ONLY FROM

optovue

INTRODUCING

THE NON-INVASIVE WAY TO IMAGE MICROVASCULAR FUNCTION

angioVUE

IMAGING SYSTEM

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optovue

EVOLVING OCULAR IMAGING IN CLINICAL PRACTICE

Optovue's commitment

Working with you to improve clinical evaluation and innovate clinical applications to address patients with ocular disease

Rich R&D heritage

18 true innovations that helped establish the industry standard for OCT imaging

Advancing clinical acumen

Delivering on the most anticipated ocular bloodflow imaging modality—previously available only in research facilities

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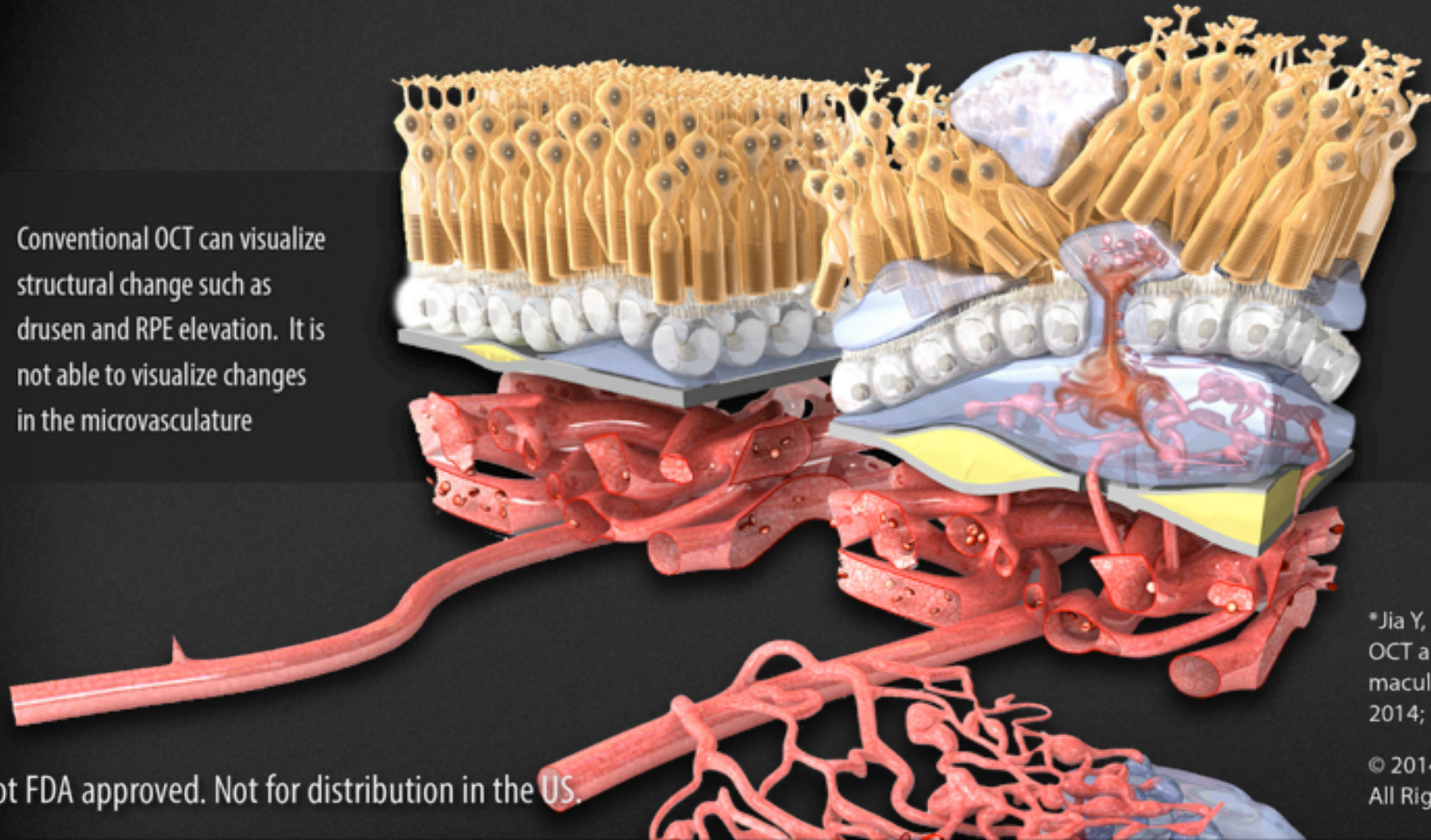
THE ARRIVAL OF OCT-ANGIOGRAPHY (OCTA)

A new way of visualizing ocular bloodflow in the vessels—identifies retinal microcirculation using the intrinsic motion of blood cells in the vessel

- Enables immediate assessment of microcirculation in ocular diseases with unprecedented microvascular detail

Conventional OCT can visualize structural change such as drusen and RPE elevation. It is not able to visualize changes in the microvasculature



OCT-Angiography can visualize ocular bloodflow in the vessels. Therefore, it can identify changes in the microvasculature such as chorodial neovascularization associated with wet AMD*

*Jia Y, Bailey S, Wilson D, et al., Quantitative OCT angiography of CNV in age-related macular degeneration. *Ophthalmology* 2014; 121: 1435

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PRINCIPLES OF OCT-ANGIOGRAPHY

Visualizing flow through motion contrast

Microvascular details not visible in traditional FA or ICG *

- Flowing water can be distinguished from static background by comparing sequential video frames to highlight motion
- Motion contrast is similarly used in OCT Angiography to distinguish blood flow in the vessel from static tissue

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*Spaide R, et al., Retinal Vascular Layers Imaged by Fluorescein Angiography and Optical Coherence Tomography Angiography, *JAMA Ophthalmology*, in press (available online)

angioVUE
IMAGING SYSTEM

INTRODUCING
THE ANGIOVUE IMAGING SYSTEM

The only commercially available, dual-modality OCT system capable of imaging and displaying function and structure of the ocular microvasculature—through a non-invasive procedure

Dual-modality OCT system expands clinical utility:

- Integrates **non-invasive microvascular enhanced imaging**—Optovue's proprietary OCTA-based technology platform—with your existing Optovue high-speed, wide field, en face OCT technology platform
- Unlike conventional OCT, the ANGIOVUE Imaging System displays ocular microvascular function
- Unlike conventional angiography, the ANGIOVUE Imaging System can image different layers of microvasculature without requiring dye injection as a contrast medium

