Anterior Segment Imaging

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Anterior Segment devices

- **UBM system** (Paradigm Medical Industries, Salt Lake City, UT) uses a **30-MHz/100-MHz** transducer **axial resolution of 25 um, lateral resolution of 50 um**, tissue **penetration of 5 um**

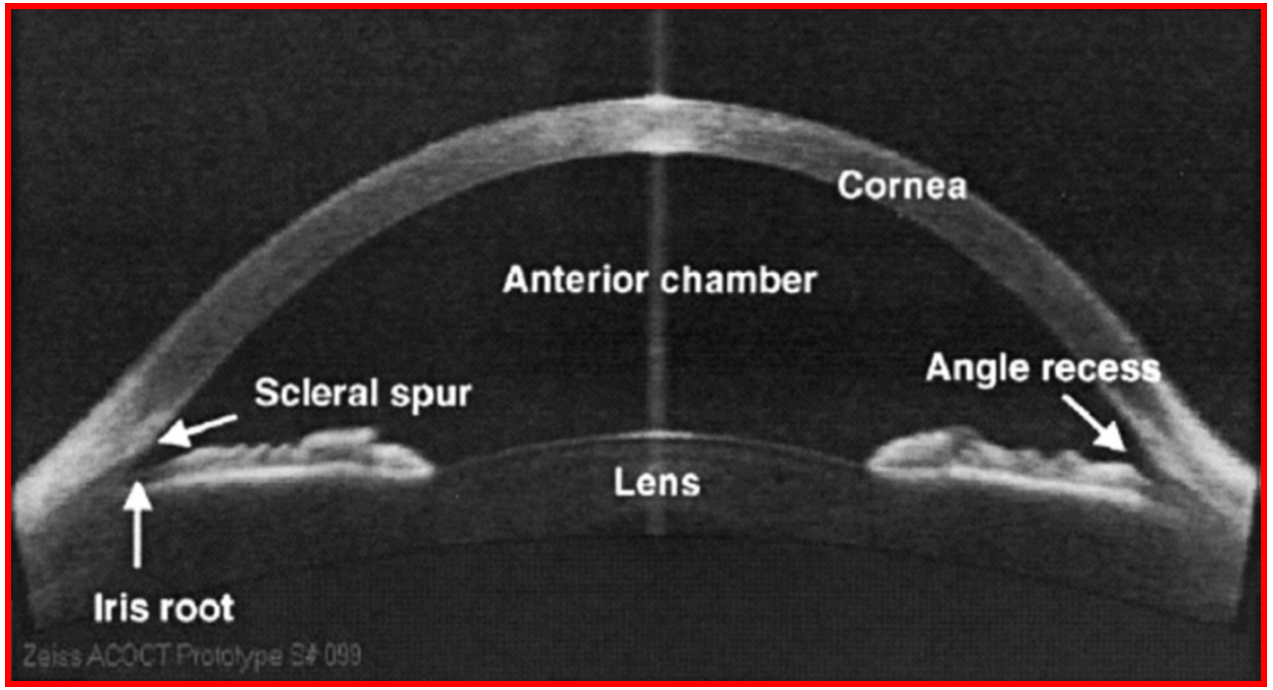
- **Optical Coherence Tomography (OCT)** **first appeared in 1991** for imaging the posterior segment of the eye, and **3 years later, first anterior segment-OCT (AS-OCT)** high-resolution cross-sectional images of the anterior eye segment.

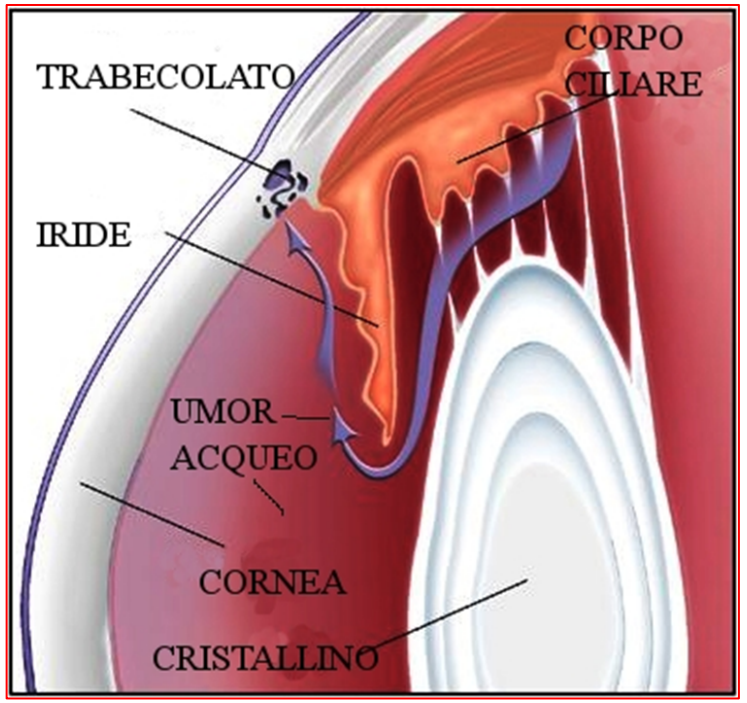
AS-OCT v/s UBM axial resolution: 18um versus 25um in 50MHz UBM

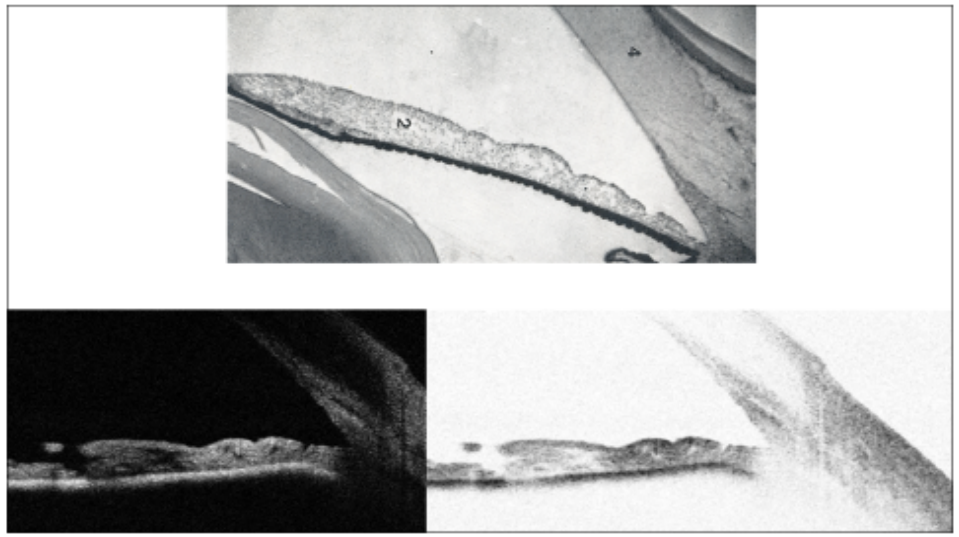
- **Scheimpflug Photography.** The Pentcam (Oculus, Lynnwood, A) rotating Scheimpflug camera to provide a 3-dimensional image of the anterior segment of the eye.

