

Advances Help Clinicians Tap Greater Potential of SD-OCT

Experts discuss some of the latest SD-OCT innovations and the future of the technology.

As spectral domain optical coherence tomography (SD-OCT) technology advances, it has become increasingly essential to retina specialists, enabling them to quickly capture high-resolution 3-dimensional images to identify retinal disease, pinpoint its precise location, and monitor its progression.

Spectral-domain OCT has significantly better ability to detect pathology compared with time domain technology. Spectral-domain scans delineate layers of the retina previous technology could not, which is especially helpful in patients with subtle pathology or unexplained subtle visual declines. SD-OCT scans may reveal very subtle retinal pigment epithelium defects and photoreceptor abnormalities that clinicians can monitor over time. Given this wealth of data, manufacturers continue to develop software to help clinicians better tap into the potential of SD-OCT. Here experts discuss some recent SD-OCT advances and those anticipated in the future.

SPECTRAL OCT SLO COMBINATION IMAGING SYSTEM

The Spectral OCT SLO Combination Imaging System (OPKO Health, Inc., Miami) performs a variety of scans while simultaneously producing a scanning laser ophthalmoscope (SLO) image for real-time registration.

Clinicians can use blood vessels on the fundus image to align images, enabling them to obtain precise thickness maps incorporating a large number of cross-sections.

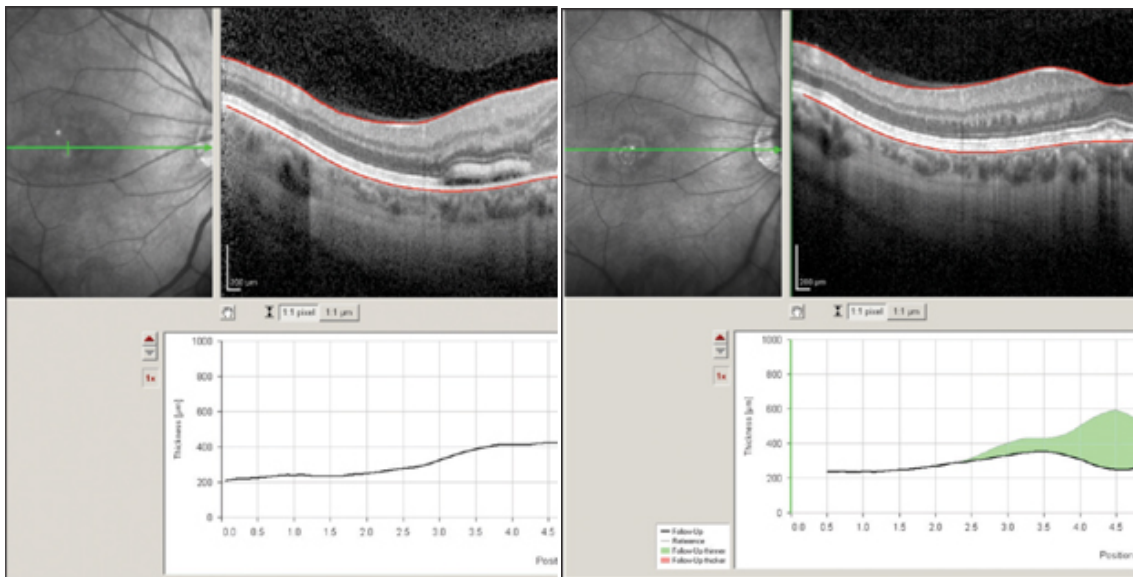


Figure 1. Marked regression of non-AMD choroidal neovascularization in a 37-year-old patient (Spectralis HRA+OCT).

SPECTRALIS OCT

Heidelberg Engineering (Vista, CA) recently announced 2 additions to its group of Spectralis devices — the 2-mode Spectralis OCT, combining confocal fundus imaging and SD-OCT, and the 5-mode Spectralis FA + OCT, which includes the features of the 2-mode unit, along with fluorescein angiography (FA) and autofluorescence.

The Spectralis FA + OCT allows the clinician to perform different functions at the same time, such as fluorescein angiography in conjunction with OCT or red-free or infrared images in conjunction with the OCT.