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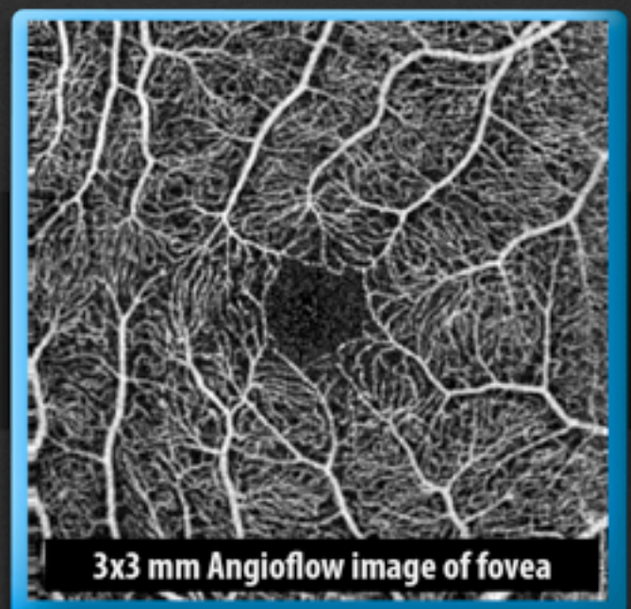
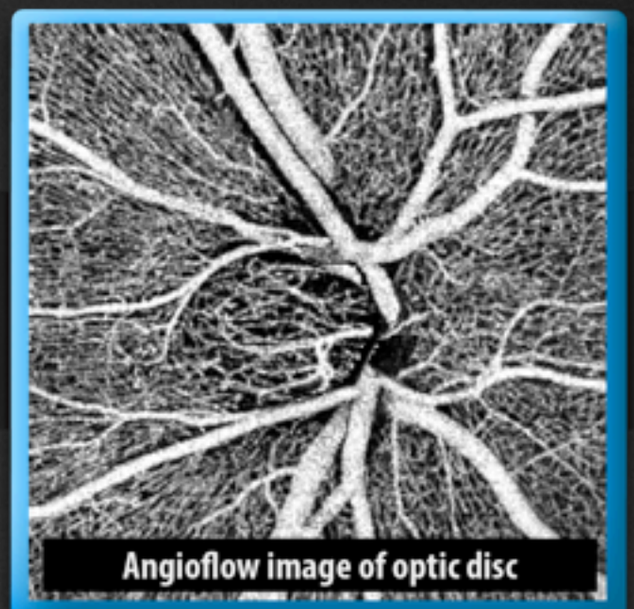
ANGIOVUE IMAGING SYSTEM