Masurements **anterior chamber depth, volume, corneal thickness, lens thickness.** **Not provide detailed information of the angle recess** because of light-scattering and has limited application in documenting angle closure. **Pentacam® AXL axial length measurement accurate IOL calculations.**

- **EyeCam** (Clarity Medical Systems, Pleasanton, CA) was originally designed to obtain wide-field photographs of **the retina in pediatric cases**. This technique is its ability to visualize the angle in its entirety, compared with UBM and AS-OCT that provide only cross-sectional views

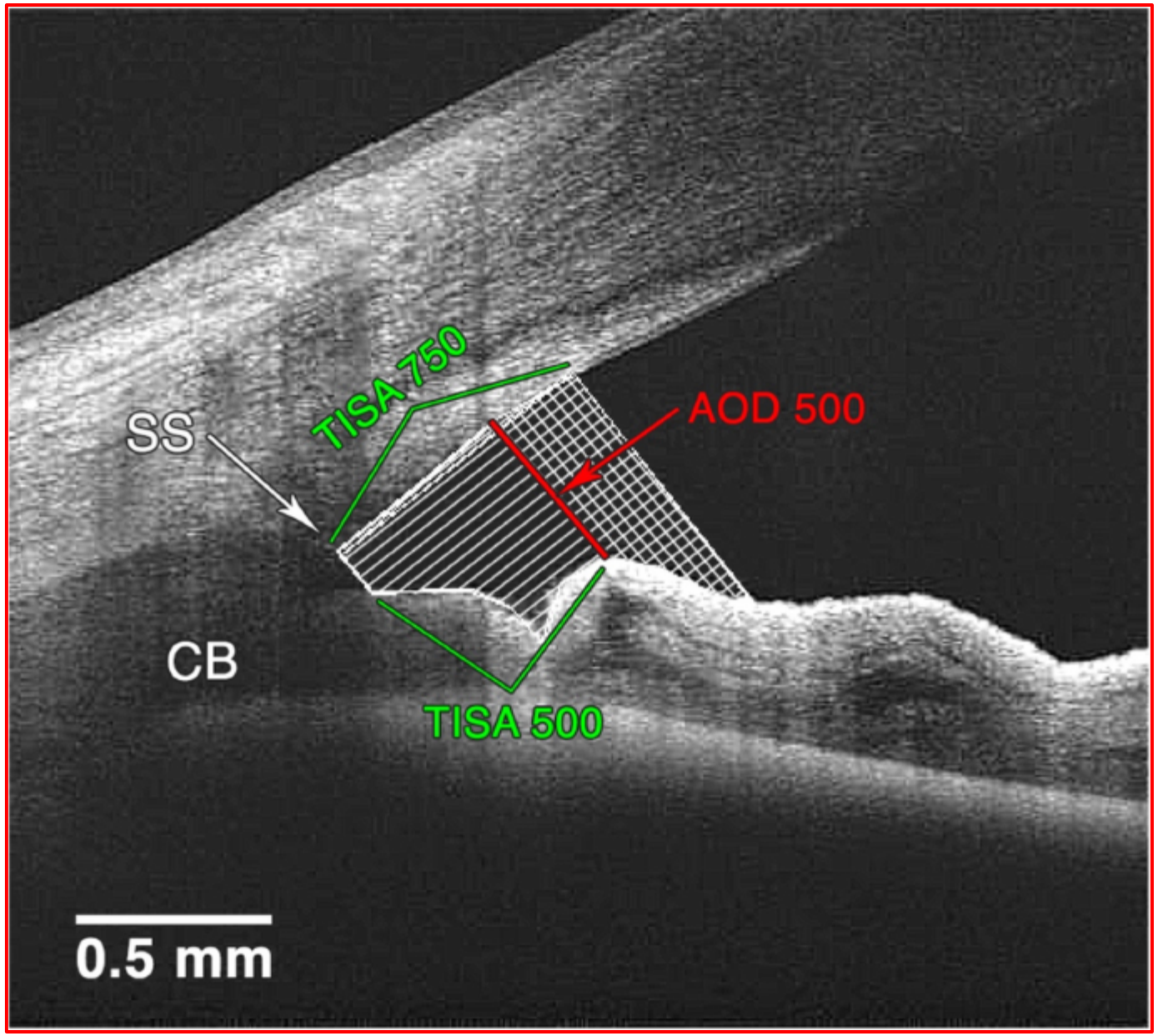






R.N. Shaffer 1960

- 0 = 0° Angolo chiuso
- 1 = < 10° Angolo molto stretto
- 2 = 20° Angolo stretto
- 3 = > 20° < 35° Angolo aperto
- 4 = > 35° < 45° Angolo molto aperto



AOD 500, TISA 500 and TISA 750 measurements on AS-OCT image of anterior chamber angle

