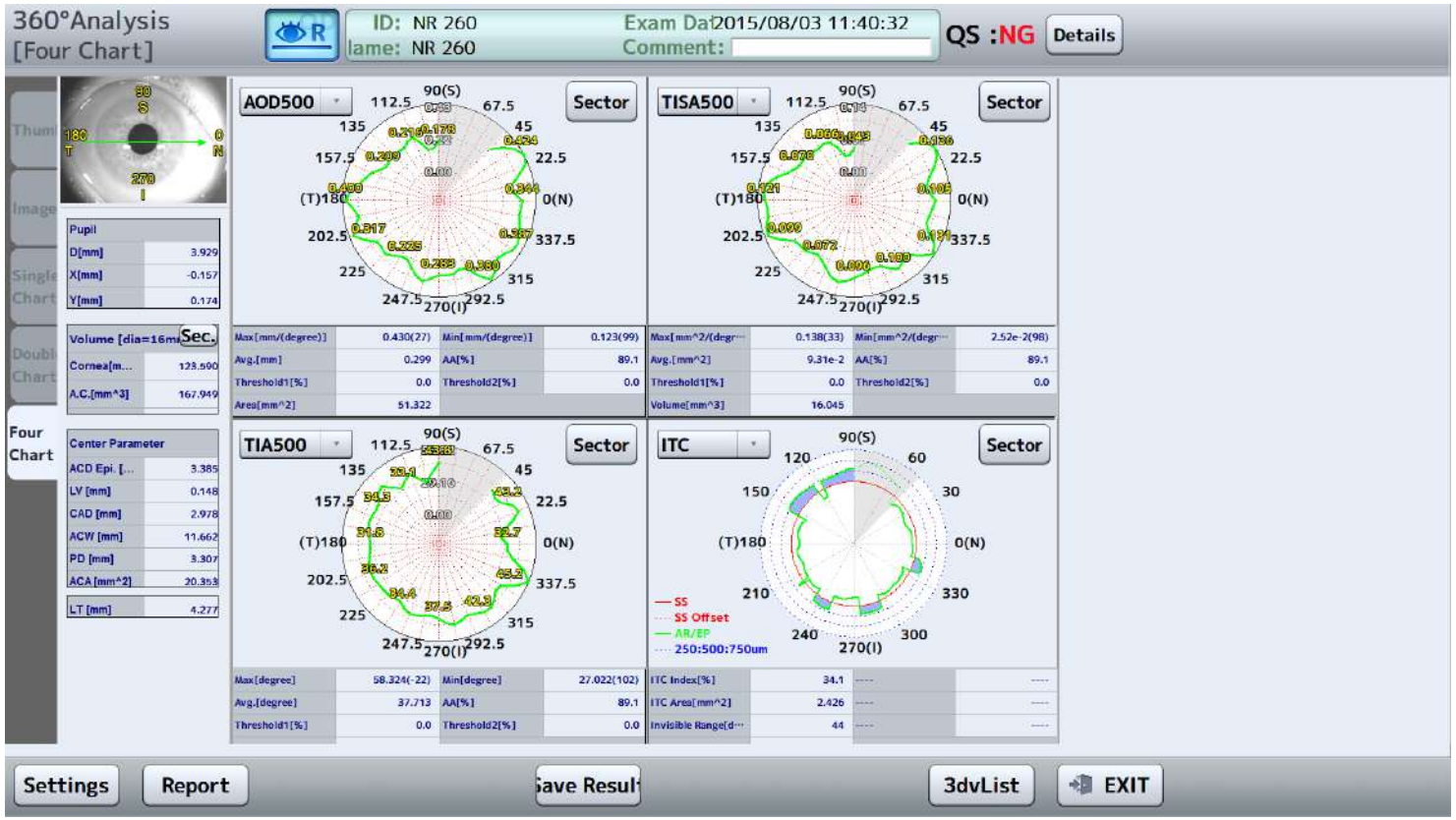
Angle analysis (360°)