Capable of imaging and displaying function and structure

FUNCTION

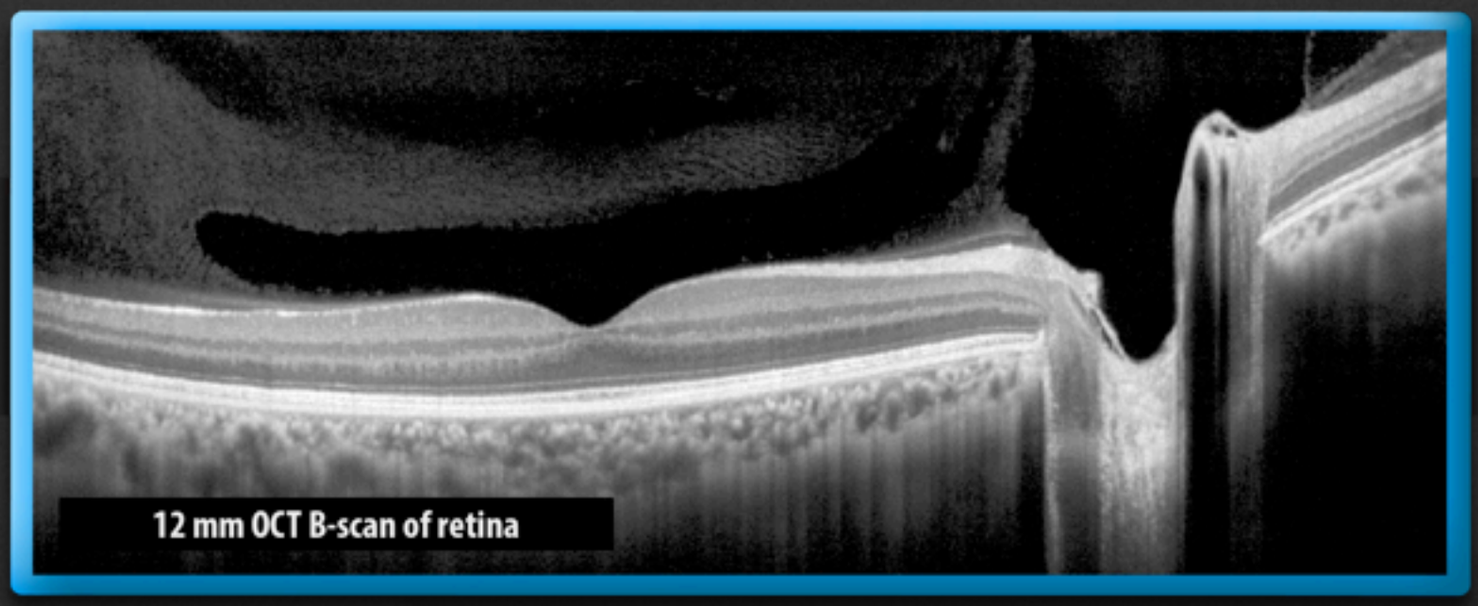


3x3 mm Angioflow image of fovea



Angioflow image of optic disc

STRUCTURE



12 mm OCT B-scan of retina

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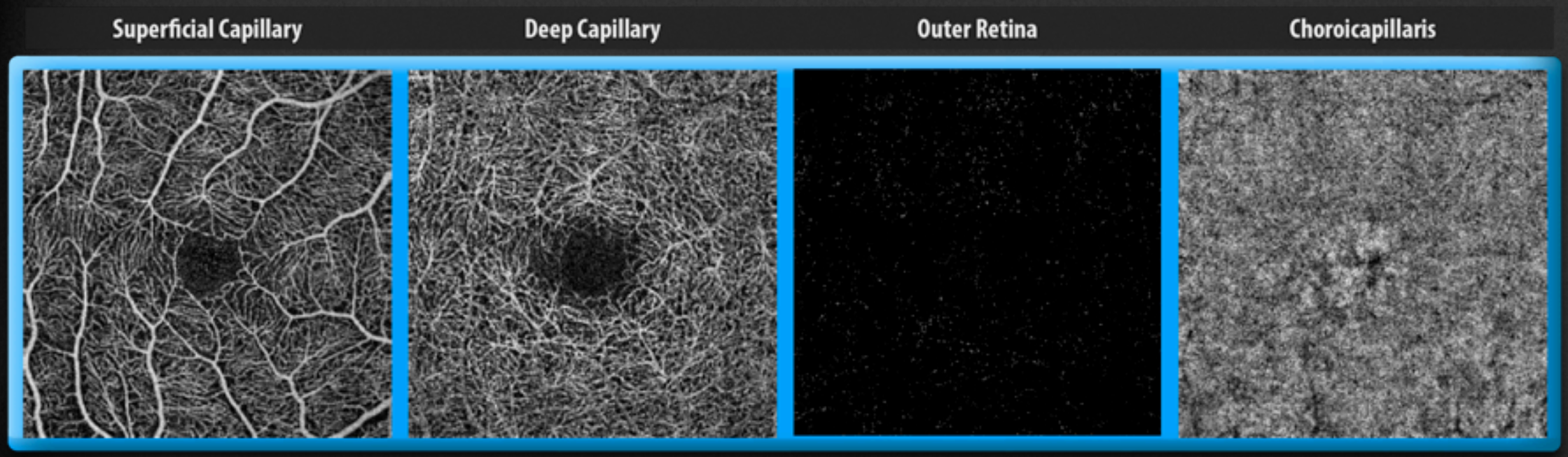
ANGIOFLOW IMAGES REVEAL MICROVASCULAR FLOW WITHIN VIRTUAL DISSECTED LAYERS OF THE RETINA

Segmentation is automatically generated—to isolate the circulatory layers of interest



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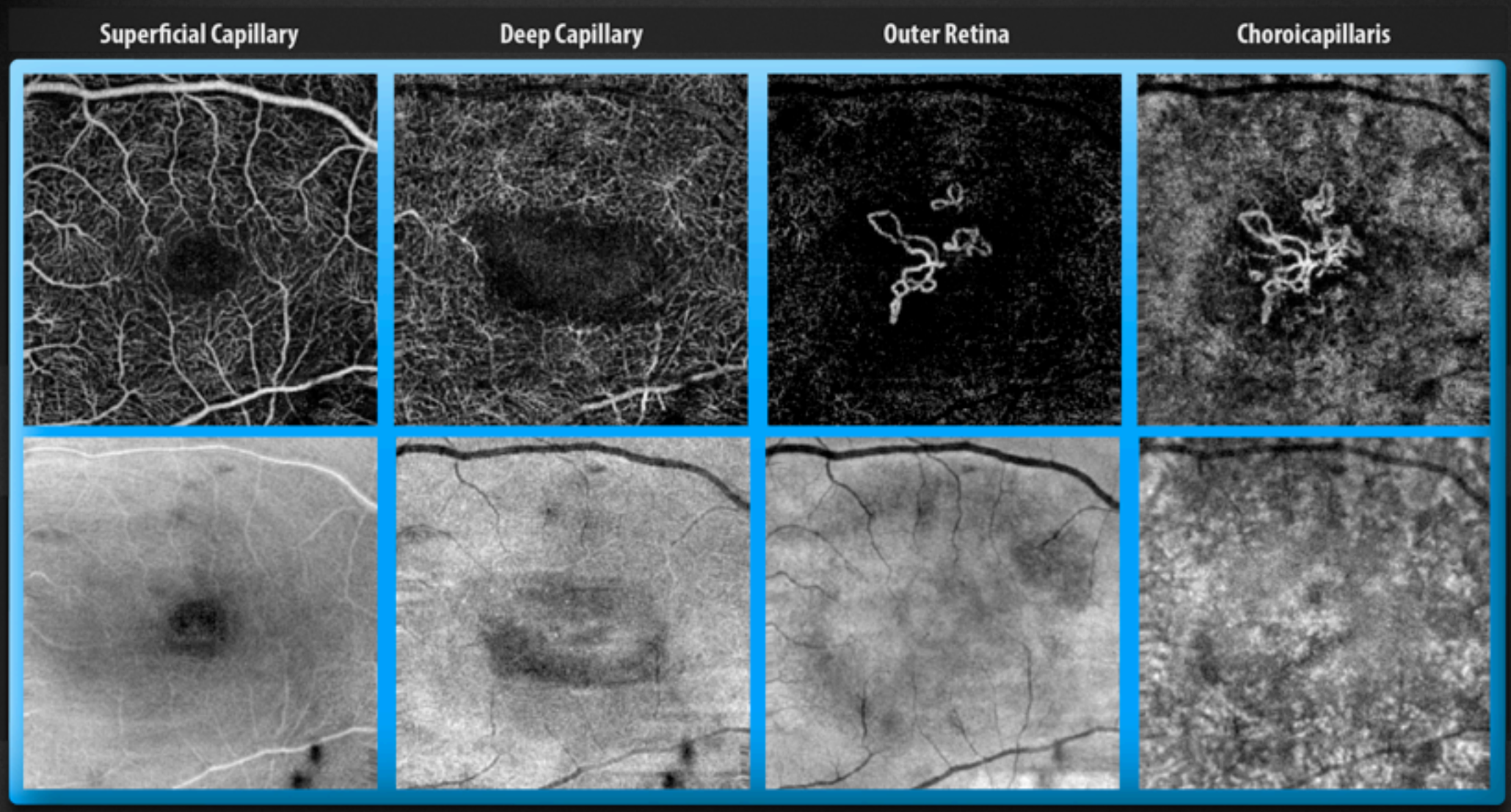
ANGIOVUE IMAGES DEPICTING CHOROIDAL NEOVASCULARIZATION



Not FDA approved. Not for distribution in the US.

