OPTOPOL
technology

1st SD-OCT in the World

20 Years of REVOlution

REVO HR
OCT | Fundus Camera

As simple as pressing
the start button

REVO HR
OCT | Fundus Camera

OPTOPOL
technology

ULTRA HIGH RESOLUTION

Optopol Technology introduced the world's first high resolution spectral OCT model, the Copernicus HR, in 2008. Today, continuing all efforts and taking functionality to the next level, Optopol Technology presents a new model in the REVO series – the REVO HR.

With a unique combination of super-fast scanning at 130,000 scans per second and ultra-high 3 µm resolution, this powerful device takes precision, accuracy, and detection of even the finest lesions to a whole new level.

The REVO HR is an all-in-one device you can use in a number of ways such as a full color fundus camera or as a combo, providing simultaneous OCT and fundus images for high quality OCT imaging, including OCT-A.
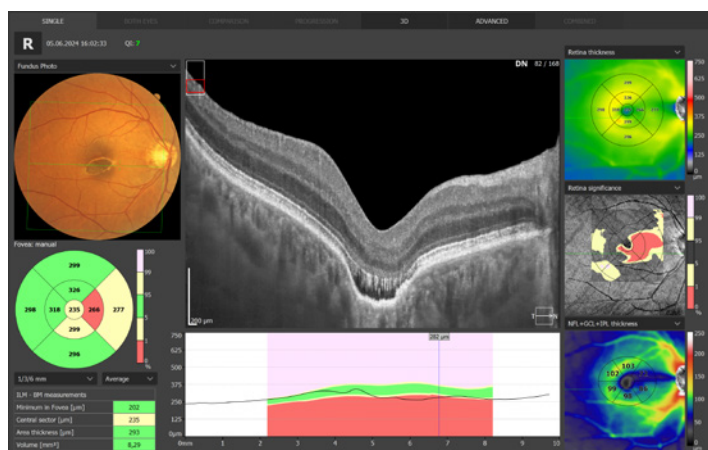
Multiple Functions in One Device
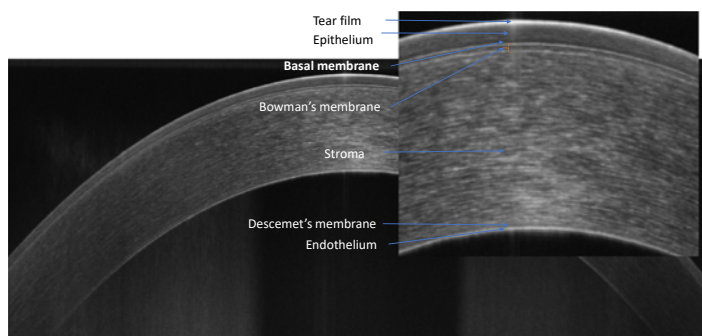
OCT MADE SIMPLE AS NEVER BEFORE

Simply position the patient and press the START button to acquire examinations of both eyes. The REVO HR guides the patient through the process with voice commands, which increases comfort and reduces patient chair time.

A PERFECT FIT FOR EVERY PRACTICE

With its small system footprint and single cable connection, the REVO HR can be placed in the smallest of exam rooms. The REVO can easily function as both a screening or an advanced diagnostic device with its variety of examination and analysis tools.

Corneal image with 3 µm optical resolution

High quality OCT scanning and a comprehensive analysis of the retinal layers combined with fundus imaging make the examination more versatile than ever.

The REVO HR offers an integrated non-mydriatic 12.3 MP fundus camera capable of capturing ultra-high quality and detailed color images. The REVO HR Fundus Camera is fully automated, safe, and easy to use.

- The advanced optical system ensures high quality imaging at a viewing angle as wide as 45°.
- New linking function makes it possible to link a single fundus photo to several OCT exams to reduce the number of photos.
- Easy to use image processing tools such as RGB channel, brightness, contrast, gamma and sharpness adjusters used with filters to deliver a stunning retinal image.
- Available view modes present detailed photos of one or both eyes as well as a time comparison of fundus photos.

The device offers all proven advantages of past generations of Spectral OCT devices, with the addition of a cutting-edge color fundus camera for a new level of diagnostic certainty.

AI DENOISE™

Improved tomogram quality powered by artificial intelligence. Advanced AI algorithms enhance the quality of a single tomogram to the level of an averaged tomogram obtained through multiple scans. The AI DeNoise algorithm filters out noise from the tomogram for the highest and smoothest image quality. The function is available on all tomograms and in every tab featuring them, including the 3D tab. On averaged tomograms the function is on by default. The moment a tomogram is loaded for review the software starts denoising it. After a short moment the original "undenoised" tomogram is replaced with a noise-free image.
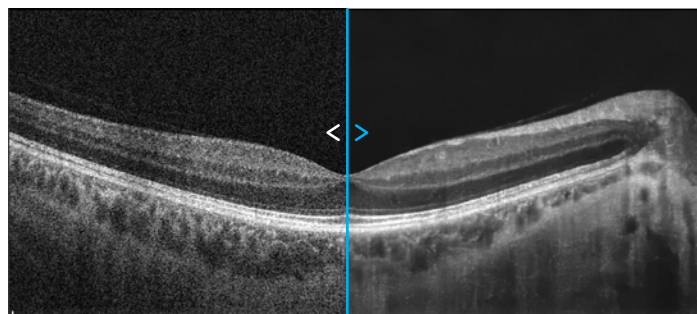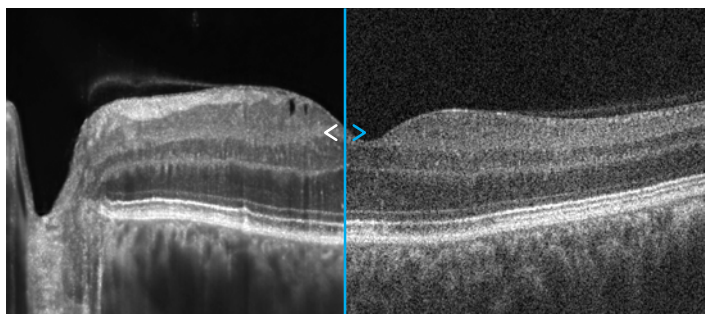

Raw Tomogram / AiDenoise Tomogram

REVOlution continues

AccuTrack™
Real time hardware eye tracking

The REVO HR now comes with a real-time hardware eye tracking function which compensates for blinks, loss of fixation and involuntary eye movements during OCT scanning. The iTracking function is still available and proves useful while examining patients who find it difficult to maintain fixation.
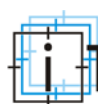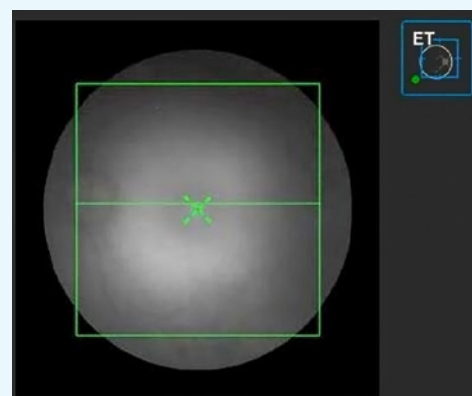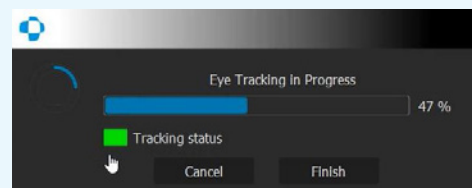

iTracking™

iTracking™ technology scans twice to compensate for any involuntary eye movements and blinks. It can be used for patients who have difficulty keeping their head on the chinrest during scanning with hardware eye tracking. After scanning, the system immediately creates an artifact-free MC examination using the Motion Correction Technology™. The elimination of eye movement and blinking artifacts ensures the high quality of Angio OCT images without patient inconvenience. Clear A-OCT data sets make it easier to interpret the condition of the retina vasculature.
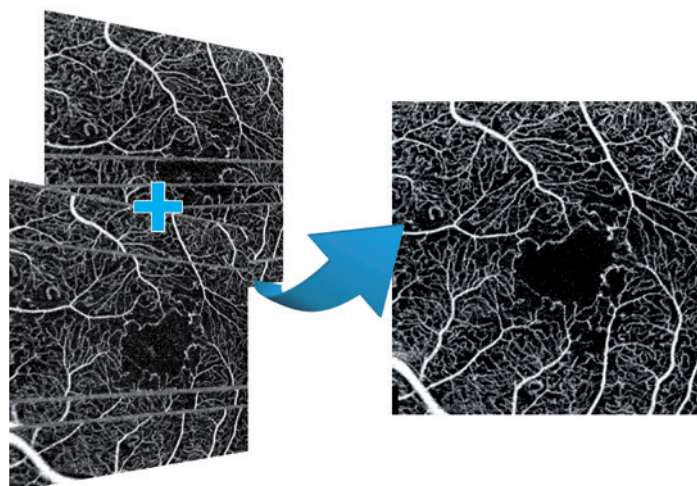
FR FULL RANGE

With scans presenting New Extended Depth™ software, based on our Full Range technology, this new imaging mode provides scans of increased depth for reliable and convenient observation of challenging cases. The Full Range mode is perfect for diagnosing even highly myopic patients.