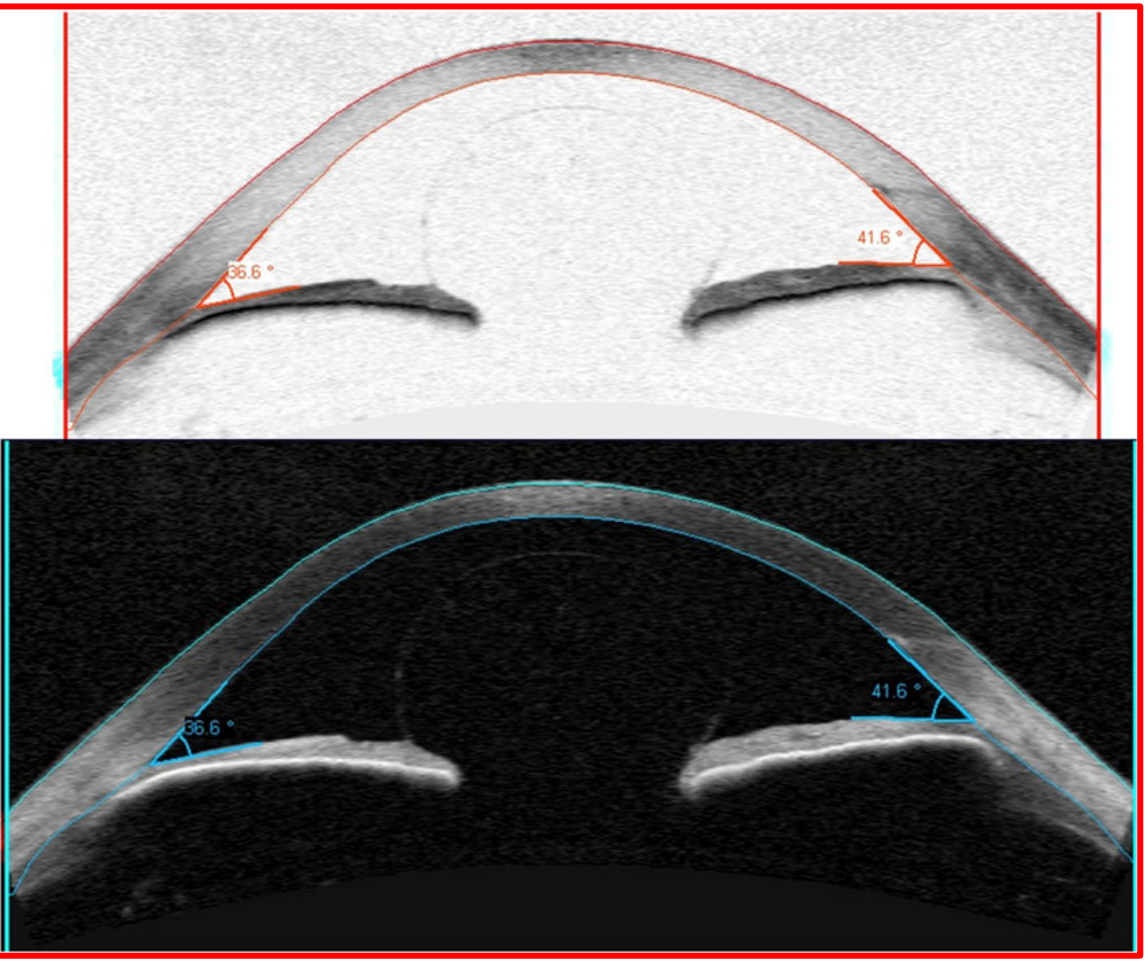
TISA Trabecular Iris Space Area

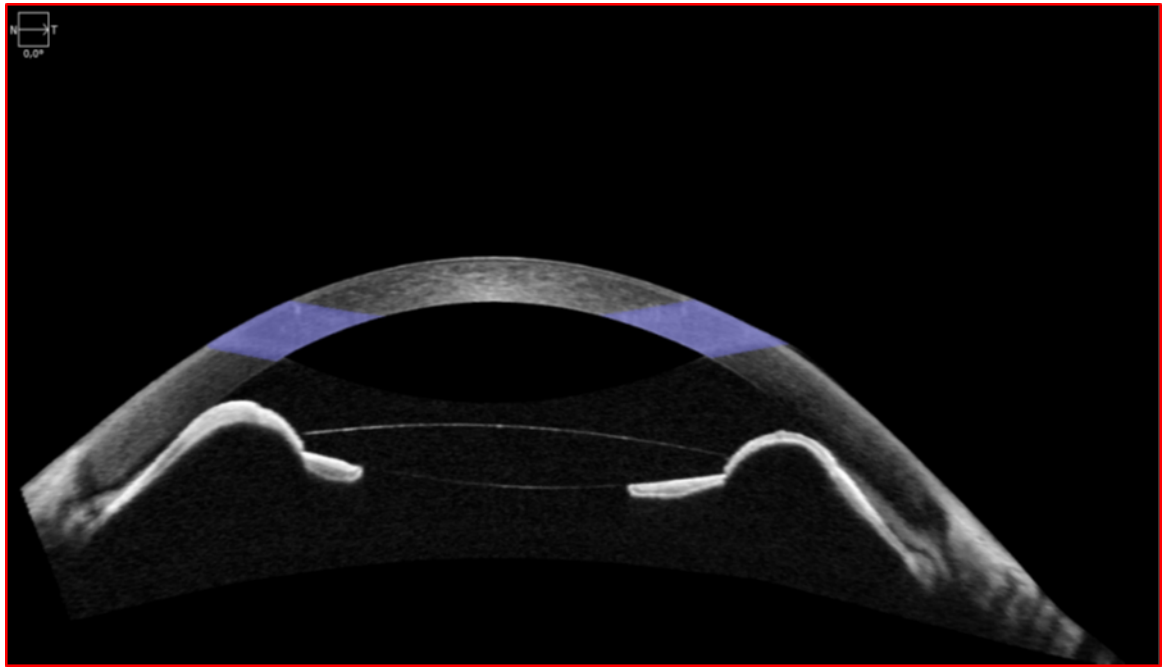
Angle Opening Distance (AOD 500)
Distance from the point on the cornea (which **was 500 µm** from the **scleral spur**) to a perpendicular point on the iris
by Pavlin et al.