Case diagnosis and images provided by Dr. Bruno Lumbroso

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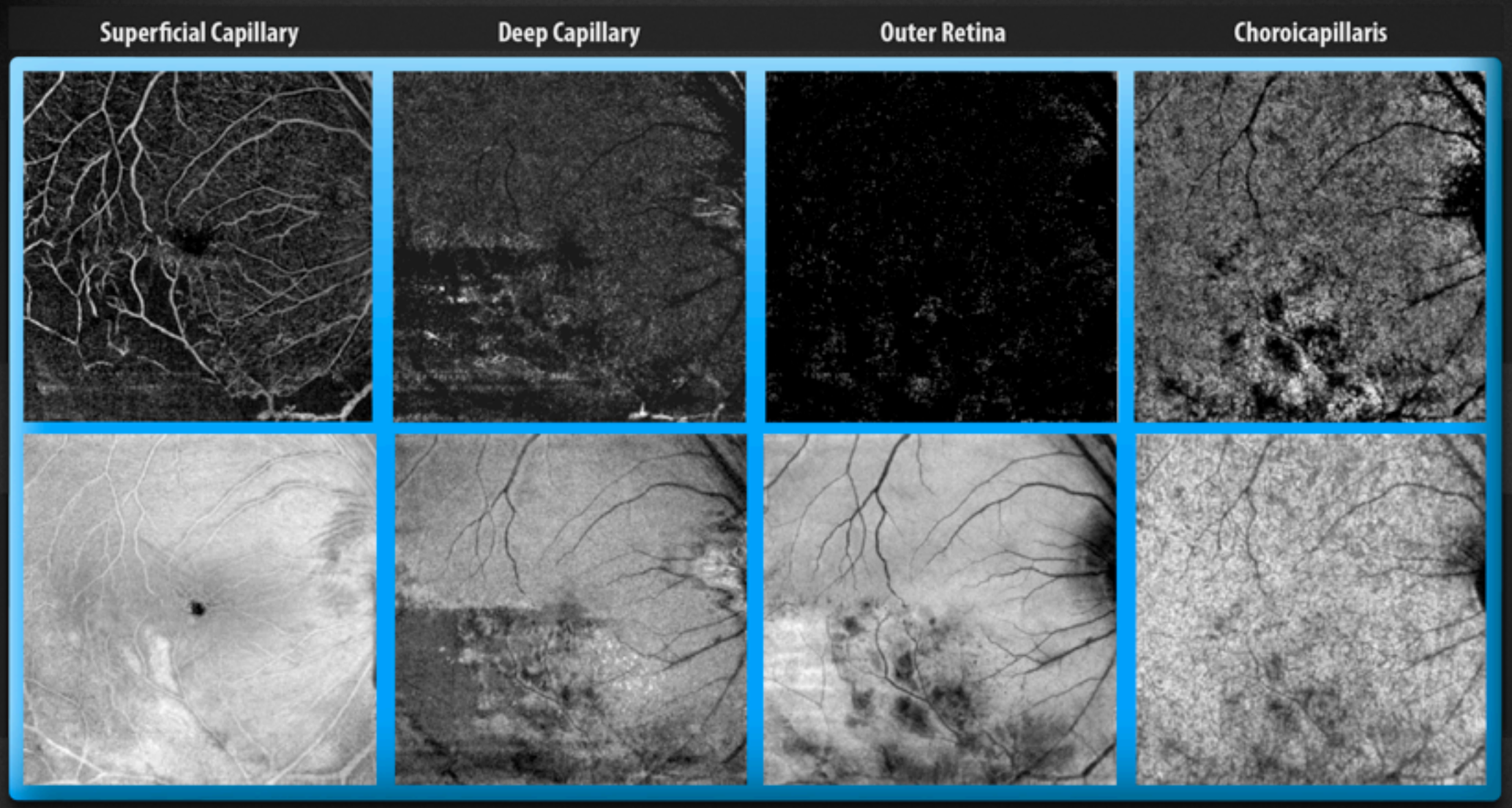
ANGIOVUE IMAGES DEPICTING RETINAL VEIN OCCLUSION



Not FDA approved. Not for distribution in the US.

Case diagnosis and images provided by Dr. Ching-Jygh Chen

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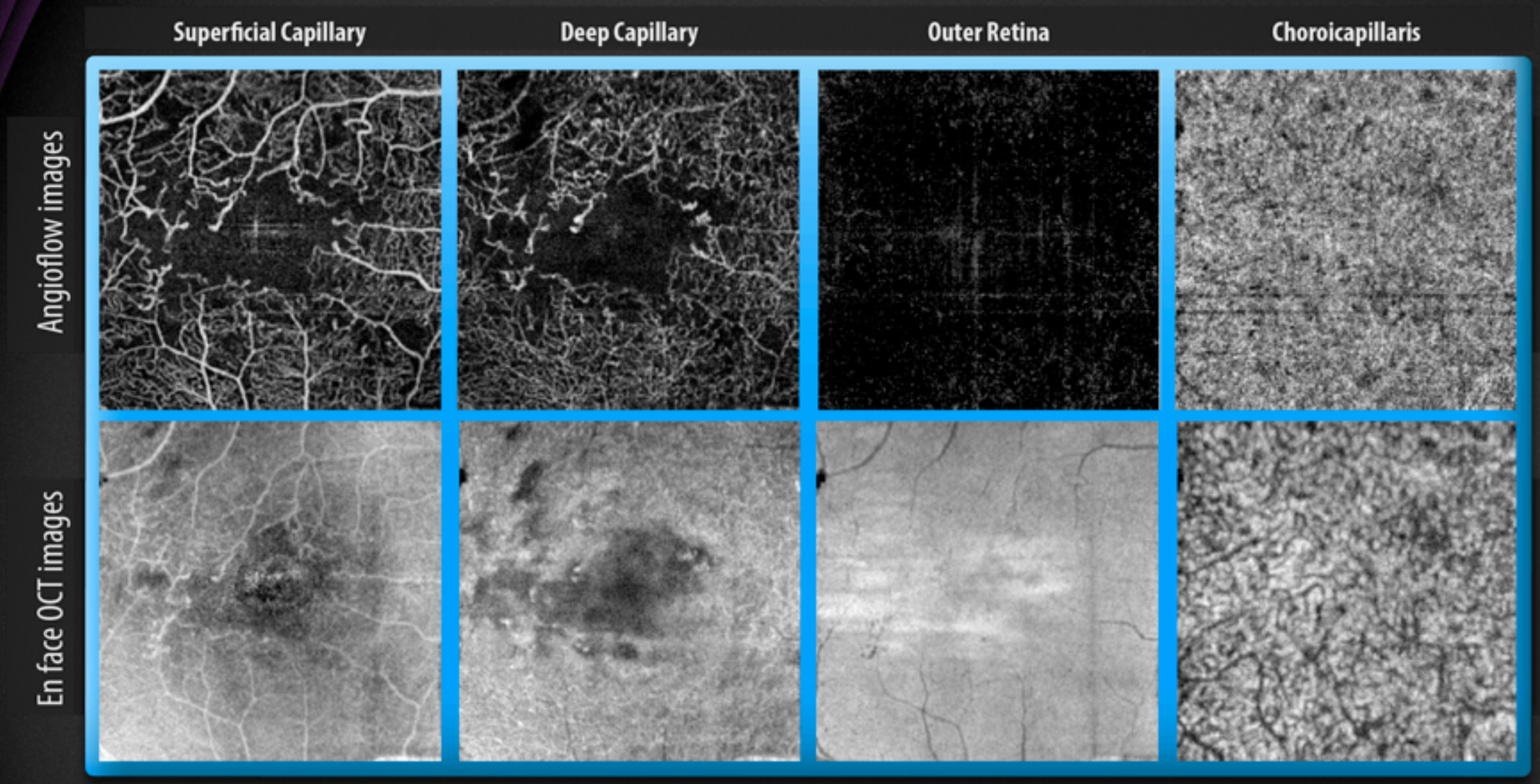
ANGIOVUE IMAGES DEPICTING DIABETIC RETINOPATHY



Not FDA approved. Not for distribution in the US.