- Quantitative angle index



More applications – for Glaucoma

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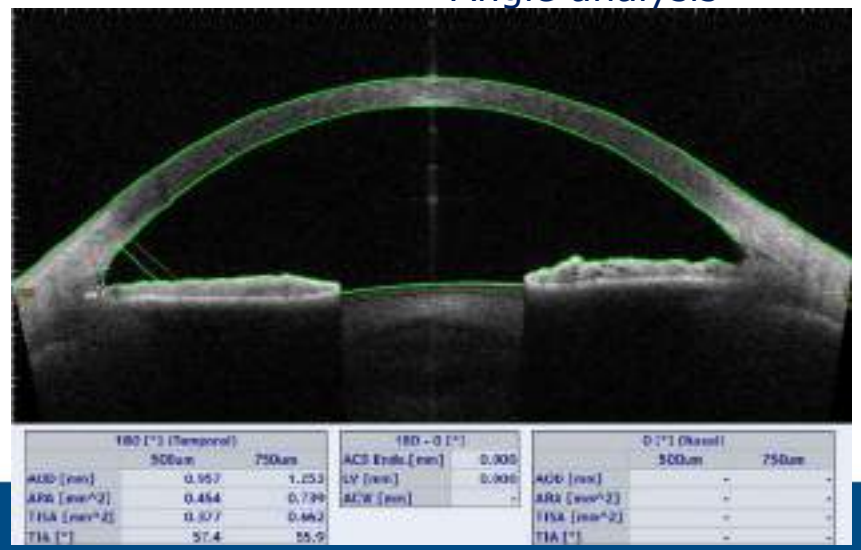
Target: Glaucoma patients / suspects

Anterior segment screening
→ Angle, ACD
Testing before cataract surgery
→ Lens shape analysis

Purpose: Diagnosis of angle-closure glaucoma / open-angle glaucoma
Changes of expansion degree of Glaucoma surgery / IOL insertion