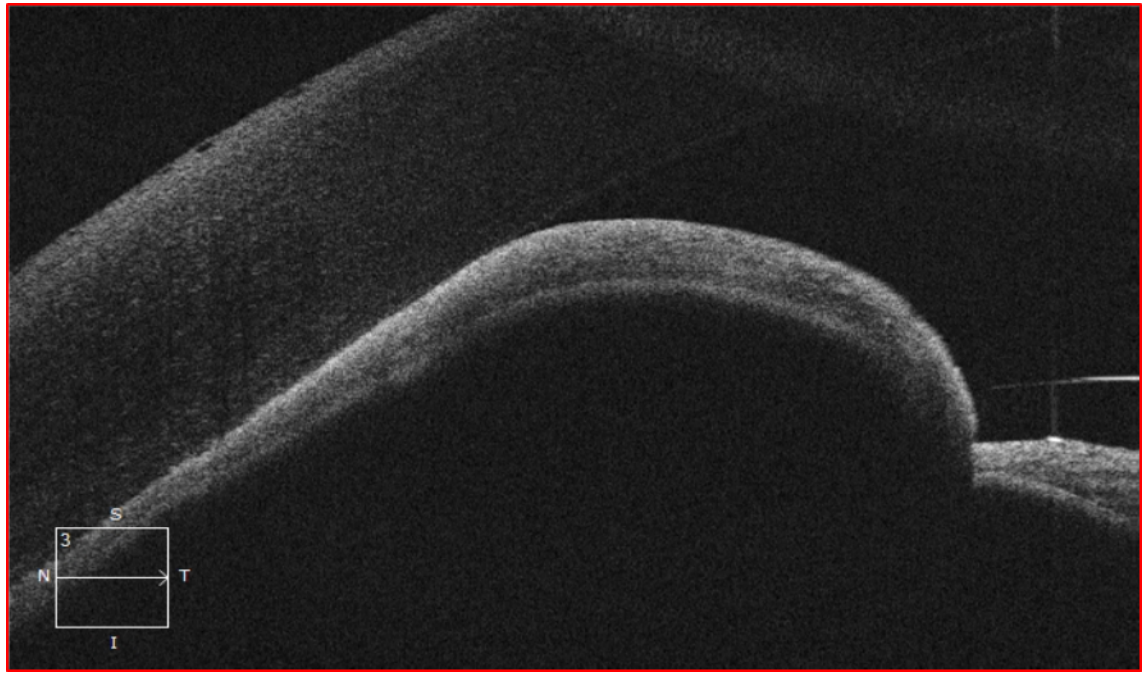
Cut-off value for indicating occludable angles in AS-OCT:

≤10°
191 µm for AOD 500
0.11 mm² for TISA 500
0.17 mm² for TISA 750
by Radhakrishnan et al.

Afachia e pseudoafachia







Anterior-segment OCT systems are categorized by wavelength of light sources

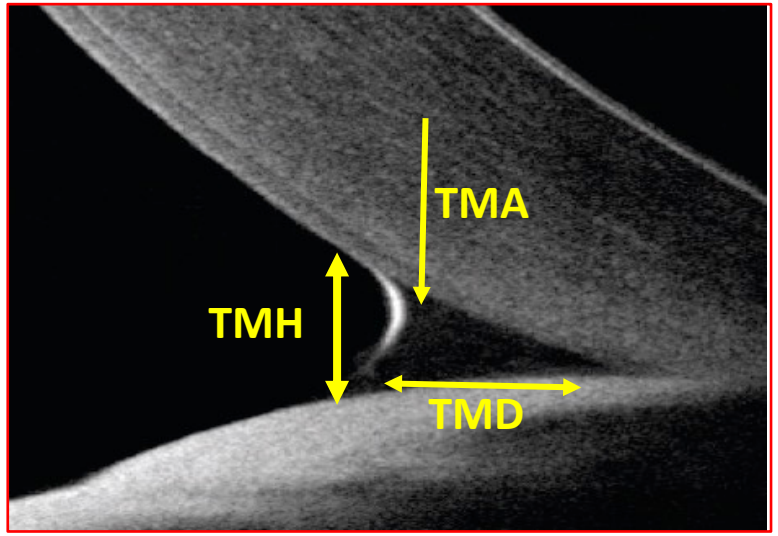
- **Systems converted from a retinal scanner using 830 nm**: Optovue RTvue, Optovue iVue, Zeiss Cirrus, Heidelberg Spectralis

- **Systems SS-OCT using 1050nm**: Topcon Triton DRI Plus, Plex Elite Zeiss

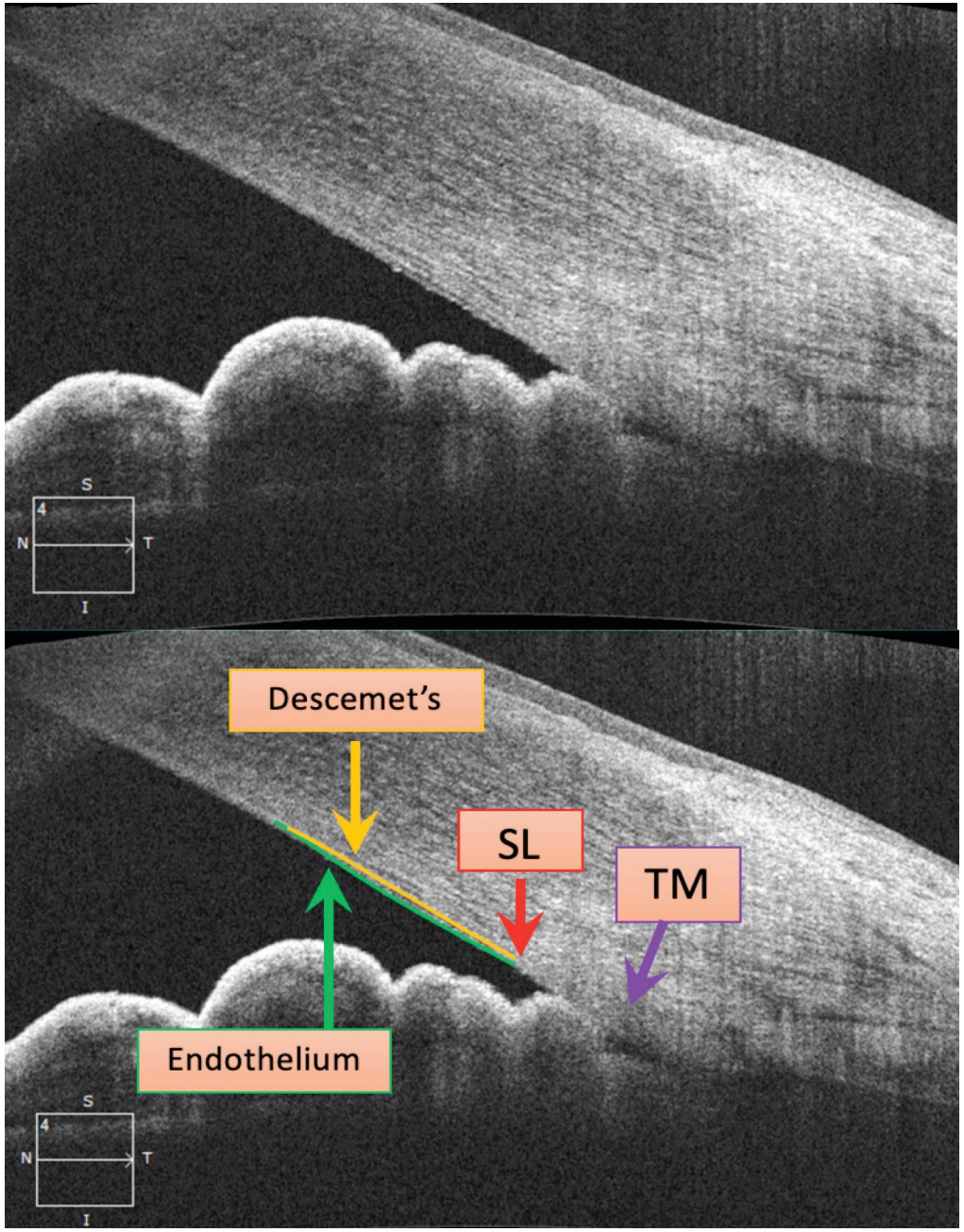
- **Systems using 1310nm**: Zeiss Visante Omni, Heidelberg SL-OCT, Heidelberg Anterion, Tomey CASIA 2