Case diagnosis and images provided by Dr. Ching-Jygh Chen

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Split-Spectrum Amplitude-Decorrelation Angiography

Spectral Domain OCT System

5

ESSENTIAL TECHNOLOGIES THAT DISTINGUISH THE ANGIOVUE IMAGING SYSTEM

En Face 3D Visualization

CUDA Parallel Computing Platform

Motion Correction Technology (MCT)

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THE ANGIOVUE TECHNOLOGY INTEGRATION PROGRAM (TIP)

Convert your existing Avanti platform to the state-of-the art ANGIOVUE Imaging System platform

- Integration requires new hardware and software
- Work is conducted on-site at your office location

AVANTI™ RTVUE XR

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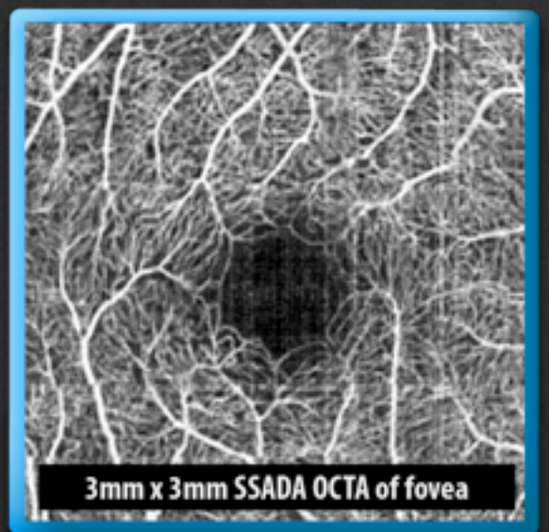
INTRODUCING THE ANGIOVUE IMAGING SYSTEM

The first commercially available, dual-OCT imaging system, capable of simultaneously imaging the function and structure of the ocular microvasculature—non-invasively

- Integrates new and existing technology platforms to expand clinical utility
- Angioflow images reveal microvascular flow within dissected layers of the retina
- Generates a level of detail not visible in traditional FA or ICG imaging

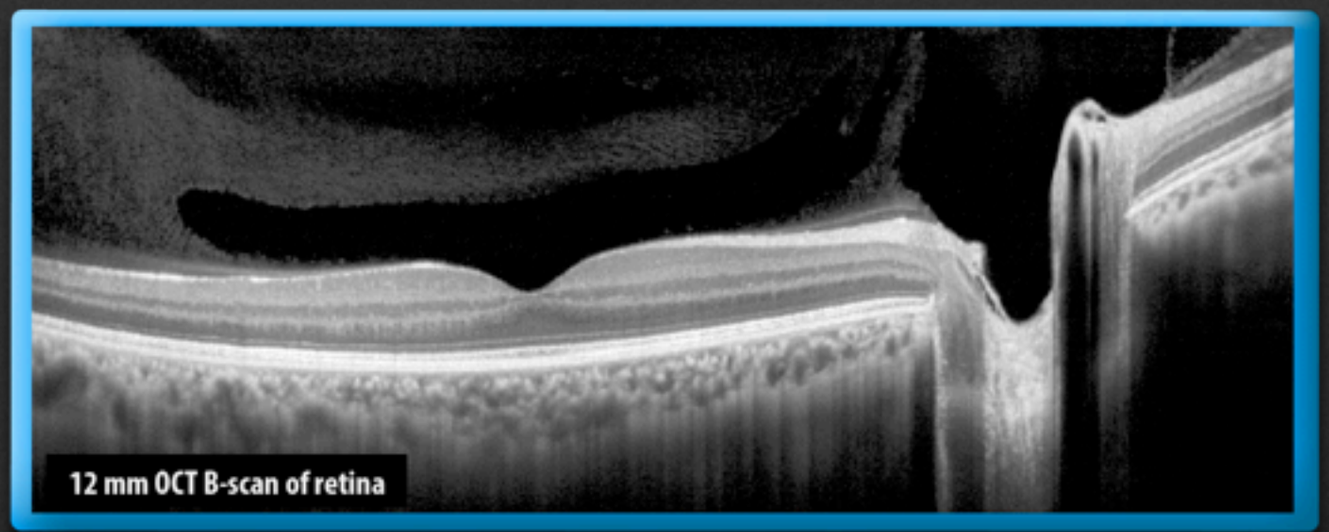
Available in two configurations: Retina and Multispecialty

FUNCTION



3mm x 3mm SSADA OCTA of fovea

STRUCTURE



12 mm OCT B-scan of retina

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INNOVATE NEW CLINICAL APPLICATIONS FOR THE MANAGEMENT AND TREATMENT OF OCULAR DISEASES

Connect to the ANGIOVUE user community

- Enhance your understanding of the clinical value of ANGIOVUE
- Receive regular updates from thought leaders and clinical investigators

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SPECIFICATIONS

Angioflow image size: 304 x 304 pixels

Total acquisition time (one group): less than 3 seconds

Angioflow scan sizes (Retina):

3 x 3 mm
6 x 6 mm
8 x 8 mm

Angioflow scan size (Optic Disc):