Lens shape analysis

Angle analysis



TOMEY
TECHNOLOGY AND VISION

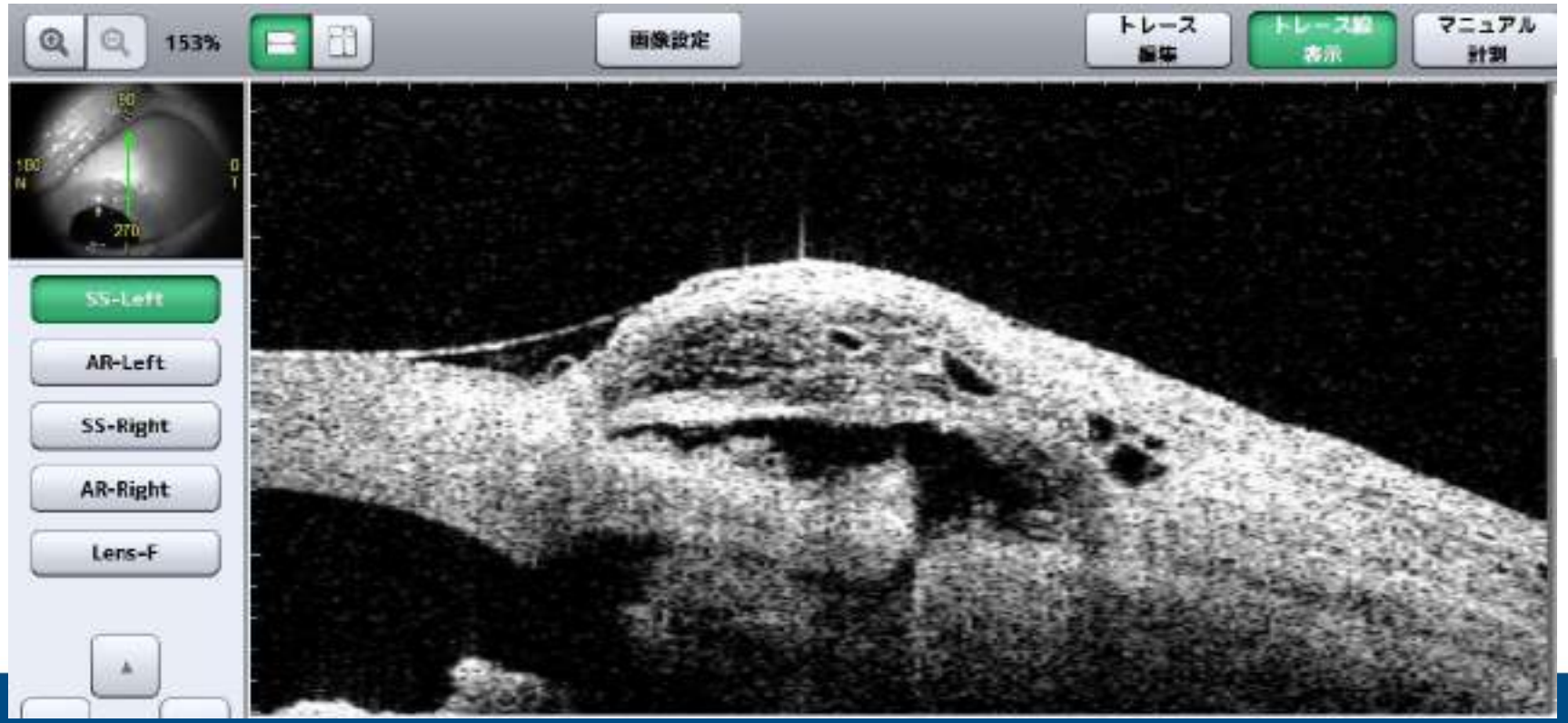
Applications - for Glaucoma

SKYMED

Target: Post-trabeculectomy eyes (filtering operation)

Bleb testing

Purpose: Observe bleb condition



Applications - for Glaucoma

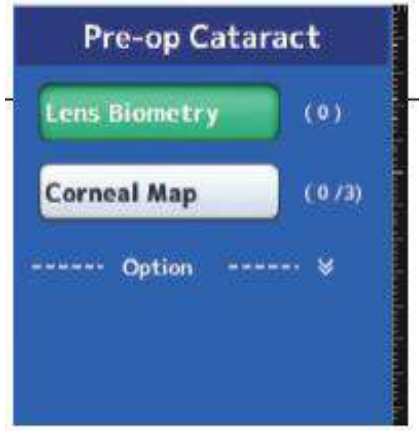
SKYMED

High usability

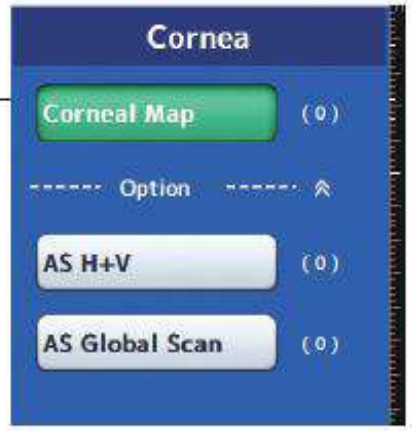
SKYMED

Easy measurement

- Measurement is made easily with touch panel operation using LCD monitor (similar to OA & EM)
- Joystick is also available
- Manage daily measuring by simply choosing your test protocol