~ 6 mm scan depth Full range scans
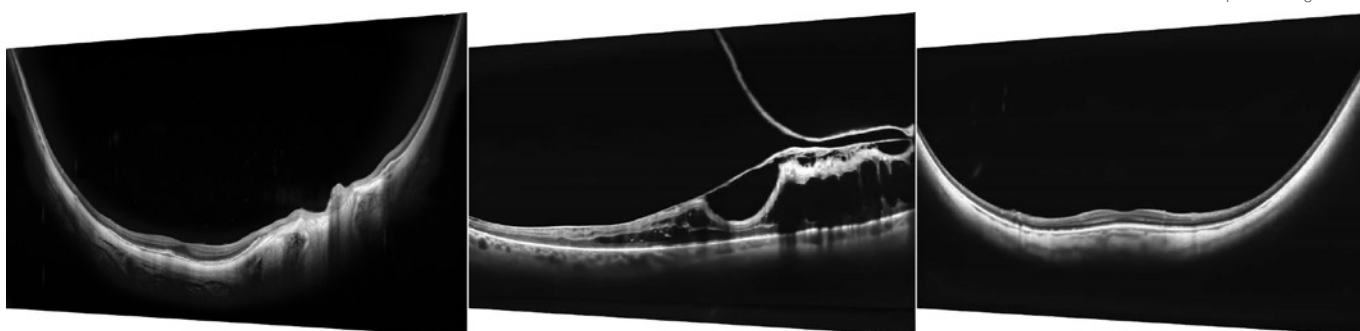
*Images courtesy of Bartosz L. Sikorski MD, PhD

FUNDUS CAMERA

A 12.3 MP Fundus Camera is integrated into our all-in-one OCT device capable of capturing detailed color images of ultra-high quality. The REVO HR is fully automated, safe, and easy to use.

- Color fundus image capture is possible with a pupil as small as 3.3 mm.
- Easy to use fundus image processing tools deliver a stunning retinal image.
- Available modes deliver detailed photos of one or both eyes, as well as a chronological comparison of the fundus photos.

- Link a single fundus photo to several OCT scans.
- IR fundus preview and photo capture settings are adjusted automatically based on the IR fundus preview.
- To meet the requirements of screening programs and allow the user to take exams for both eyes in non-mydriatic mode, the device now has three auto flash levels.
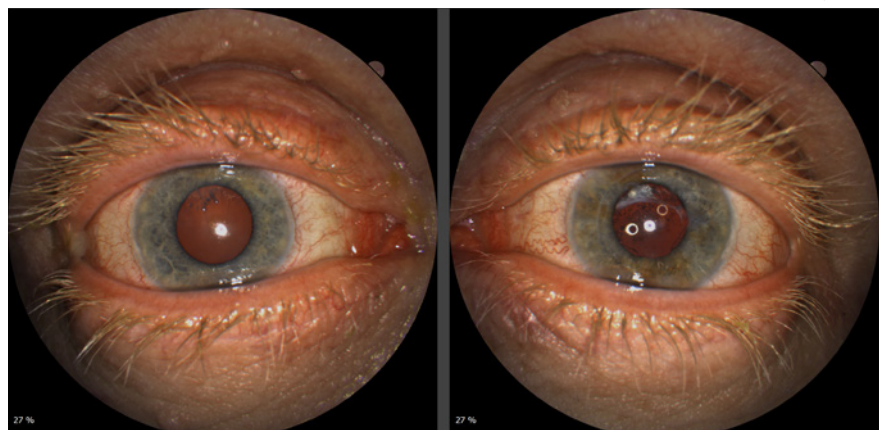
Fundus Photo Both Eyes View
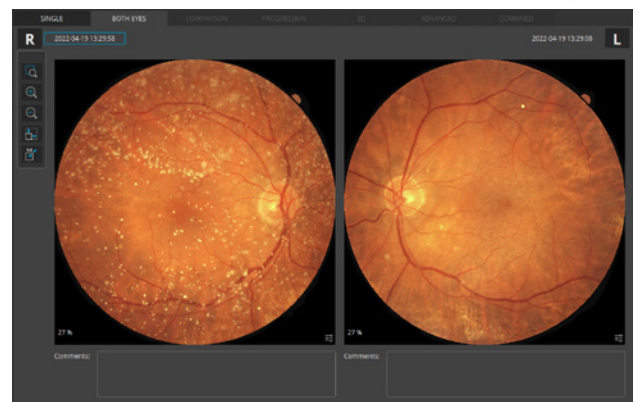
Fundus Photo Comparison View

Anterior Photo Eye View
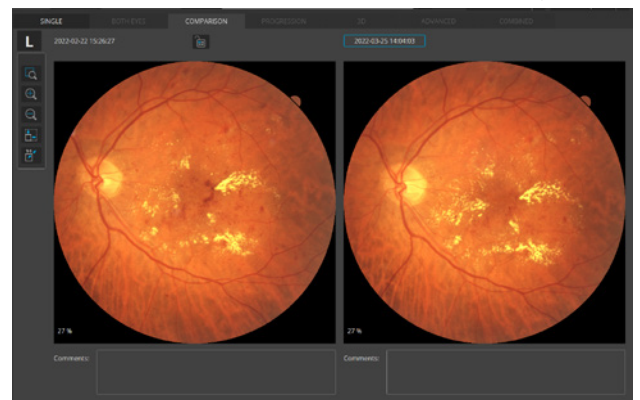
ANTERIOR SEGMENT PHOTO

Anterior segment photograph mode is a new mode which allows the user to take color photos of the anterior segment, presenting the cornea, eyelid, pupil, and sclera.

REVOlution continues

AI RETINA

This new layer segmentation for the posterior segment is based on artificial intelligence, resulting in more accurate recognition of retinal layer boundaries. The AI system has a direct impact on the accuracy of the clinical assessment and the assessment of the status of areas of pathology in the retina.

This level of detection accuracy empowers the eye care and results in more detailed screening. Overall, it is a more effective way of running a pathology evaluation.

12 retinal layers segemntation

AI segmentation will be important for follow-up examinations, bringing a more accurate diagnosis when analysing pathology over time. It can also be used in patients who have already been monitored.

In addition, a new definition of ILM – BM retinal thickness has been added for more sensitive monitoring patients with subretinal disorders.
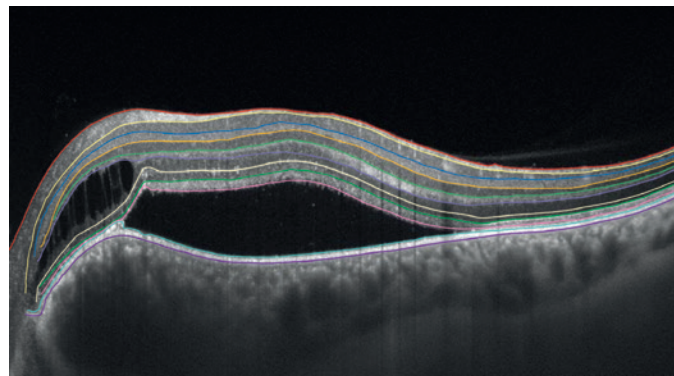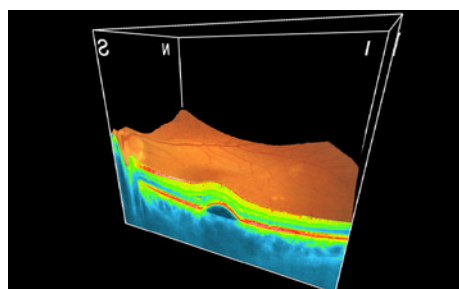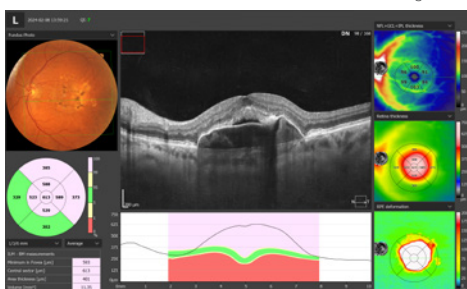
RETINA

A single 3D Retina examination is sufficient to perform both Retina and Glaucoma analysis based on retinal scans. During the analysis, the software automatically recognizes twelve retinal layers to ensure a more precise diagnosis and mapping of any changes in the patient's retina condition.
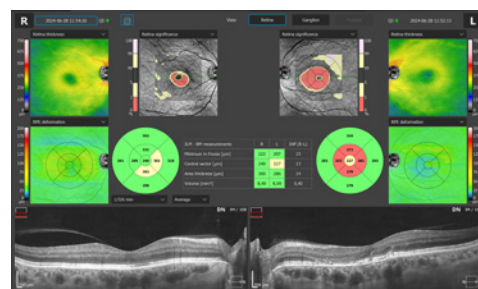


3D

Single View

Both View

FOLLOW-UP

The high density of standard 3D scans allows the operator to precisely track disease progression. The operator can analyze changes in morphology, quantified progression maps, and evaluate the progression trends.

PRECISE REGISTRATION

The software can track 3D scans and register them to the OCT baseline exam by recognizing patterns in the shape of blood vessels. Active tracking and post-processing point-to-point registration allows the user to precisely see and track the changes in retina morphology in Comparison and Progression analysis.
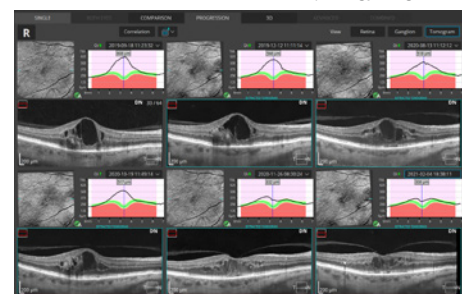

Comparsion
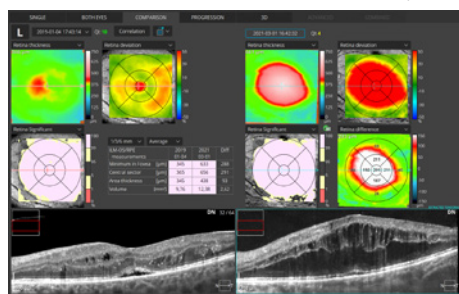
Quantification Progression
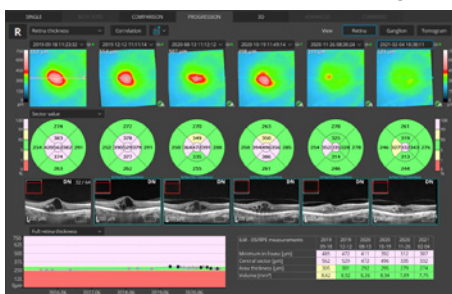
Morphology Progression

EXTRACTED TOMOGRAMS

Advanced correlation now enables the creation of extracted tomograms for increased follow-up precision. This compensates for image misalignment occuring between sessions to make cross-sectional images of the same area available during consecutive sessions.