3 x 3 mm
4.5 x 4.5 mm

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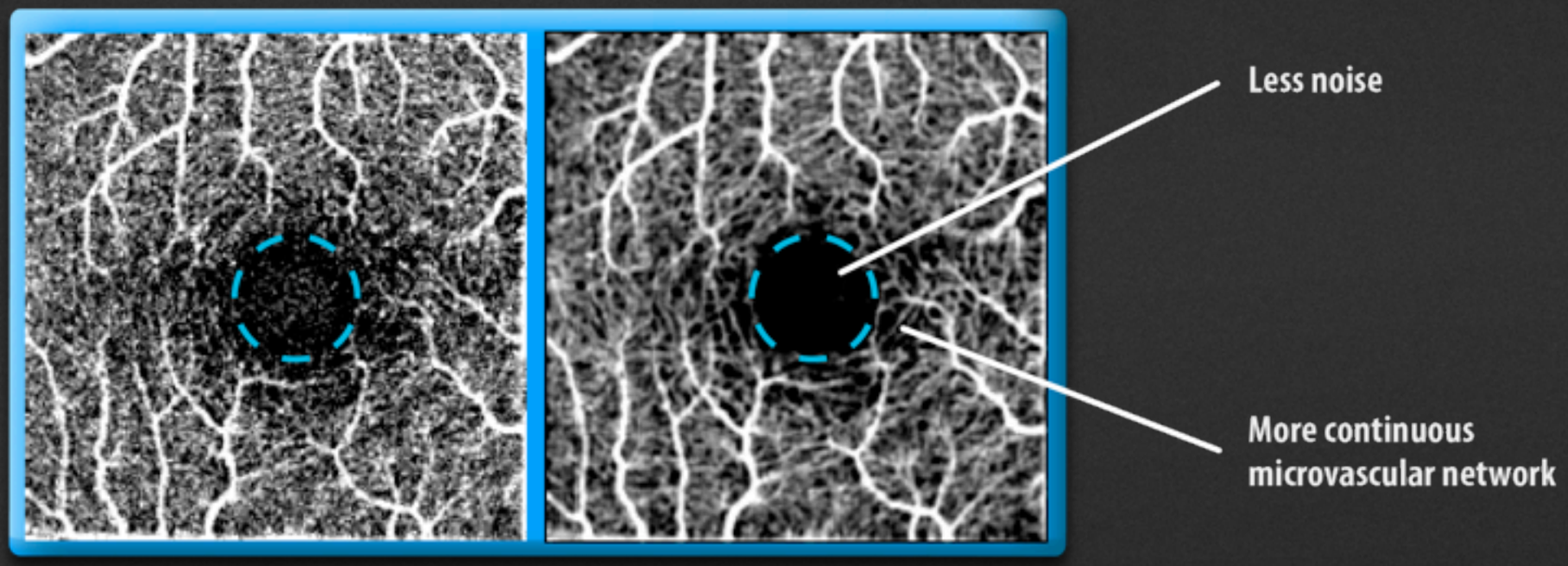
SPLIT-SPECTRUM AMPLITUDE-DECORRELATION ANGIOGRAPHY

- Uses motion contrast to detect flow
- Sequential OCT B-scans are acquired at a single cross section of the retina and compared to each other
- Large number of repeated B-scans, taken at different locations, create a 3D volume from which to generate the highest quality Angioflow images



Without Split-Spectrum Amplitude-Decorrelation Angiography

With Split-Spectrum Amplitude-Decorrelation Angiography

Not FDA approved. Not for distribution in the US.

Jia Y, Tan O, Tokayer J, et. al., Split-spectrum amplitude-decorrelation angiography with optical coherence tomography. *Optics Express* 2012; 20:4710

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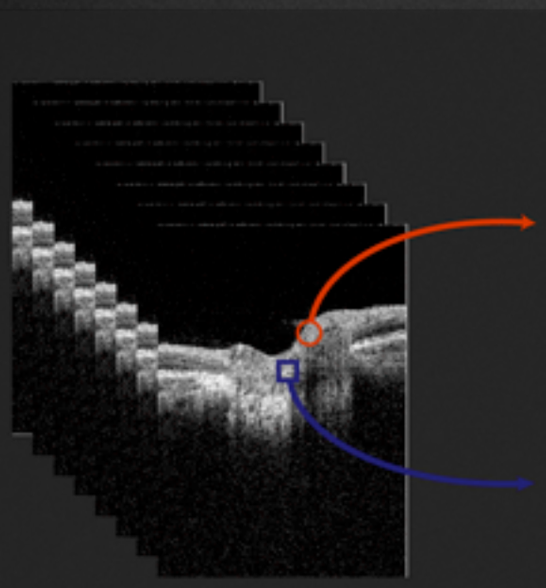
Split-Spectrum Amplitude-Decorrelation Angiography | En Face 3D Visualization | Motion Correction Technology (MCT) | CUDA Parallel Computing Platform | Spectral Domain OCT System

BACK

1

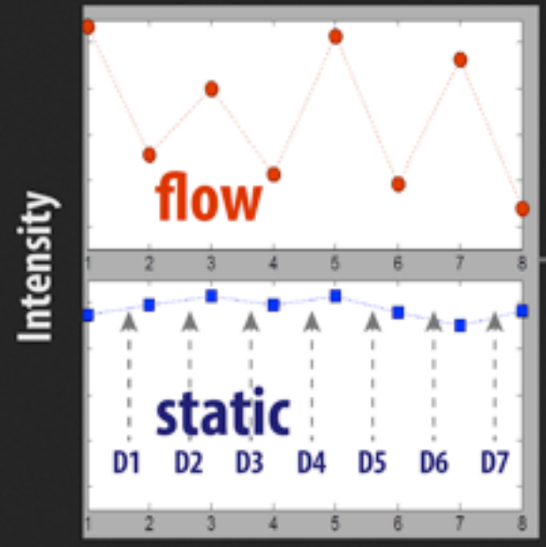
2

SPLIT-SPECTRUM AMPLITUDE-DECORRELATION ANGIOGRAPHY TECHNOLOGY DETECTS VASCULAR FUNCTION



8 consecutive OCT scans at each position

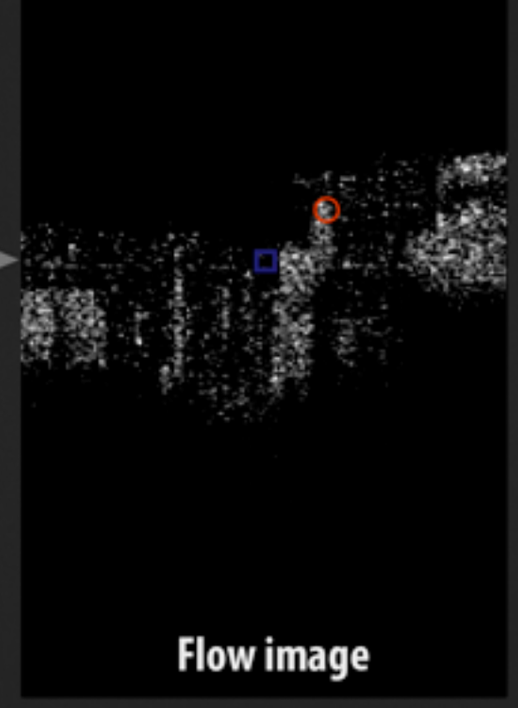
(M-B-scan Mode, N=8)



$$\frac{1}{N-1}\sum_{n=1}^{N-1} D_n$$

$$D_n(x,z) = 1 - \frac{A_n(x,z)A_{n+1}(x,z)}{[\frac{1}{2}A_n(x,z)^2 + \frac{1}{2}A_{n+1}(x,z)^2]}$$

$(n = 1 \rightarrow N-1)$



Static tissue — Blood flow

Not FDA approved. Not for distribution in the US.