BIOPTIGEN 3D SD-OCT

In addition to generating high-resolution, 3-dimensional images, Biotigen 3D SD-OCT systems (Biotigen, Inc., Research Triangle Park, NC) offer clinicians and researchers flexibility, with a selection of interchangeable imaging probes, such as clinical scanners, a microscopic addition for research, and handheld probes.

3D OCT-1000

Topcon Medical Systems (Paramus, NJ) recently received approval from the FDA for its 3D OCT-1000 TrueMap Measurement Software, which enables clinicians to visualize the inner limiting membrane, the IS/OS junction, RPE, and Bruch's membrane.



Figure 2. Normal retinal exam with overlying vitreous gel liquefaction and partial separation of posterior hyaloid face nasal to the fovea.

The new Topcon software allows clinicians to set their thickness measurements. The clinician may measure the thickness from the inner limiting membrane to RPE, as defined in the traditional histopathology, or measure the thickness from the inner limiting membrane to IS/OS junction, for consistency with the legacy time domain system. In addition, Topcon also provides a software utility called the StratusViewer.

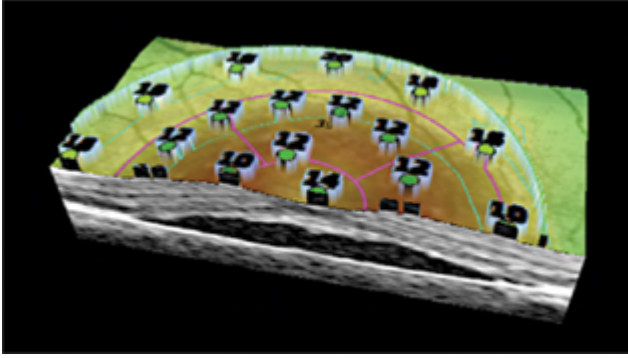


Figure 3. 3-D rendering of retinal topography with superimposed microperimetry threshold values in a case of central serous retinopathy. Image is sliced to reveal OCT cross-section showing focal macular detachment.

Future software is expected to allow clinicians to determine the volume, number, and area of drusen.

RTVUE FD-OCT

The high resolution of the RTVue FD-OCT (Optovue, Fremont, CA), with a 5- μm depth and 15- μm transverse resolution, allows clinicians to evaluate a multitude of retinal disease states from very early stages, says **Mark Fromer, MD, medical director of Fromer Eye Centers, New York.** "Drusen and photoreceptors can be seen on the OCT, in addition to a well-defined choriocapillaris. One of the most significant changes is the ability to quantify full-thickness retinal changes over time." He explains that the new RTVue unit allows the clinician to evaluate RPE changes, and the SLO-like imagery allows visualization of geographic atrophy, which can be tracked over time.

The exquisite detail of the images, along with the quantitative and qualitative progression mapping of full-thickness retinal images and the RPE, will allow retinal specialists to tailor treatment protocols to responses they can follow quantitatively, **Dr. Fromer** says. "The ability to quantitatively assess a variety of retinal disease processes while qualitatively assessing the topographic images will allow retinal specialists to make more accurate judgments and clearly improve our decision-making process in the diagnosis and management of retinal disorders."

In addition, he says, alignment algorithms are the key to the progression analysis, and the 3-dimensional video analysis, which can be freeze-framed, is useful for analysis, for patient education, and as a teaching tool.

Dr. Fromer believes it would be useful to use the available volumetric analysis to quantify lesion regression with various treatment regimens. Drusen detection, quantification, and tracking software are being analyzed and should be available in the near future.

SP-OCT HR

Canon Medical Systems (Irvine, CA) expects to receive FDA approval in 2009 for the SP-OCT HR, which the company describes as having superior high resolution, an ultrahigh scanning speed, and improved patient and operator comfort.

Dr. Fromer also suggests considering a multifunction device, which may save money, space, and time in technician training. "Our practice is a multispecialty practice, which requires imaging of both the anterior and posterior segment," he says. "Purchase of the RTVue has allowed all of our subspecialists to benefit from this extraordinary technology. Instead of purchasing several instruments, we have been able to meet all of our needs with this single unit."

LOOKING FORWARD

Advances in SD-OCT technology will continue, shedding new light on retinal disease and how it responds to treatment.

Editor's Note: **Dr. Fromer** has no financial interest in any product mentioned in this article. DIANE DONOFRIO ANGELUCCI