NEW

UWF

ULTRA-WIDEFIELD MODULE[1]

The UWF module provides a new wide perspective of imaging up to ~105º with a single scan. It allows the user to image the macular area along with the far periphery to capture the early stages of disease in the posterior part of the eye. The module allows 3D imaging for full analysis, averaging in enhancement mode, and angio OCT with the ability to visualise perfusion problems in the periphery.

UWF FR Line scan – 21 mm width and 5.4 mm depth

With the UWF feature in Extended DepthTM software, the diagnostic of high myopia patients will be even easier while selecting Full Range scanning technology.

For patients with difficulties, the UWF feature will provide an option of a Radial scan. This scan will take less time to attain a proper signal from the eye.

UWF 3D scan report

UWF fundus reconstruction

[1] An optional software module

REVOlution continues
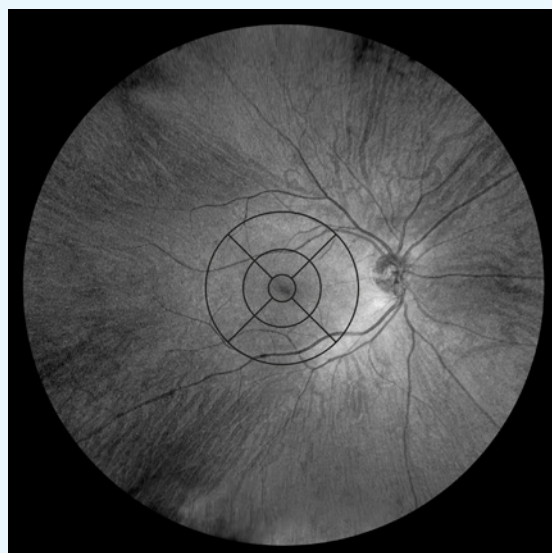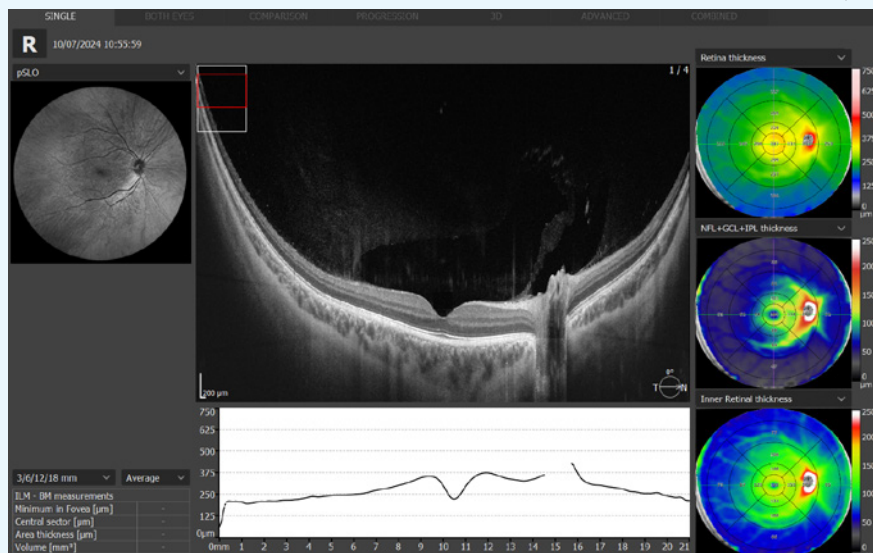
WIDEFIELD ANALYSIS

A single Widefield 3D examination is now sufficient for the rapid assessment of both the retina and the glaucoma. Visualize and assess the thickness of the retina, ganglion cell, nerve fibers layers and optic nerve head on comprehensive data report when performing a rapid examination mapping up to 15×15 mm section.

Widefield report presents horizontal and vertical tomograms and will include the topography of the disc creating helpful observation of glaucoma patients.
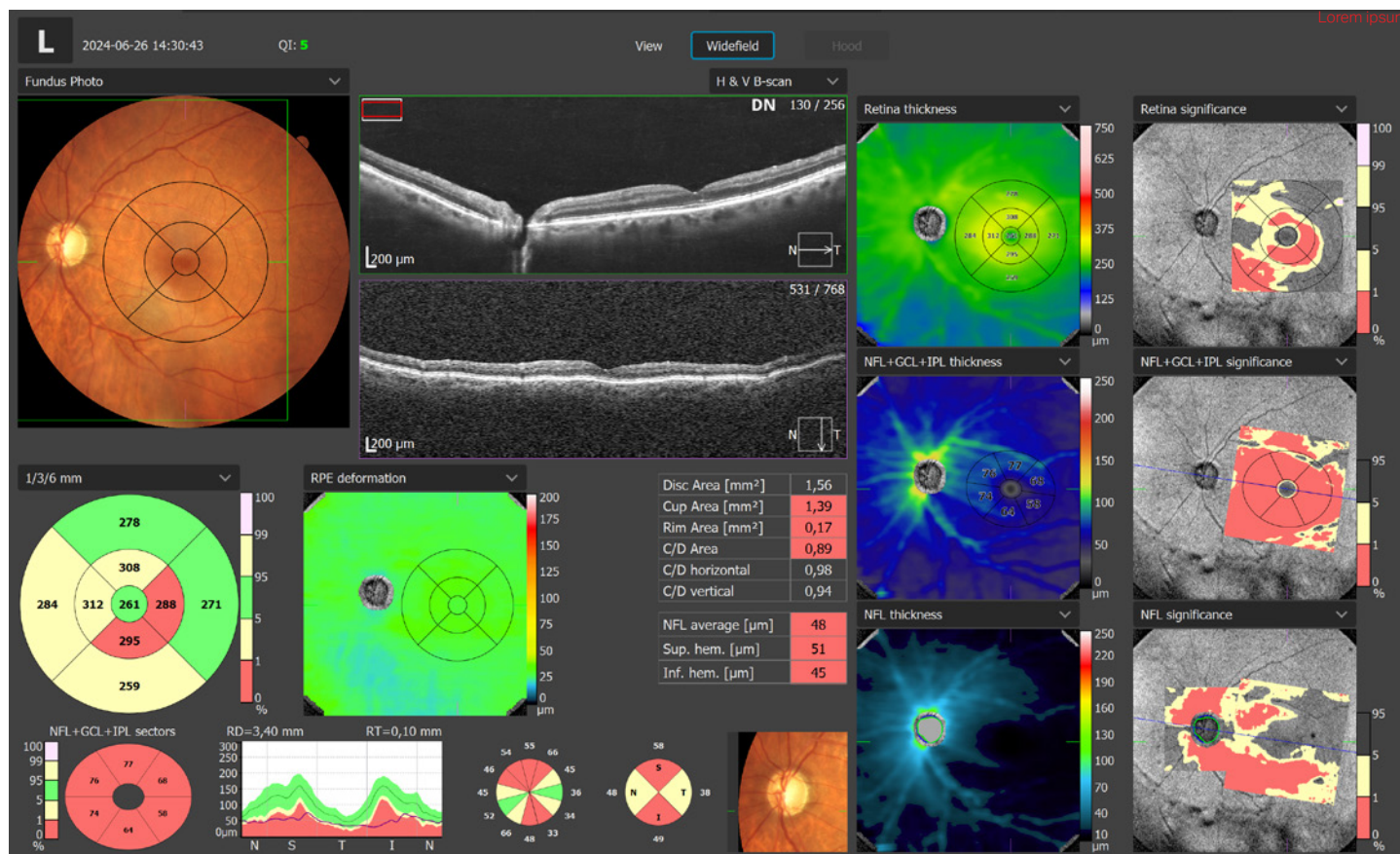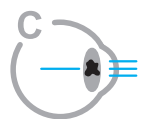
CATARACT MODE

The cataract mode in the REVO series opens up new possibilities for patients with challenging cases. This feature provides visualisation of structures hidden beneath opaque layers, making it ideal for diagnosing eye conditions that were previously difficult or impossible to study in patients with cataract, corneal oedemas or very dense floaters.

The cataract mode allows the scanning speed and sensitivity of the OCT to be modified for better visualisation of patients with opaque media.


Normal

Fine

Ultra Fine
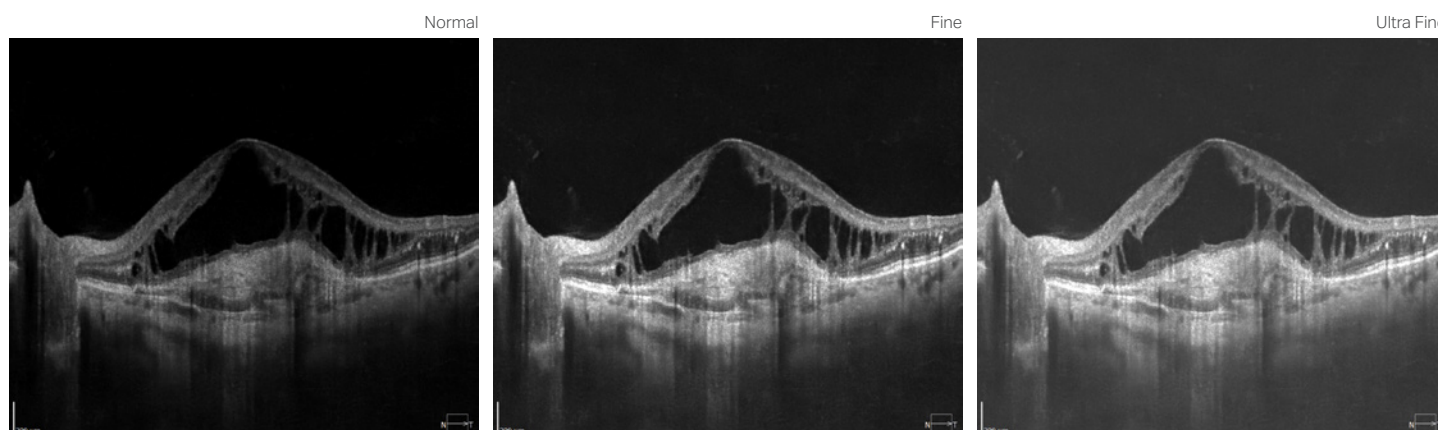
GLAUCOMA

Advanced view provides combined information from Retina and Disc scans to integrate details of the Ganglion cells, RNFL, ONH in a wide field perspective for comprehensive analysis for both eyes.