Jia Y, Tan O, Tokayer J, et. al., Split-spectrum amplitude-decorrelation angiography with optical coherence tomography. *Optics Express* 2012; 20:4710

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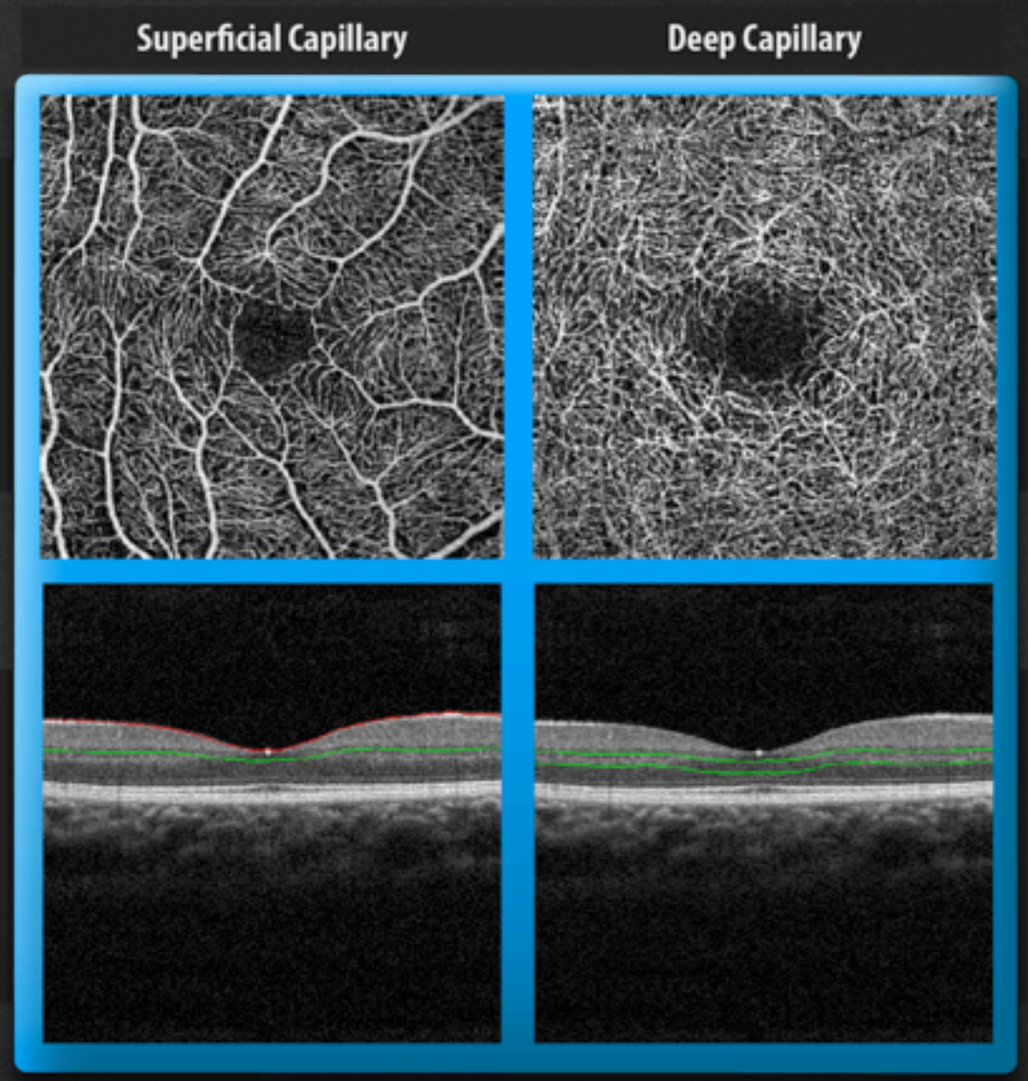
EN FACE 3D VISUALIZATION

- Enables visualization of the various anatomic layers of interest, including the superficial capillary, deep capillary, outer retina, choroidal capillary
- Data set is 3D and depth resolved
- Enface viewing of the 3D data allows for selected layers of the retina to be assessed for small changes in structure and function