- A shorter wavelength system 830 nm, near infrared system provides a higher axial resolution, but its imaging depth is limited

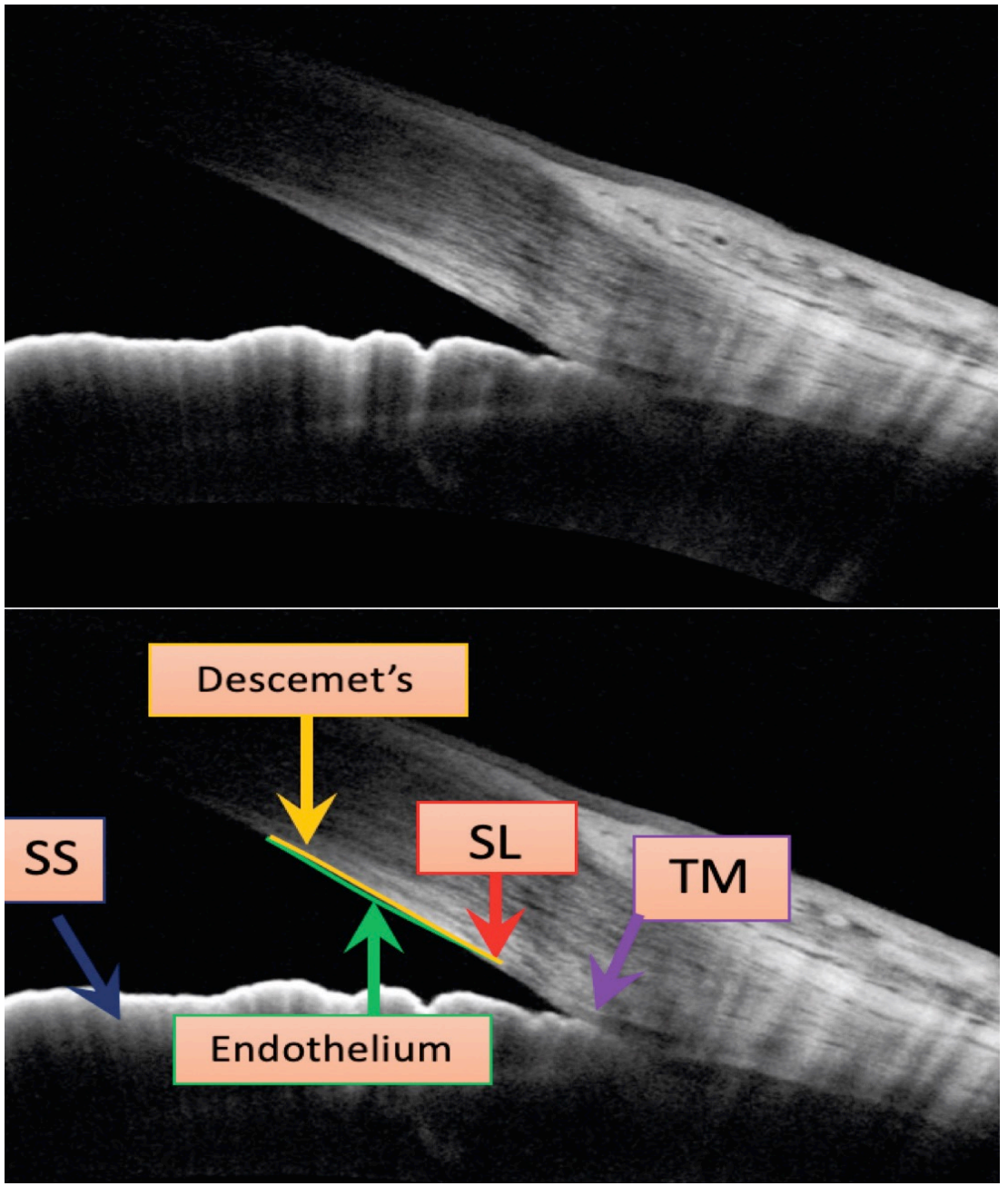
- A longer wavelength system 1050/1310 nm provides deeper penetration, strongly absorbed by water in ocular media



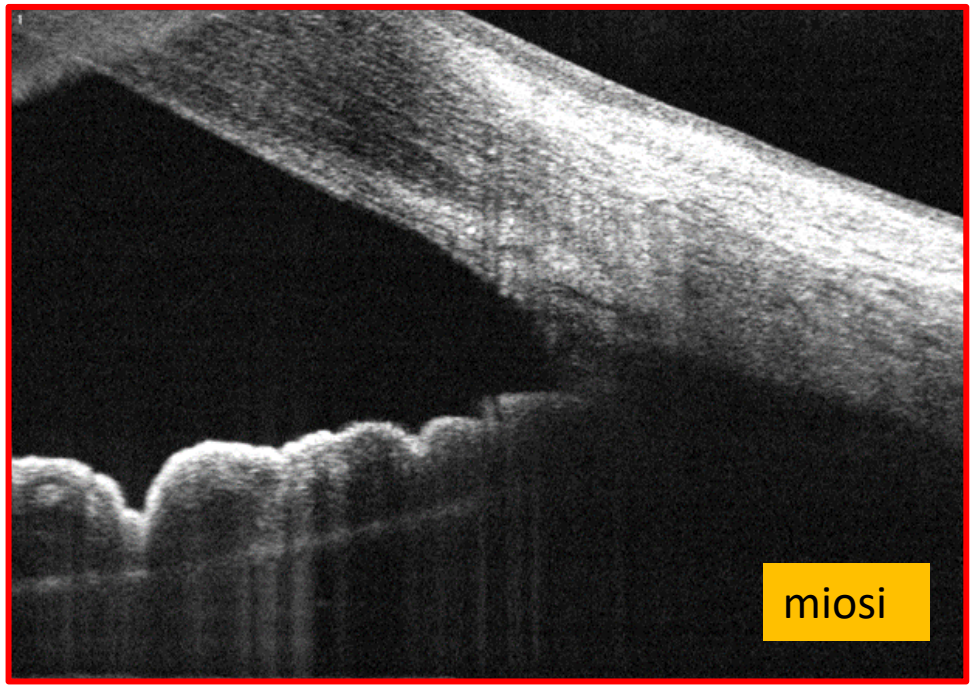
TMH Tear Meniscus Height
TMD Tear Meniscus Depth
TMA Tear Meniscus Area



Cirrus HD-OCT in the five-line raster imaging mode. Original image (A) and image labeled with anatomic landmarks (B).
Abbreviation: SL, Schwalbe line; TM, trabecular meshwork.