The REVO DDLS (Disc Damage Likelihood Scale) uses 3 separate classifications for small, average and large discs. It supports the practicioner in a quick and precise evaluation of the patient's glaucomatous disc damage.

Asymmetry analysis of Ganglion layers between hemispheres and between eyes helps to detect and identify glaucoma in early stages and in non-typical patients.

Precise registration and comprehensive glaucoma analytical tools for quantification of the Nerve Fiber Layer, Ganglion layer and Optic Nerve Head with DDLS provide precise diagnostics and monitoring of glaucoma over time.
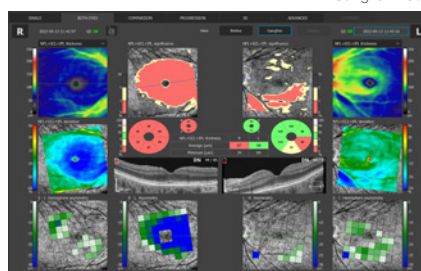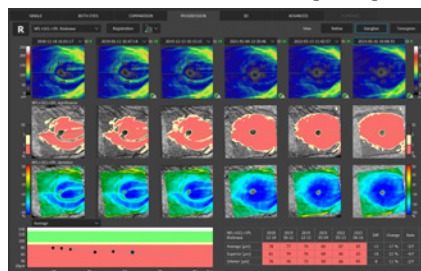

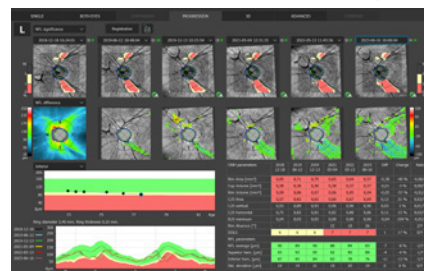Advance Retina & ONH
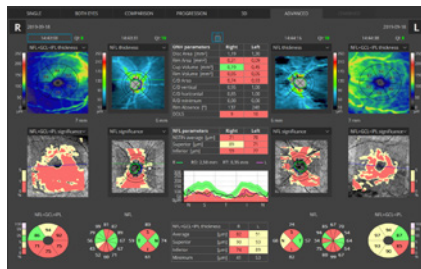
ONH Single

Ganglion Both

ONH Both

Ganglion Progression

ONH and NFL progression

COMPLETE YOUR GLAUCOMA REPORT

To eliminate the common problem of understanding the patient's IOP, the pachymetry module provides IOP Correction value. With the implemented Adjusted IOP formula, you can quickly and precisely understand the measured IOP value. The Pachymetry and Anterior Chamber Angle Verification require no additional attachments. The predefined Glaucoma protocol, which consists of Retina, Disc and Anterior Chamber Full range scan, can be done automatically to reduce patient chair time.

Narrowing angle
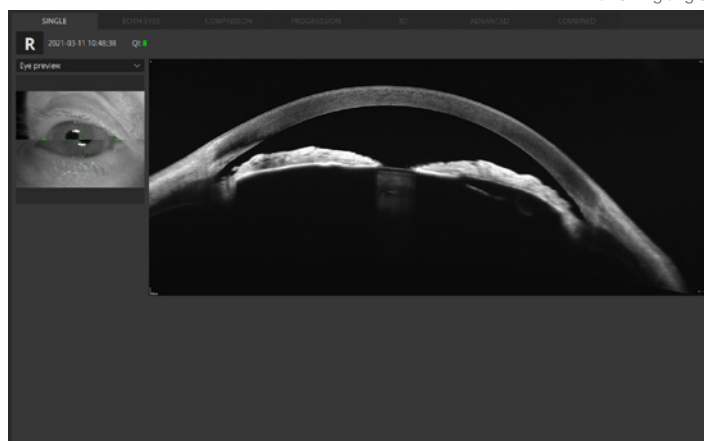
Anterior single view
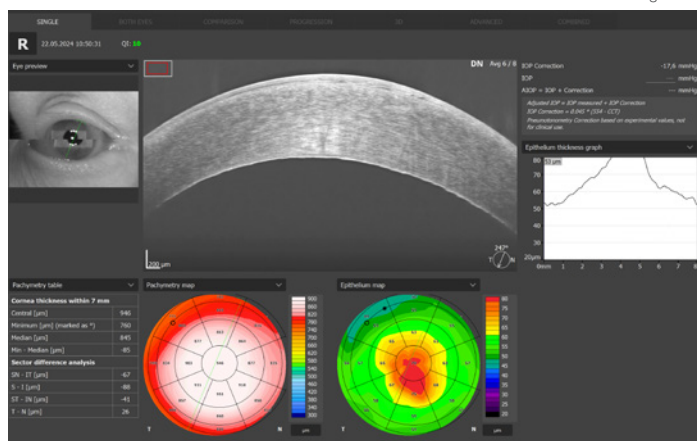
REVOlution continues

COMPREHENSIVE GLAUCOMA SOLUTION[1]
Structure & Function - Combined OCT and VF results analysis

Comprehensive glaucoma analytical tools for quantification of the Nerve Fiber Layer, Ganglion layer and Optic Nerve Head with DDLS provide precise diagnostics and monitoring of glaucoma over time.

With the gold standard 14 optic nerve parameters and a new Rim to Disc and Rim Absence the description of ONH condition is quick and precise.

Structure & Function report

COMPRHENSIVE STRUCTURE AND FUNCTION REPORT INCLUDES:

- VF sensitivity results (24-2/30-2 or 10-2)
- Total and Pattern Deviation probability graphs for VF results
- Reliability and Global indices for VF results
- Combined map of Structure & Function
- Ganglion cells analysis (GCL+IPL or NFL+GCL+IPL)
- ONH and NFL analysis including charts and comparison tables

- NFL Asymmetry Plot
- Nasal and Temporal sectors have been spilt to present structural changes better
- Compare exact numerical sensitivity values

SINGLE PAGE REPORT[1]

S+F provides a quick and comprehensive single page report for glaucoma management.
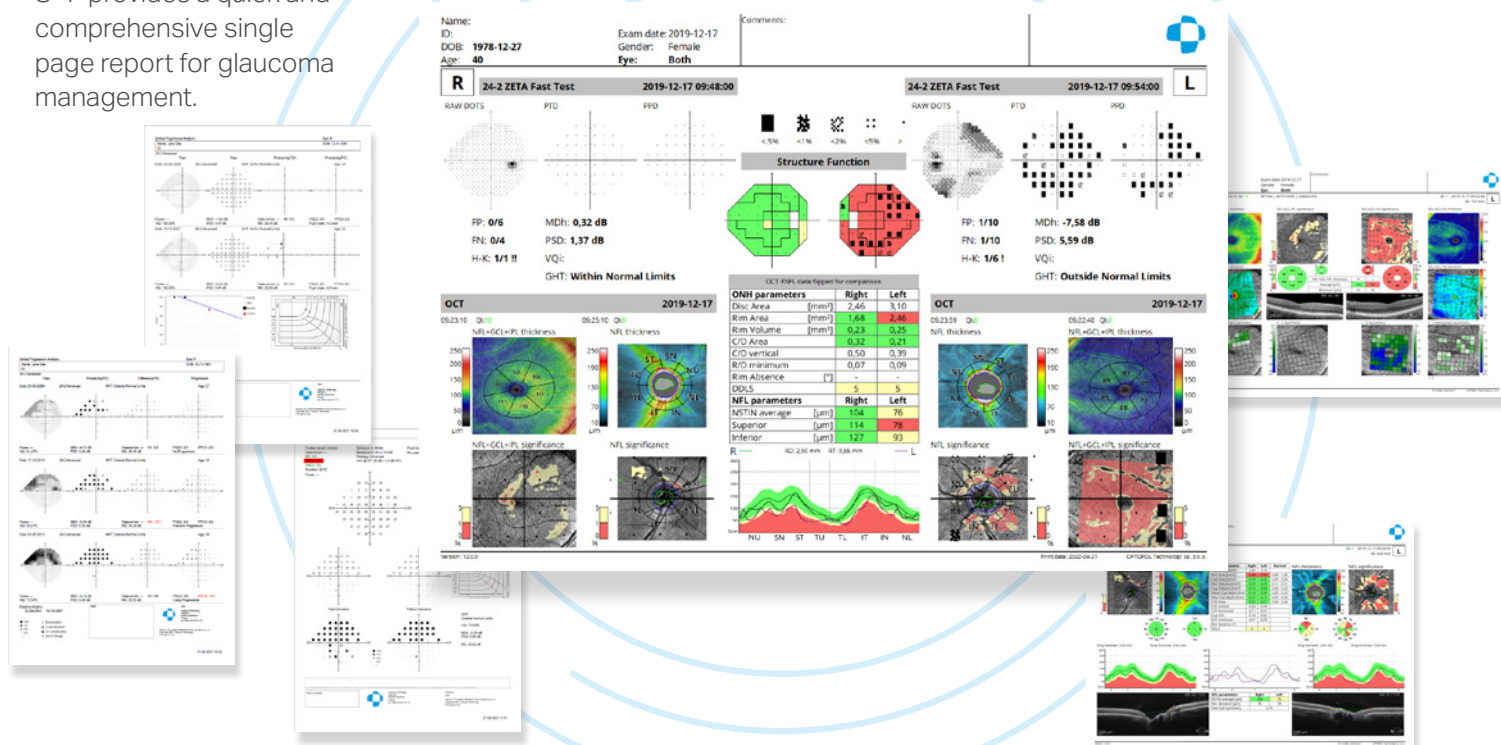
[1] Integrates with Optopol PTS perimeters running software version 3.8 or above.

RA OCT ANGIOGRAPHY[1]

This non-invasive dye free technique provides the visualization of the microvasculature of the retina. Both blood flow and structural visualization give additional diagnostic information about many retinal diseases.