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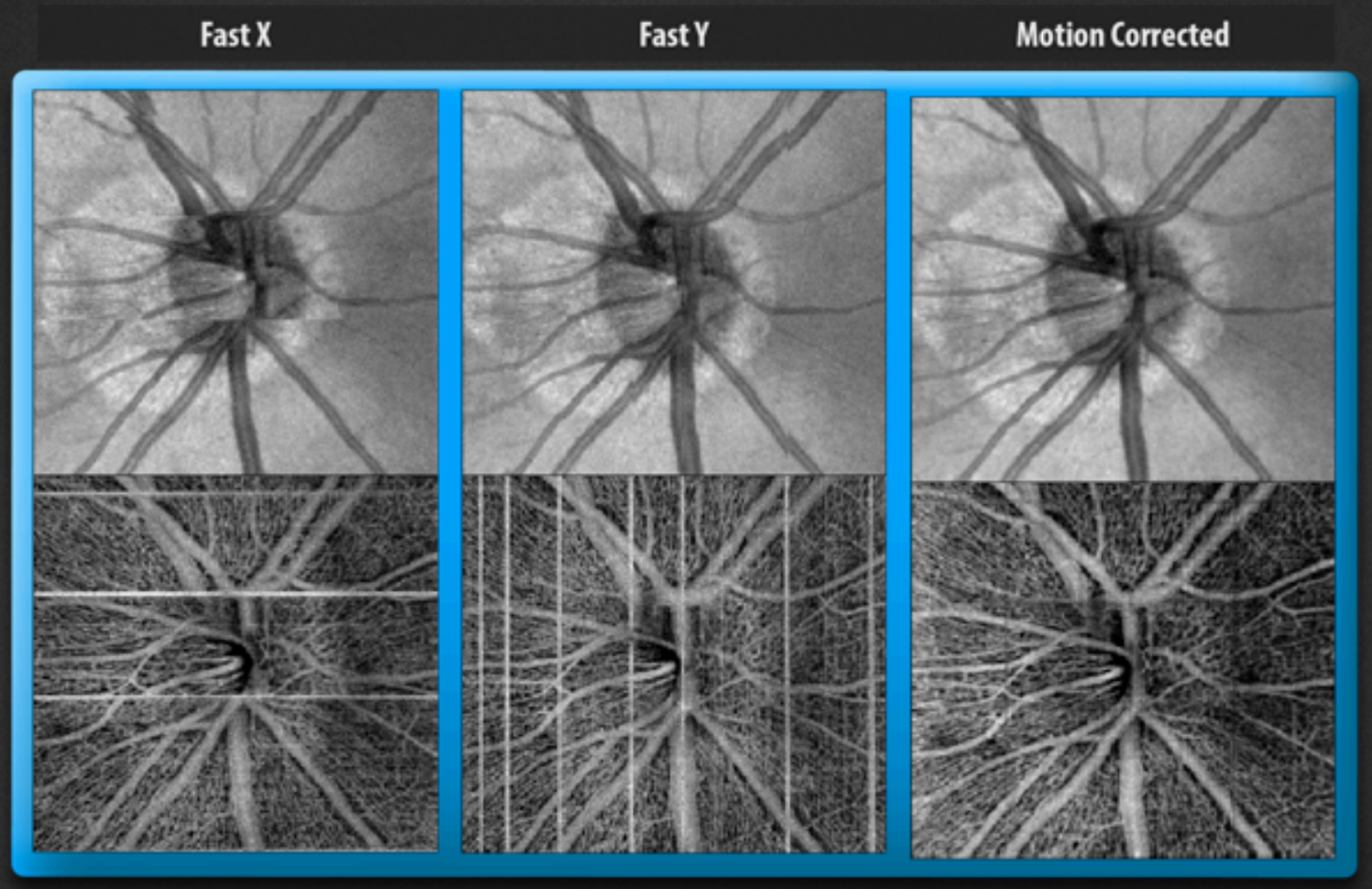
MOTION CORRECTION TECHNOLOGY (MCT)*

- MCT is used to remove motion artifacts such as saccades
- Working closely with MIT, Optovue developed significant improvements in MCT—available only in the ANGIOVUE Imaging System



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*Motion Correction Technology was originally developed at MIT

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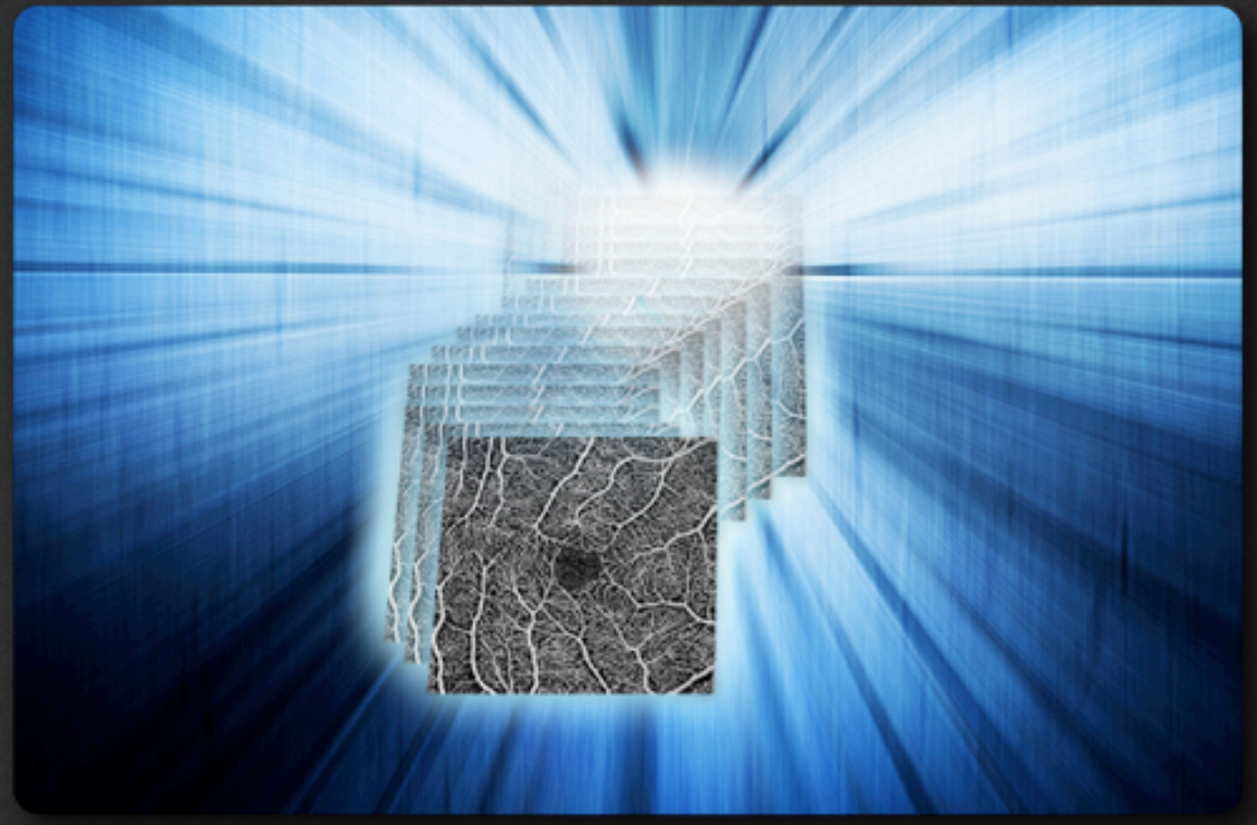
CUDA PARALLEL COMPUTING PLATFORM

- Dramatically reduces computation time needed to correct motion artifacts post data acquisition
- 10 seconds to perform motion correction, whereas before it would take several minutes



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SPECTRAL DOMAIN OCT SYSTEM

- Achieve A-line detection without moving mechanism
- Inherently more stable platform for OCT-Angiography
- Minimize the number of repeated scans
- Refined user and patient interface for optimal clinical usage (no bite-bars)