Spectralis (Heidelberg Engineering) with an add-on anterior segment lens (Heidelberg Engineering). Original image (A) and image labeled with anatomic landmarks (B).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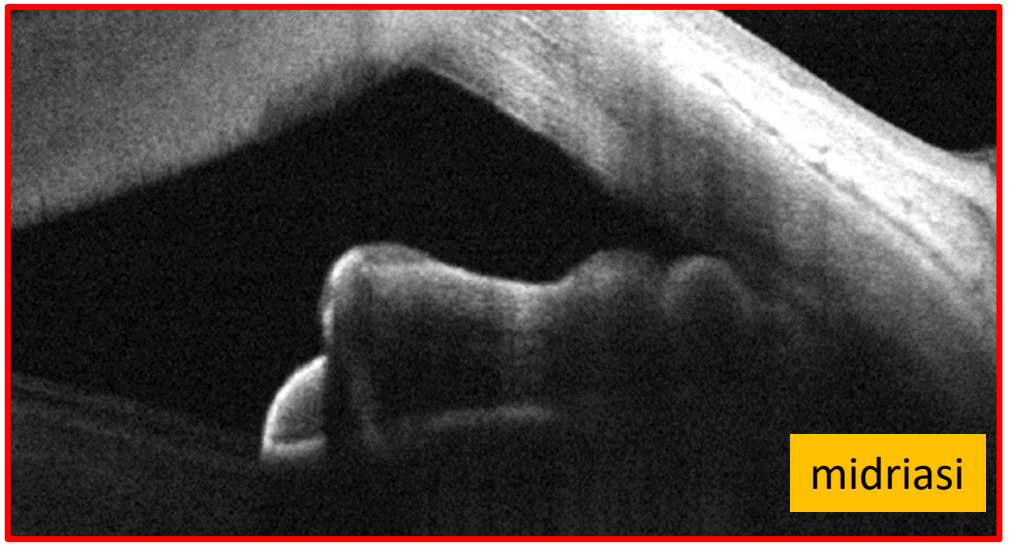
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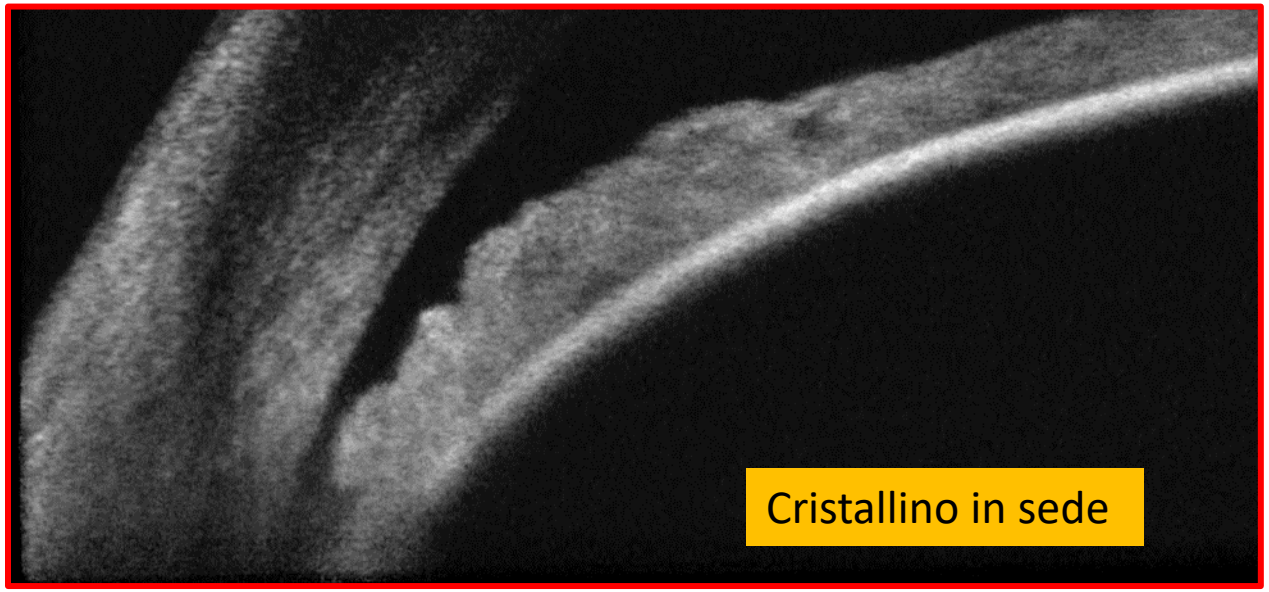
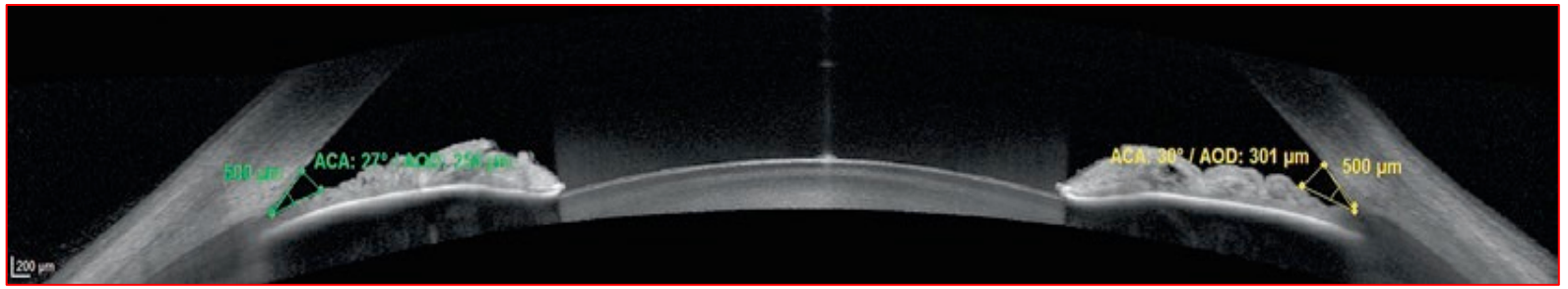