Angiography scan allows the operator to assess the structural vasculature of the macula, the periphery or the optic disc.

Extremely short scanning times of 1.6 seconds in standard resolution or 3 seconds in high resolution. Now, Angiography OCT can become routine in your diagnostic practice.

[1] An optional software module

ANGIO ANALYSIS METHODS

Vessel Density Map

Skeleton Density Map
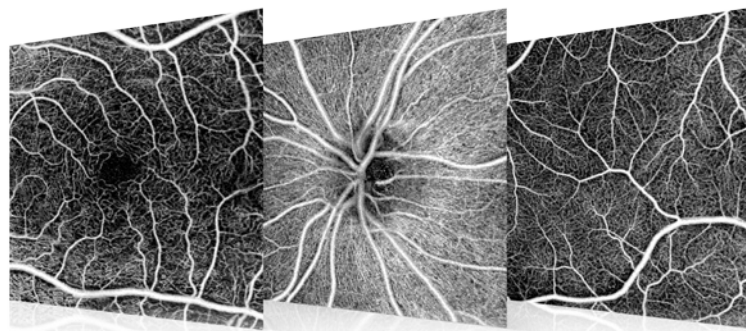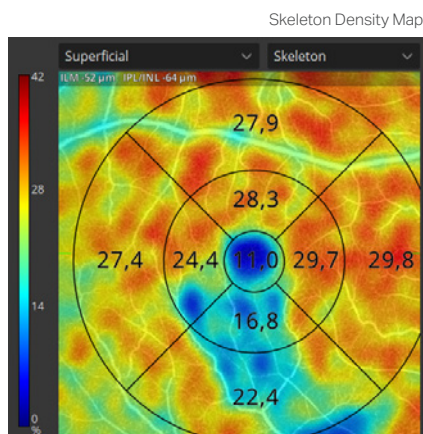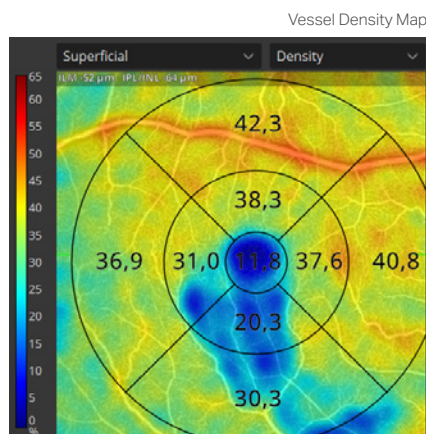
QUANTIFICATION

The quantification tool provides quantification of the vasculature in the entire analyzed area along with values in specific zones and sectors.

The heat map of the analyzed vasculature allows faster evaluation of vascular structure conditions.

Multiple quantification methods increase the sensitivity of analyses for specific diseases.

Available quantification methods:

- Vessel Area Density - defined as the total area of perfused vasculature per unit area in a region of measurement.
- Skeleton Area Density - defined as the total area of skeletonized vasculature per unit area in a region of measurement.

Quantification is available for a specific layer in Angio OCT exam:
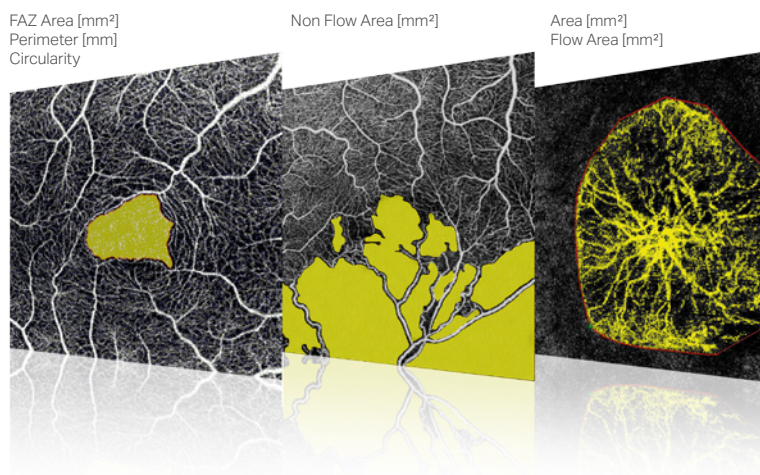
- Retina: Superficial Plexus and Deep Plexus
- Disc: RPC - Radial Peripapillary Capillary

ANGIO-ANALYTICAL TOOLS

FAZ – Foveal Avascular Zone measurements enable quantification and monitoring of changes in superficial and deep vascular layers. FAZ tool is also available for narrow and wide scans.

VFA – Vascular Flow Area can be used to examine pathologically affected structures to precisely measure the vascularization area. The user can easily measure area on a predefined or selected vascular layer.

NFA – Non Flow Area measurement makes it possible to quantify the Non Flow Area on the OCT Angio examination. It provides the sum of all marked areas.

FAZ Area [mm²]
Perimeter [mm]
Circularity

Non Flow Area [mm²]

Area [mm²]
Flow Area [mm²]

REVOlution continues

MAXIMUM INTESITY PROJECTION – THE MIP ALGORITHM

MIP

Choose better visualization of angio data for analysis with the Maximum Intensity Projection (MIP) feature. This tool is useful for visualizing OCT-A data as it enables easier identification and tracking of high-intensity structures such as blood vessels.

AIP

MIP
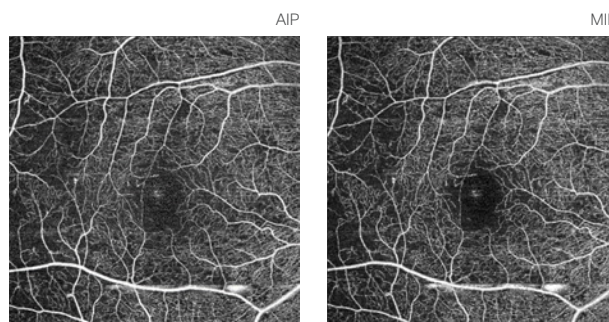
A COMPLETE SET OF ANGIO OCT ANALYSIS VIEWS

This software allows the user to observe, track and compare changes in the microvasculature of the retina in both eyes.

Standard Single View

Detailed Single View

Comparison view

Progression Analysis view
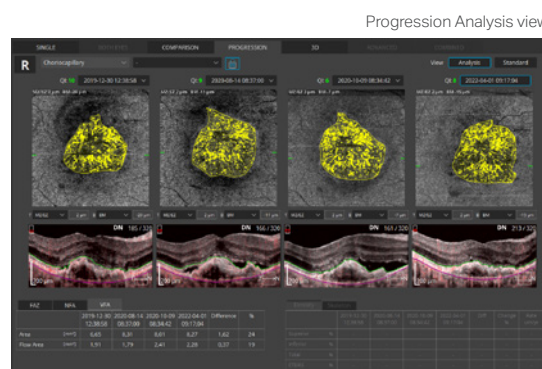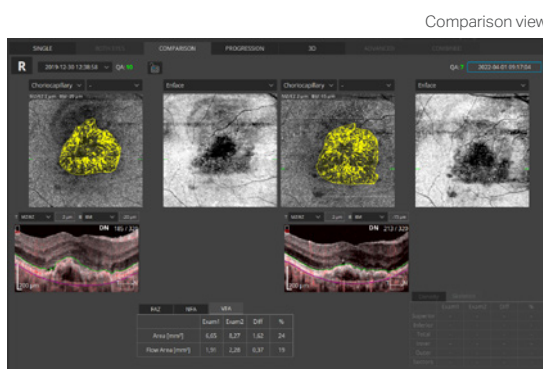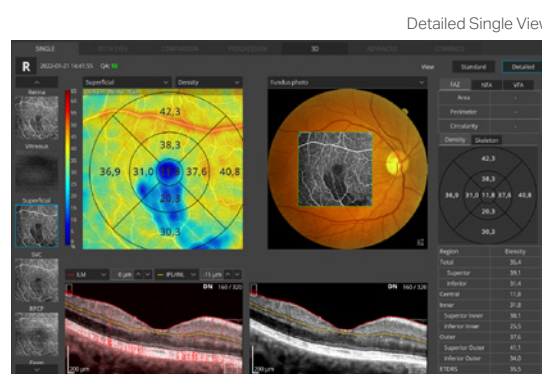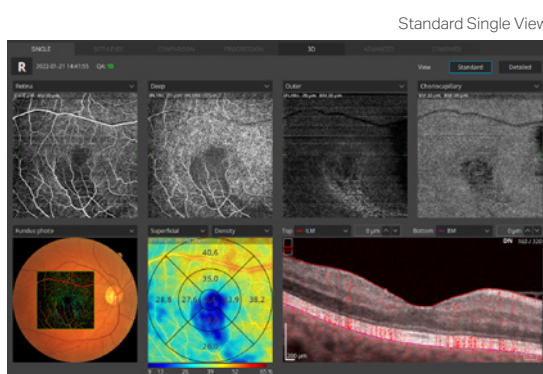
ANGIOGRAPHY MOSAIC

The Angiography mosaic delivers high-detail images over a large field of the retina. Available modes present a predefined region of the retina in a convenient way.

In manual mode it is possible to scan the desired region. Built-in analytics allow the user to see vascular layers, en face or thickness maps.