Scanning type is already set

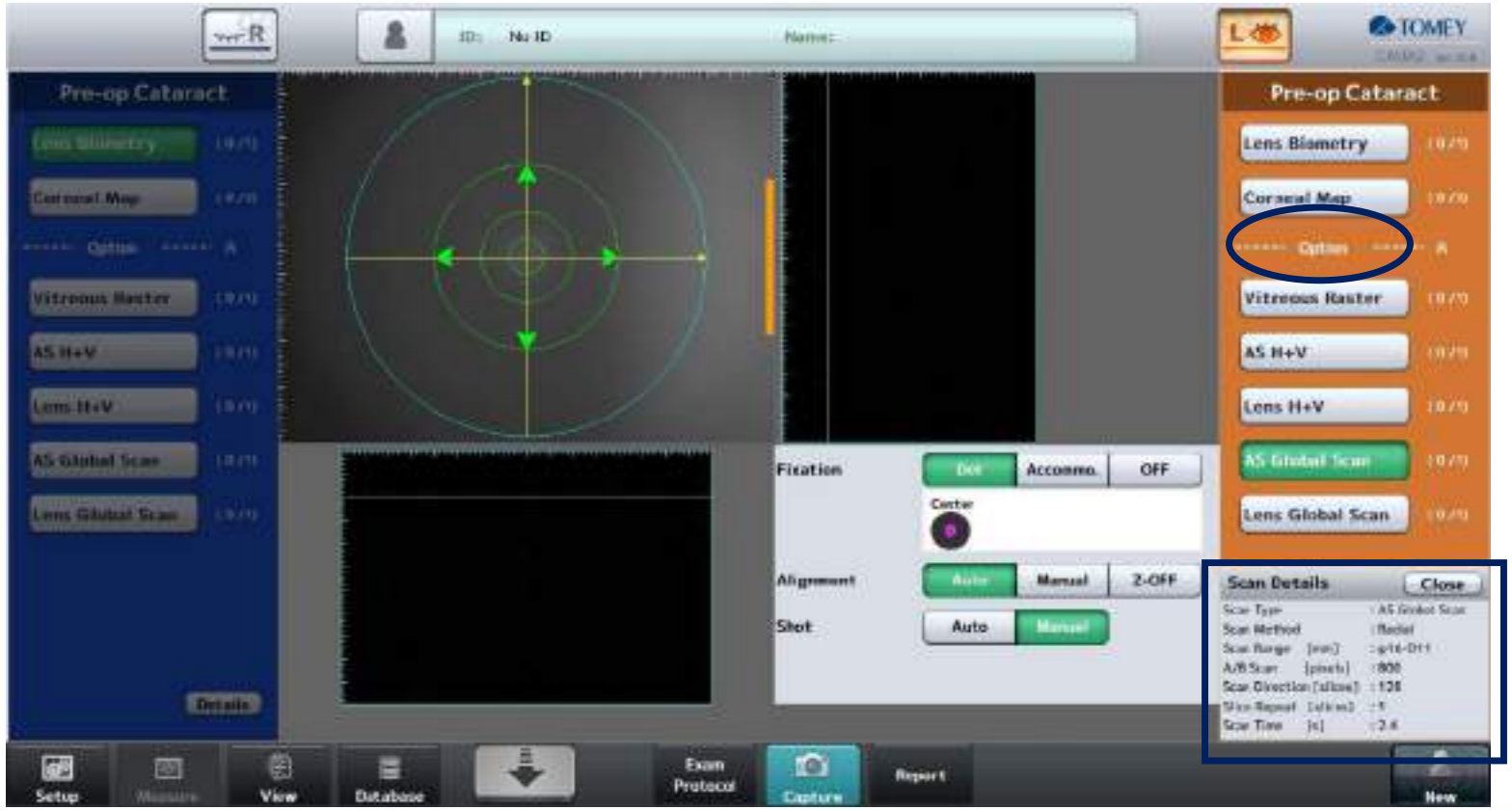


Other scanning types are also selectable

High usability

Easy measurement

- More options below chosen measurement type

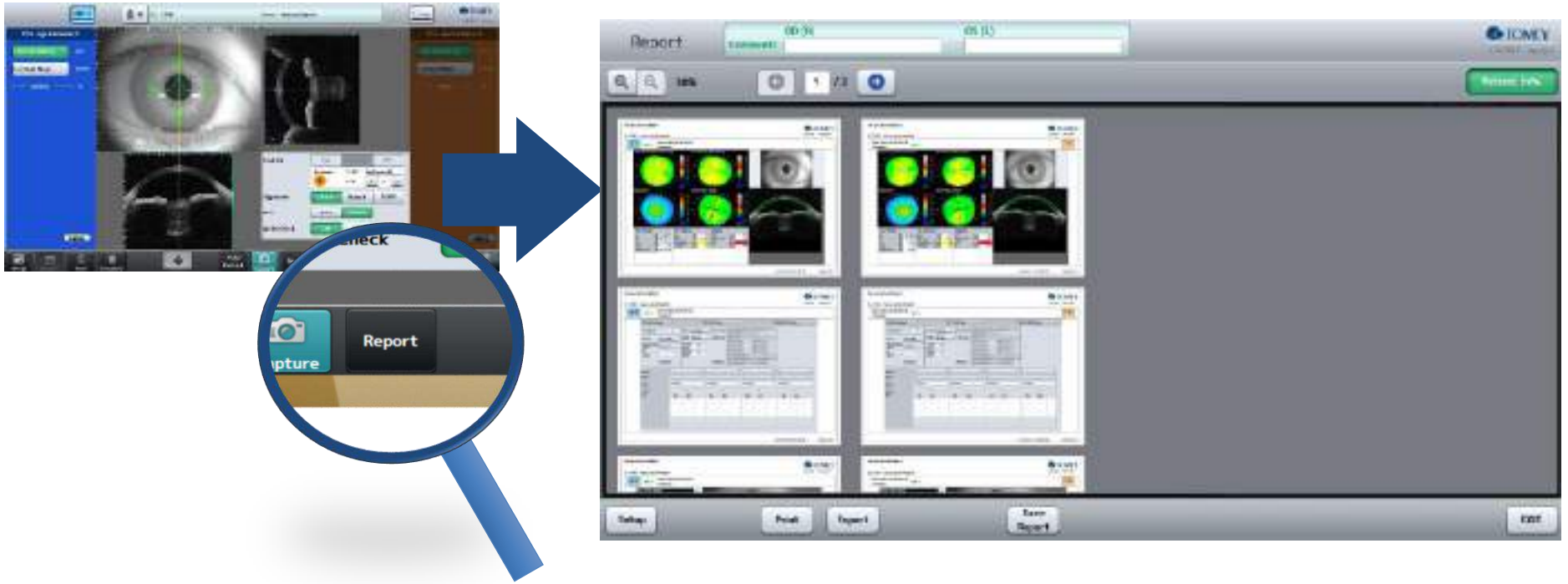


See scan details and check settings

High usability

Report function

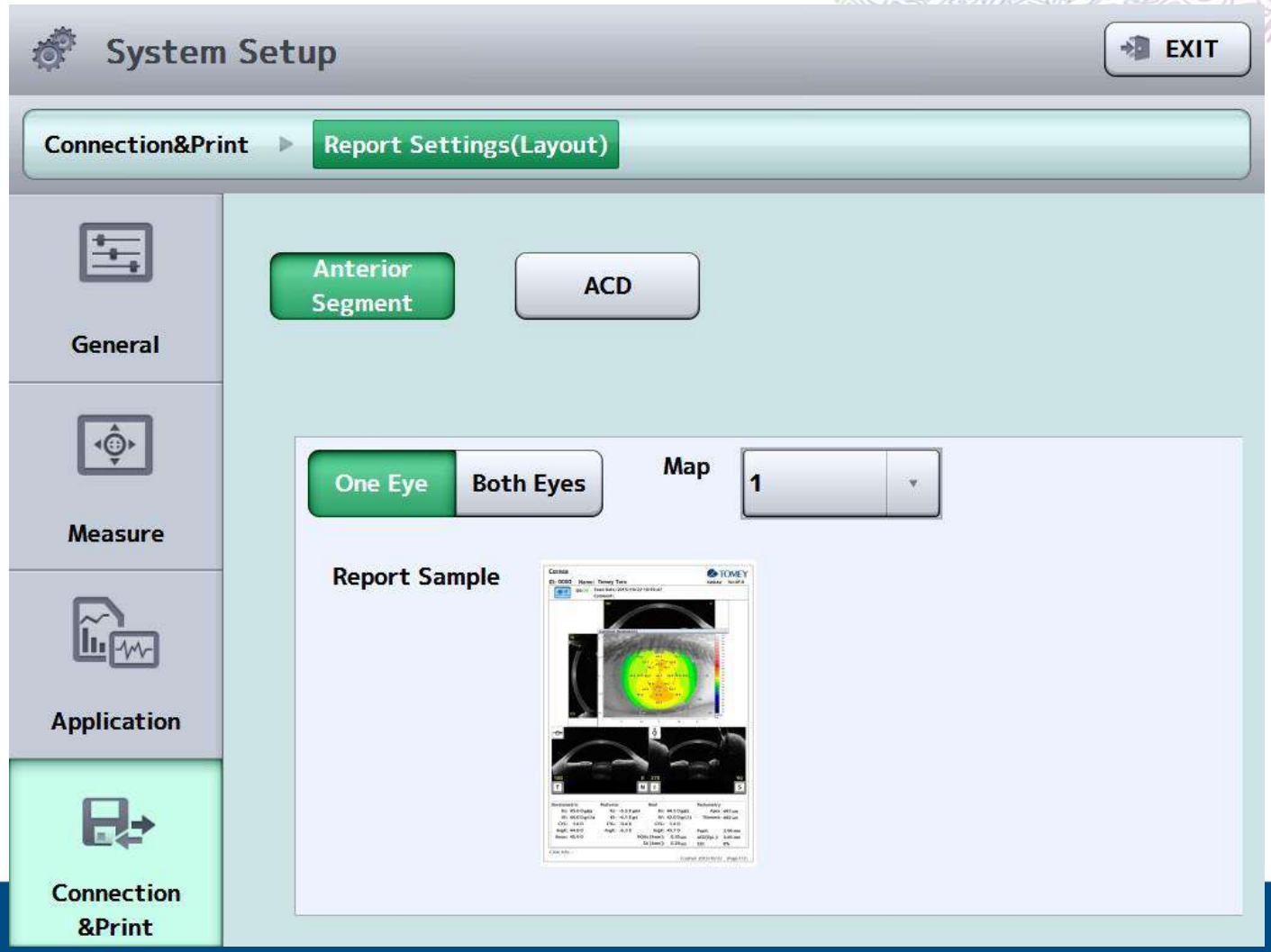
- Display the report with one touch after measurement
- Output in a clear format (pdf) is available



High usability

Report function

- Choose Report layout in the system setup



CASIA2 – Benefits

SKYMED

- 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

SKYMED

- 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

SKYMED

CASIA2 covers everything you need for anterior segment testing