Cristallino in sede

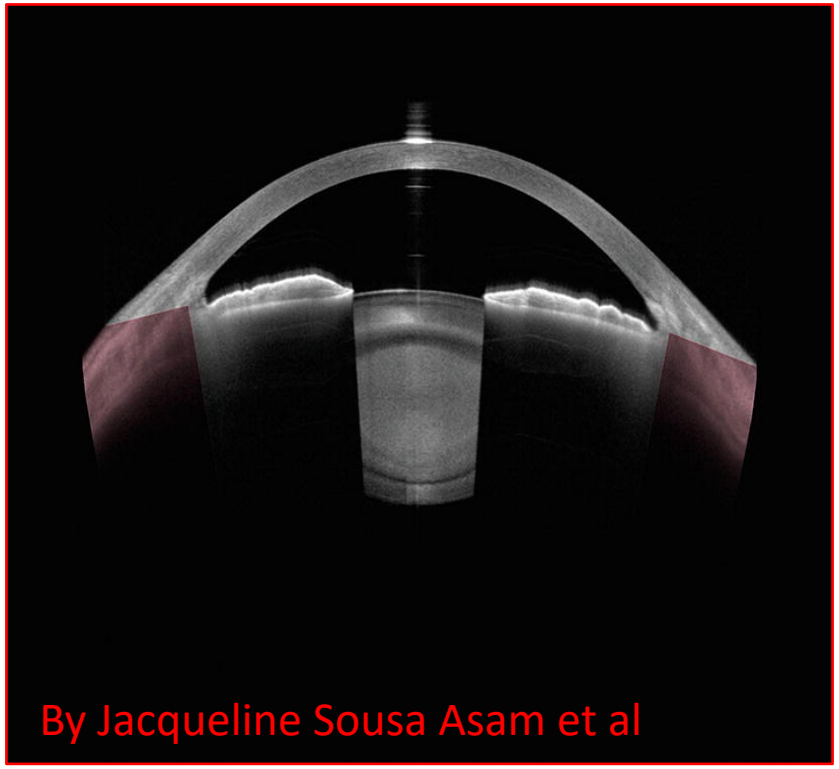

Estrazione del cristallino

Heidelberg Engineering SPECTRALIS ASM Module versus Anterion 830nm v/s 1300nm

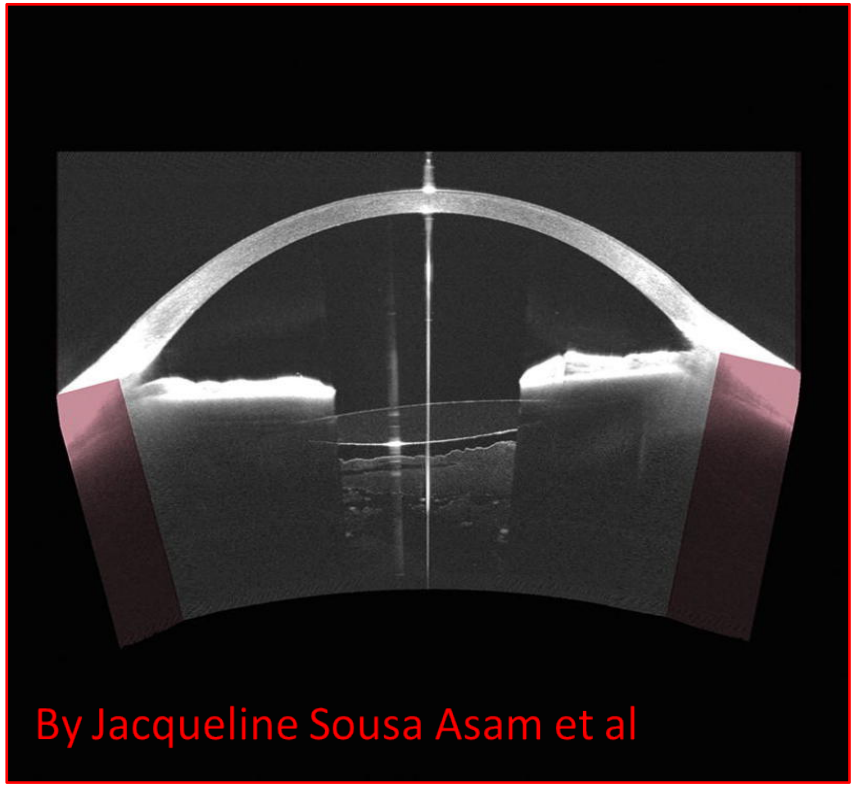


SD-OCT 830 nm

The SPECTRALIS Anterior Segment Module (ASM) is an add-on lens, accompanied by a software package that can be added to the SPECTRALIS SD-OCT device