10×6 mm   12×5 mm   7×7 mm   10×10 mm

AM   AM   AM   AM
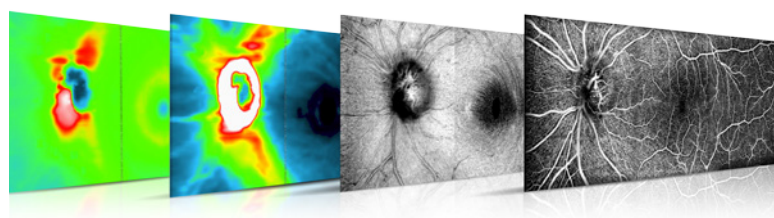
PDR, Angio Mosaic mode: 10x10 mm

*Images courtesy of Bartosz L. Sikorski MD, PhD

11

ANTERIOR CHAMBER

AC
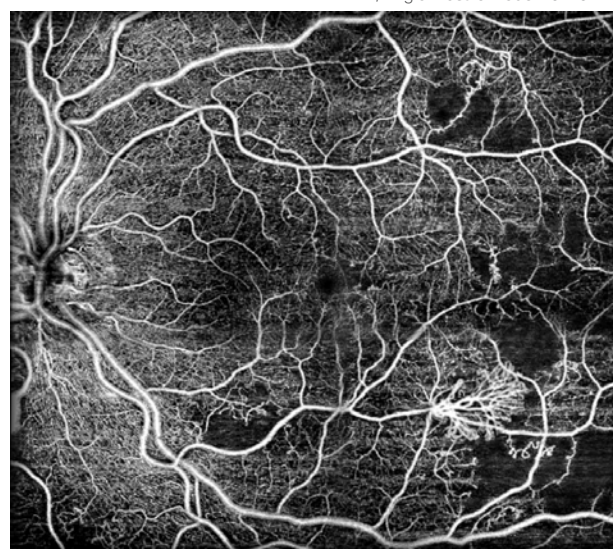
The built-in anterior lens allows the user to perform imaging of the anterior segment without installing additional lenses or a forehead adapter. Now you can display the entire anterior segment or focus on a small area to bring out the details of the image.

FULL RANGE TECHNIQUE

Anterior Chamber exam with a fast view of the entire Anterior Chamber makes the evaluation of gonioscopy and the verification of cataract lens easier and faster.

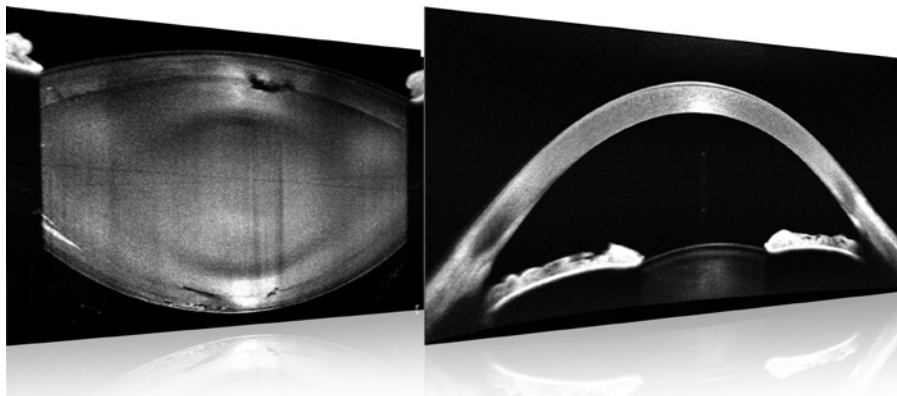OCT gonioscopy provides the visualization of both iridocorneal angles together with information on iris configuration on a single, high-resolution 360º radial scan scan for glaucoma evaluation.

Narrowing angles - 16 mm Full Range Anterior Chamber scan
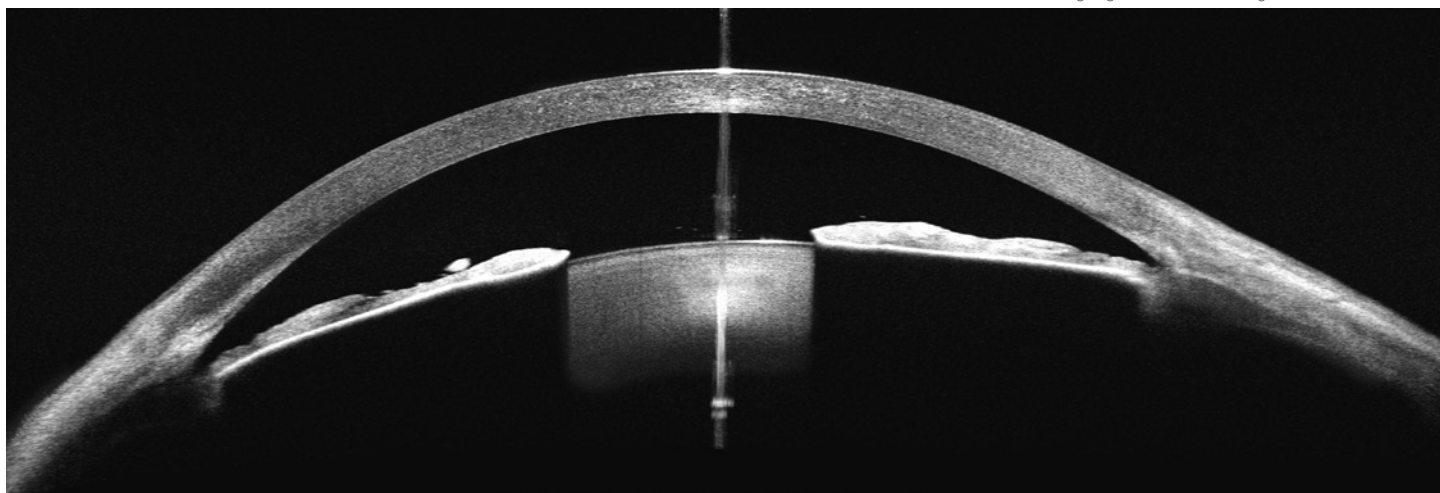
* Images courtesy of Prof. Edward Wylegała MD, PhD

CORNEA AND EPITHELIUM

AI

Presentation of the results for both eyes allows quick and precise evaluation of the condition of the patient's anterior segment.

Epithelium and Pachymetry maps are included in the standard package.

AI Segmentation

Cornea Single

Both

Comparison

Progression

REVOlution continues

OCT TOPOGRAPHY[1]

T-OCT™ is a pioneering way to provide detailed corneal curvature maps by using posterior dedicated OCT. Anterior, Posterior surfaces, and Corneal Thickness provide the True Net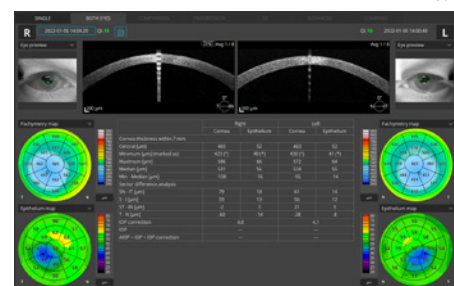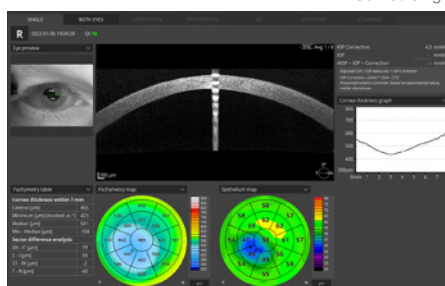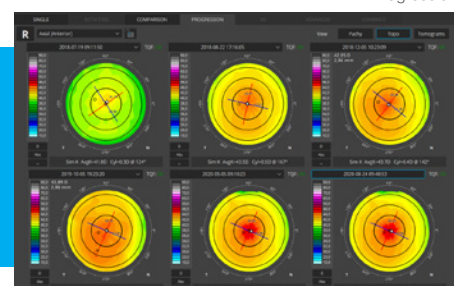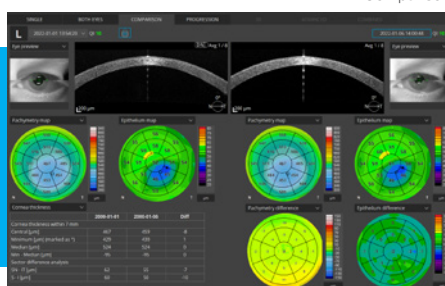 Curvature information. With the Net power, a precise understanding of the patient's corneal condition comes easily and is free of errors associated with modeling of posterior surface of the cornea. The REVO T-OCT module provides Axial maps, Tangential maps, Total Power map, Height maps, Epithelium and Corneal thickness maps.

The corneal topography module shows the changes in the cornea on the difference map view. Customize favored view by selecting from a variety of available maps and display options. Fully Automatic Capture with examination time of up to 0.2 sec makes testing quick and easy.

[1] An optional software module

TOPOGRAPHY MODULE PROVIDES:

Full featured Corneal mapping of Anterior, Posterior and real curvatures. Presentation of K's values of Anterior, Posterior and real power as Sim-K, Meridian and semi Meridian.

COMPARE THE EXAMS

Comprehensive software features a range of selectable views: one or both eyes, comparison and progression.

See details on standard single view and easily see corneal asymmetry on the both eyes view.

The follow-up feature in the T-OCT™ module allows you to fully compare the changes in the corneal topography over time for:

• LASIK patients
• Keratoconus patients
• Contact lens wearers

Single

Both

Comparison

Progression
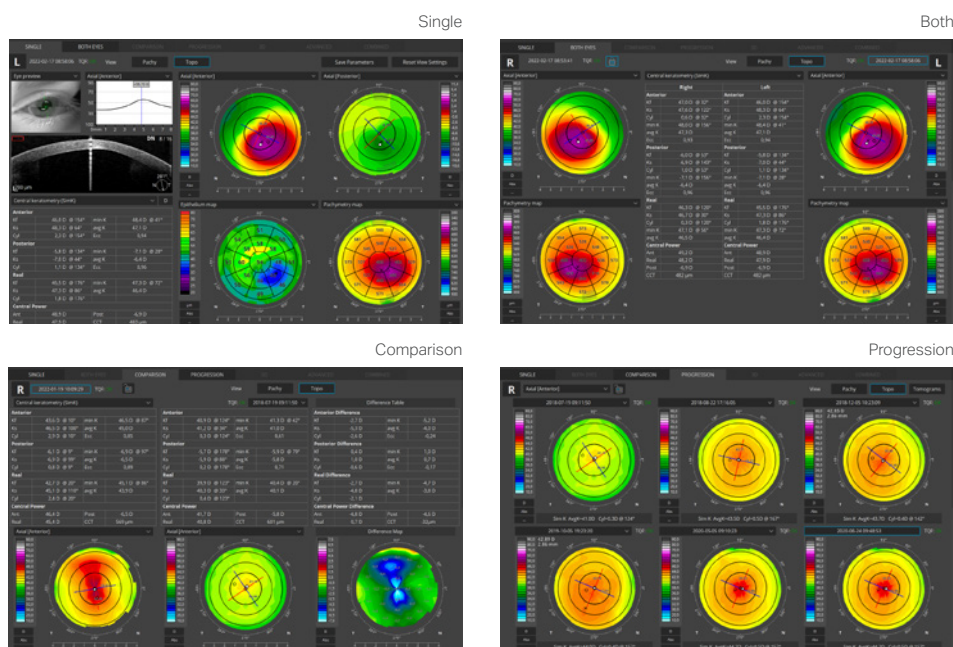
* Image courtesy of Prof. Edward Wylegała MD, PhD

KERATOCONUS SCREENING

Easily detect and classify keratoconus with the Keratoconus Classifier. The classification is based on KPI, SAI, DSI, OSI, and CSI. In the early stages of keratoconus, the results can be complemented by Epithelium and Pachymetry maps.

Normal

ATR Astigmatism

Keratoconus

NEW

MY
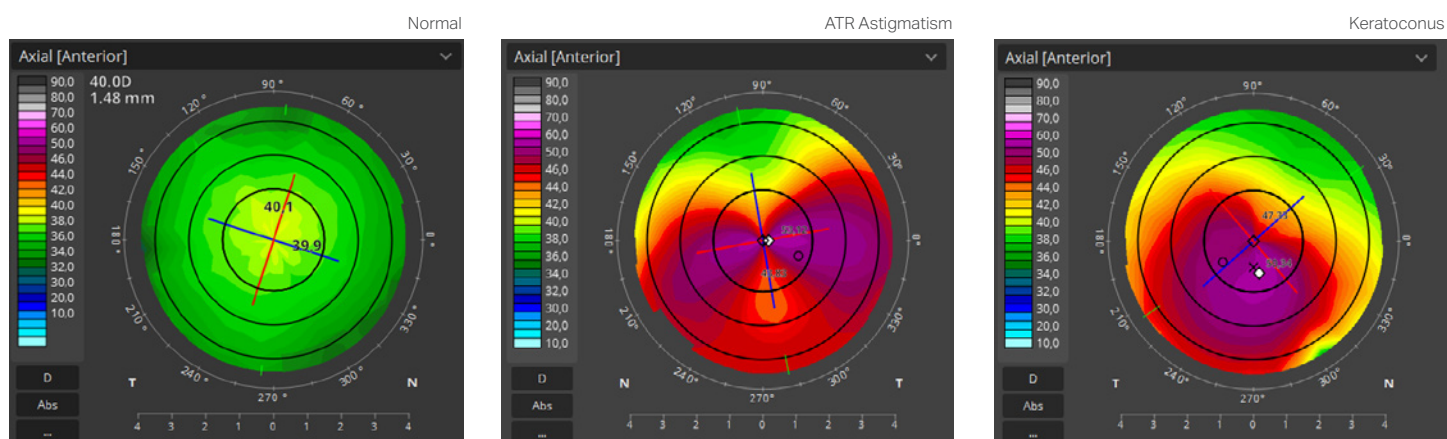
HIGH MYOPIA[1]

The Myopia Forecast module opens progression of the ocular structure parameters according to trends over population mode. Usage reference based on research from multiple universities along with environmental factors allow the monitoring of changes from childhood to adolescence.

The REVO offers exclusive selection of reference data based on different studies over various time frames and demographics. Reference data can be selected from NICER[2] study San Diez[3] or Tideman[4].

This module significantly enhances myopia risk assessment for patients initial prediction for child's myopia risk, additionally providing the possibility of refractive errors and K readings monitoring.

Highlighting the treatment period through graphs enables easy interpratation of treatments effects to evaluate counteracting while myopia progression.

[1] An optional software module

Based on:
[2] Sara McCullough, Gary Adamson, Karen M. M. Breslin, Julie F. McClelland, Lesley Doyle & Kathryn J. Saunders; Axial growth and refractive change in white European children and young adults: predictive factors for myopia
[3] Pablo Sanz Diez, Li-Hua Yang, Mei-Xia Lu, Siegfried Wahl, Arne Ohlendorf; Growth curves of myopia-related parameters to clinically monitor the refractive development in Chinese schoolchildren
[4] Jan Willem Lodewijk Tideman, Jan Roelof Polling, Johannes R. Vingerling,Vincent W. V. Jaddoe, Cathy Williams, Jeremy A. Guggenheim and Caroline C. W. Klaver, Axial length growth and the risk of developing myopia in European children ("Acta Ophthalmol" 2018: 96: 301–309 doi: 10.1111/aos.13603 https://creativecommons.org/licenses/by/4.0/")

High myopia trend analysis

AL
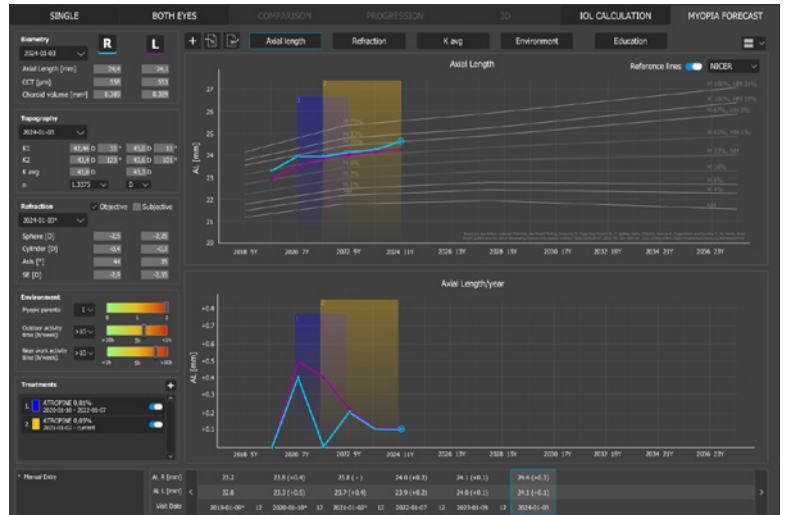
OCT BIOMETRY[1]

B-OCT® is an innovative method of using the posterior OCT device to measure ocular structure along eye axis. OCT Biometry provides a complete set of biometry parameters: Axial Length (AL), Central Cornea Thickness (CCT), Anterior Chamber Depth (ACD), Lens Thickness (LT), Pupil size (P), and White to White (WTW).

B-OCT® module is available in two options:

• Standard: featuring IOL calculator
• Basic: for high myopia managment

The biometry image provided by the REVO FC presents measurement calipers on all structural boundaries of the eye. This enables easy visual identification of the measured structures or manual correction of the measurement. With a simple cursor shift, it is possible to precisely set boundaries in difficult cases with 5 µm axial resolution. The device eliminates the common uncertainty of how the optical biometer classifies the boundaries in non-typical patients.

[1] An optional B-OCT module

Single View

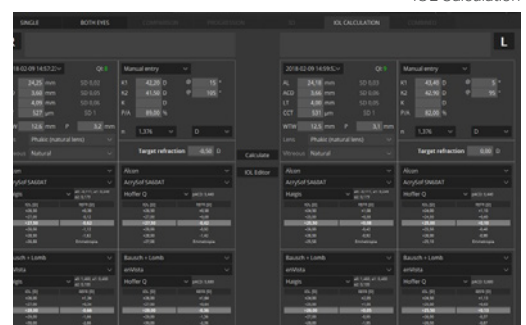
Result view

IOL
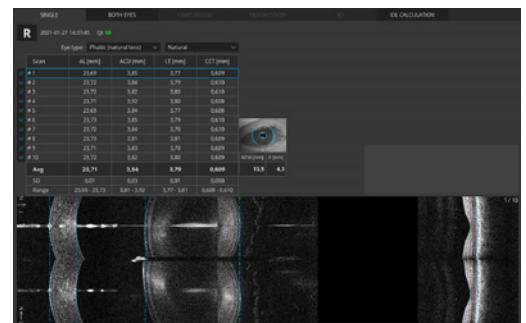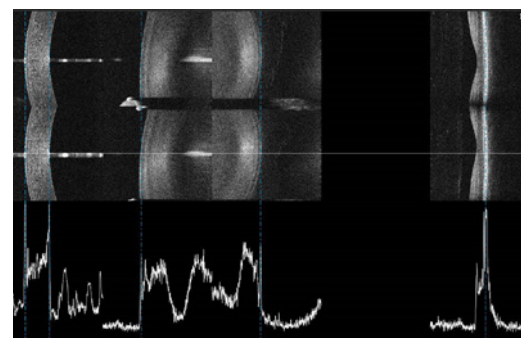
IOL CALCULATOR [1,2]

IOL formulas allow the user to calculate IOL implant parameters. Our systems now support the latest IOL data base standard, IOLCon.org, so that you can always keep your library up-to-date.

[1] Biometry module required
[2] IOL Calculator required seperate licence

IOL Calculation

REVOlution continues

DICOM, EMR, NETWORK INTEGRATION

A proficient networking solution increases productivity and enhances the patient experience. It allows you to view and manage multiple examinations from review stations in your practice. This effortlessly facilitates patient learning by allowing you to interactively show examination results to patients. With DICOM connectivity, the REVO can be connected to large hospital medical systems, with functionality of sending worklists (MWL) and reports (C-storage) or the whole examination to viewing stations. CMDL interface enables the integration of the REVO into practice management systems. There is no additional charge for the networking and DICOM functionality.