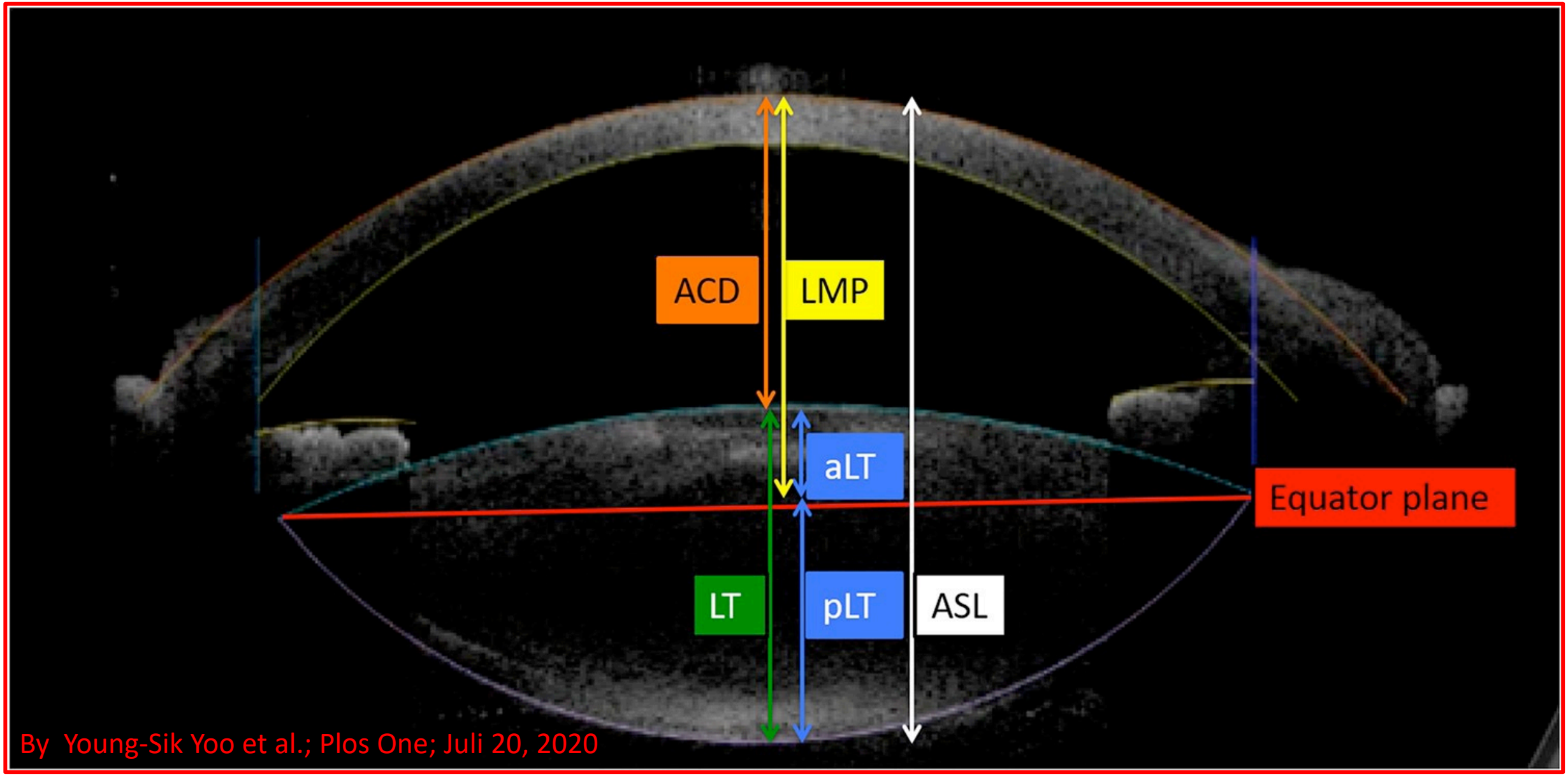


SS-OCT technology at 1300 nm delivers high-resolution images of the anterior segment along a large image depth, at a fast acquisition speed



ANTERION Metrics App. Dense cataract OCT image

ANTERION Metrics App. Posterior chamber intraocular lens after cataract surgery with anterior vitreous visualization



LMP Lens Meridien Parameter: ASL Anterion Segment Lens; LT Lens Thichness (aLT anterior part /pLT posterior part)
Catalys TM Precision Laser System Johnson & Johnson

Thank you for your kind attention!

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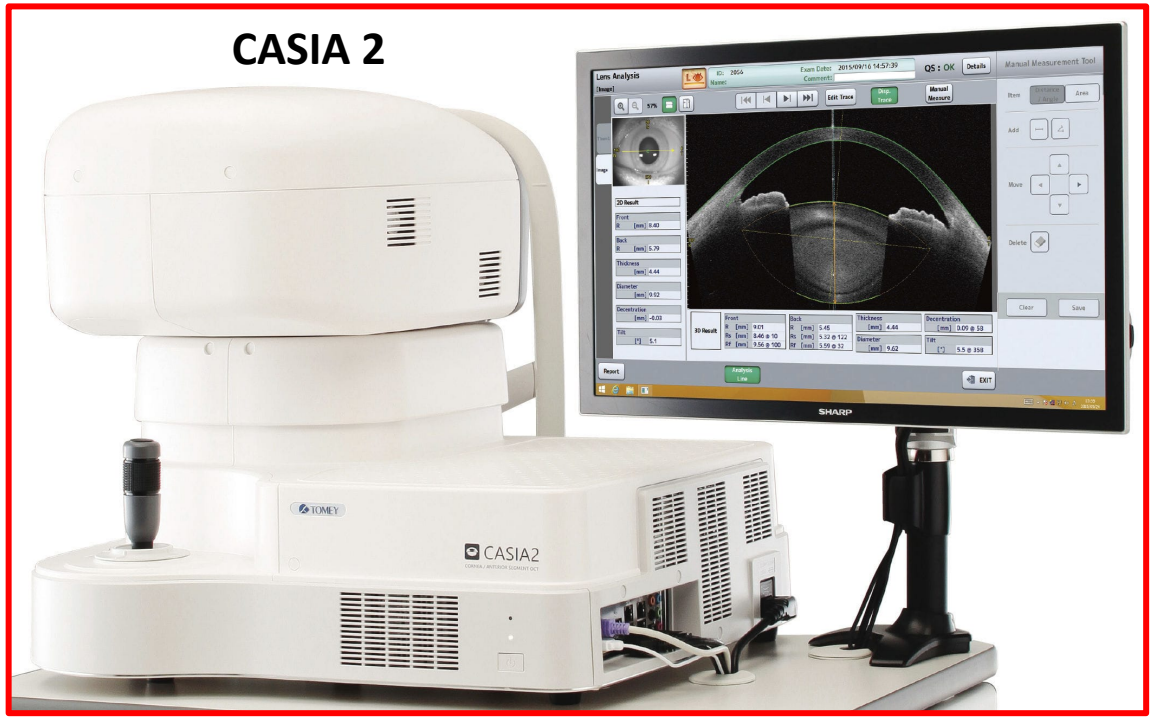
SS OCT 1300/1310 nm

CASIA 2



CORNEA APP
CATARACT APP
METRICS APP

Testing application for Cataract / Glaucoma / Cornea Surgery
Glaucoma angle analysis (360°)
Advanced imaging with high resolution and deep scanning depth (13 mm)
Very fast scanning speed (50.000 A-scan/sec)
Corneal topography + IOL choice & calculation
Lens shape analysis & trend analysis
Phakic IOL simulation

Toric intraocular lens calculation is based on measurements of the anterior surface of the cornea. More recently, estimation algorithms have been introduced for the posterior surface of the cornea, depending on the steep axis of the astigmatism on the anterior surface of the cornea