The clinical examples

Retina Line 9 mm
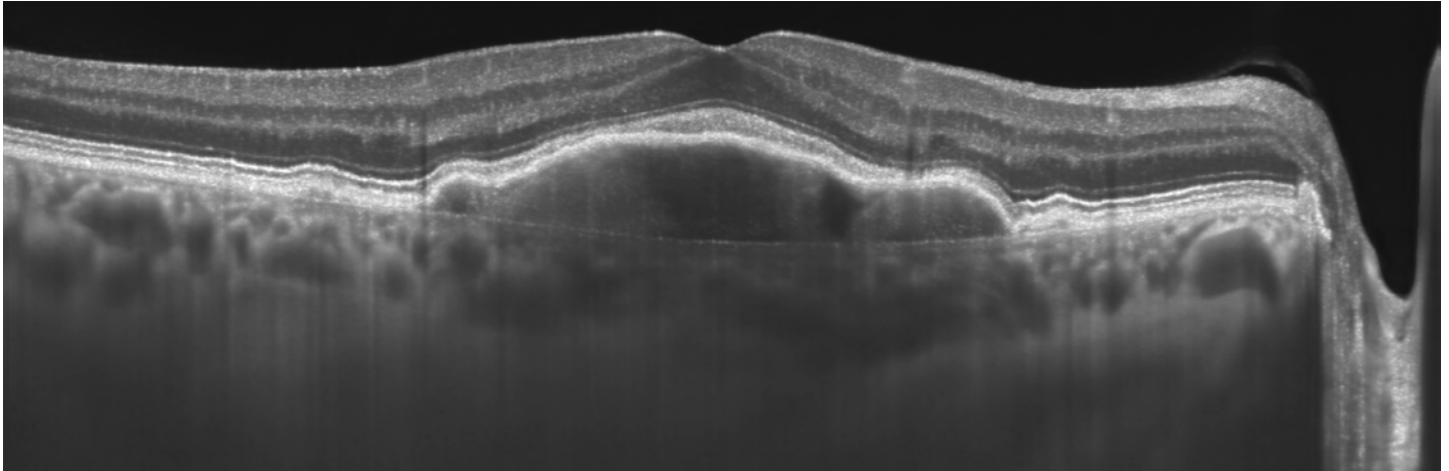
Retina Line 9 mm

Cornea imaging

REVO HR — OCT | FUNDUS CAMERA
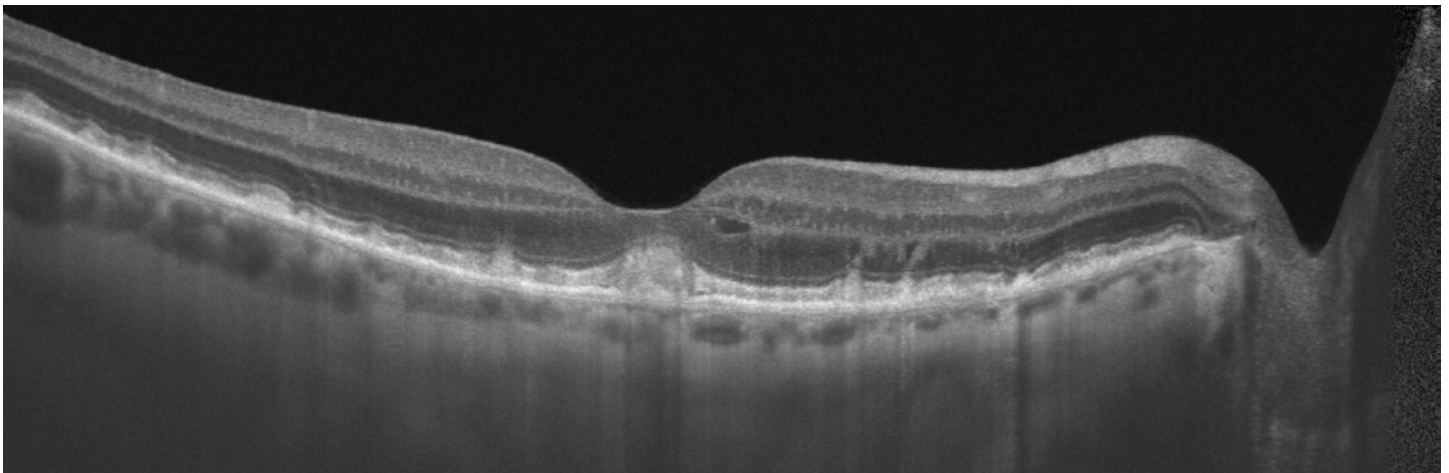
FUNDUS CAMERA

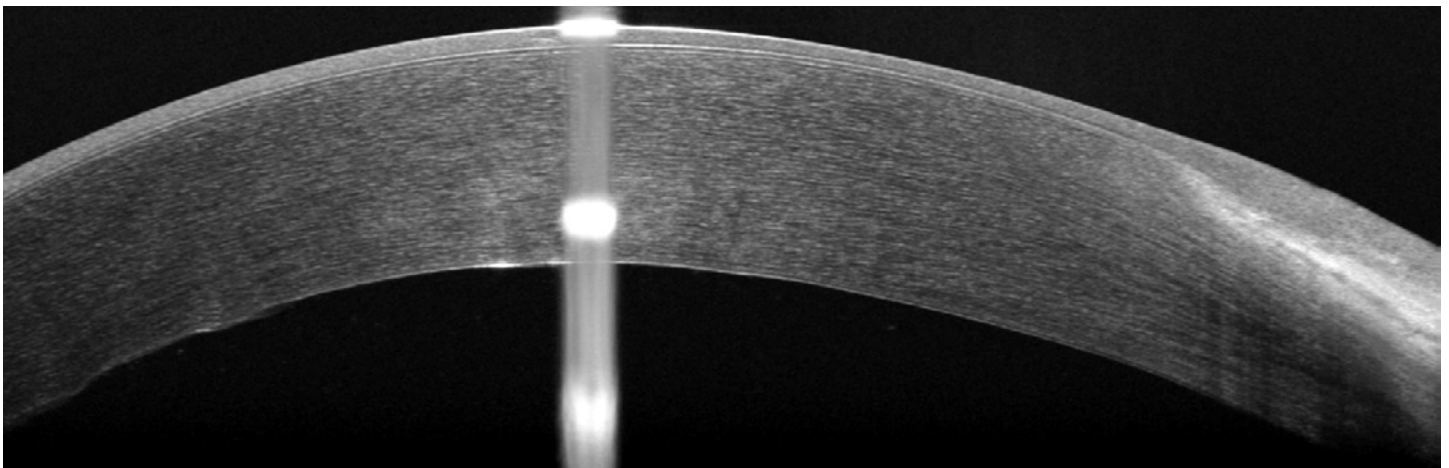|	
Type	Non-mydriatic fundus camera
Photograph type	Color
Angle of view	45° ± 5%
Min. pupil size for fundus	3.3 mm
Camera	12.3 Megapixel
Photography	Fundus (Retina, Central, Disc, Peripheral with Manual fixation), Anterior
Flash adjustment, Gain, Exposure	Auto, Manual
Intensity levels	High, Normal, Low

OPTICAL COHERENCE TOMOGRAPHY

Technology	Spectral Domain OCT
Light source	Superluminescent Diode, SLED Central wavelength: 870 nm Half bandwidth: 93 nm
Scanning speed	130 000 A-scans per second
Min. pupil size for OCT	1.7 mm
Axial resolution	~ 1.3 µm digital 3 µm in tissue
Transverse resolution	12 µm, typical 18 µm
Overall scan depth	2.6 mm / 5.4 mm in Full Range mode
Focus adjustment range	-25 D to +25 D
Scan range	Posterior 3-15 mm, Anterior 3-18 mm
Scan types	3D, Angio[1], Full Range Radial, Full Range B-scan, Radial (HD), B-scan (HD), Raster (HD), Raster 21 (HD), Cross (HD), TOPO[1], Biometry AL[1]
Fundus alignment	IR, pSLO (Live Fundus Reconstruction)
Alignment method	Fully automatic, Automatic, Manual
Fundus Tracking	ACCUtrack – active real time, iTracking
Retina analysis	Retina thickness, Inner Retinal thickness, Outer Retinal thickness, RNFL+GCL+IPL thickness, GCL+IPL thickness, RNFL thickness, RPE deformation, MZ/EZ-RPE thickness
Angiography OCT[1]	Vitreous, Retina, Choroid, Superficial Plexus, RPCP, Deep Plexus, Outer Retina, Choriocapilaries, Depth Coded, SVC, DVC, ICP, DCP, Custom, Enface, FAZ, VFA, NFA, Quantifcation: Vessel Area Density, Skeleton Area Density, Thickness maps
Glaucoma analysis	RNFL, ONH morphology, DDLS, OU and Hemisphere asymmetry, Ganglion analysis as RNFL+GCL+IP and GCL+IPL, Structure + Function[2]
Angiography mosaic	Acquisition method: Auto, Manual Mosaic modes: 10x10, 10x6, 12x5, 7x7, Manual up to 12 images
Biometry OCT[1]	AL, CCT, ACD, LT, P, WTW
IOL Calculator[3]	IOL Formulas: Hoffer Q, Holladay I, Haigis, Theoretical T, Regression II
Corneal Topography Map[1]	Axial [Anterior, Posterior], Refractive Power [Kerato, Anterior, Posterior, Total], Net Map, Axial True Net, Equivalent Keratometer, Elevation [Anterior, Posterior], Height, KPI (Keratoconus Prediction Index)
Anterior (no lens/adapter required)	Anterior Chamber Radial, Anterior Chamber B-scan, Pachymetry, Epithelium map Stroma map, Angle Assessment, AIOP, AOD 500/750, TISA 500/750, Angle to Angle view
Connectivity	DICOM Storage SCU, DICOM MWL SCU, CMDL, Networking
Fixation target	OLED display (the target shape and position can be changed), external fixation arm
Dimensions (L×W×H) / Weight	479 mm × 367 mm × 493 mm / 30 kg
Power supply / consumption	100 V to 240 V, 50 / 60 Hz / 90 VA to 110 VA

UWF LENS[4]

Scan angle	~105°[5]
Working distance	15 mm
Scan types	3D, Radial, Line, Angio[1], Full Ranger Radial, Full Range Line
Fundus tracking	iTracking
Overall scan depth	2.6 mm / 5.4 mm in Full Range mode

[1] An optional software module

[2] Via connection with PTS software version 3.8 or higher

[3] The Biometry module and a separate license for the IOL Calculator are required

[4] Ultra-Wide Field imaging is available with the optional UWF lens

[5] Measured from the center of the eye

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