Confocal imaging system appears promising for retinal diagnostics

Novel device provides different imaging modalities, dilation-free operation

By Dr Valentina Sarao

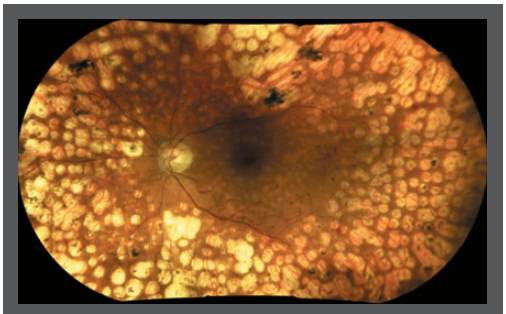
Advances in retinal imaging lead periodically to radical changes in the diagnosis and management of retinal diseases. Confocal imaging systems are at the centre of a revolution that is improving the assessment and management of several retinal pathologies. Recently, the introduction on the market of a true colour confocal scanner (Eidon, Centervue; Padova, Italy) has opened a new window into retinal imaging.

I have tested the device in a large-volume ASC in Udine, Italy (IEMO, Istituto Europeo di Microchirurgia Oculare). I was enthusiastic about its capabilities to provide high-quality and real-colour pictures — allowing a retinal image as it exactly looks when directly observed, and therefore, new opportunities for an early diagnosis of many retinal conditions.

The device uses confocal imaging and white light illumination integrated in a pupil-dilation-free system. This unique combination offers high-resolution images and high-fidelity to real retinal colours, providing a physician with accurate anatomy and all the detailed information needed for an accurate diagnosis and a precise monitoring of particular retinal diseases.

The combination of multiple imaging modalities within a single instrument (true colour, red-free, infrared, autofluorescence) is a key characteristic of this device. Red-free enhances the detail of the retinal vasculature and retinal nerve fiber layer; white illumination is able to provide high-quality true colour imaging; infrared provides information corresponding to choroid, and autofluorescence allows the assessment of the retinal pigment epithelial (RPE) layer. Infrared light images allow a physician to truly capture what is visually not detectable and provide a real-time confocal view of the retina during acquisition.

The system captures 60° in a single exposure, supports single- or multi-field acquisitions, provides seven predefined fields, and allows selection of any non-standard field by displacing the internal fixation target. The device's optics allow a view angle of up to 110° in automatic mode for more comprehensive retinal documentation. (Figure 1)



(FIGURE 1) **The novel device presents a 110° mosaic image of proliferative diabetic retinopathy laser treated.**

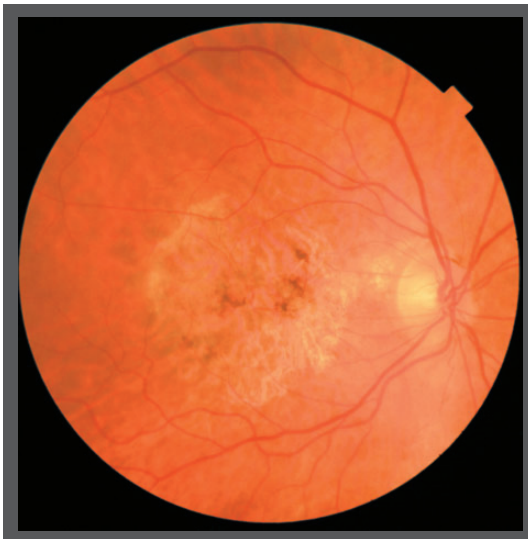
Versatility an important feature

The device and its software interface are user-friendly and quick to learn. It ensures minimal operator involvement by automatically aligning the patient's pupil, focusing the retina, and capturing images in less than one minute using a soft light source that guarantees maximum comfort for patients. Its intuitive commands permit a range from fully automated to fully manual mode.

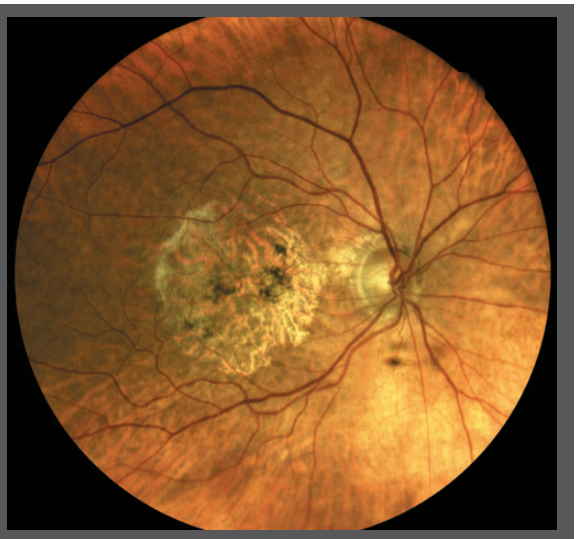
At any time it is possible to stop the automatic alignment and switch to manual mode using the joystick, offering the ability to customise focusing

IN SHORT

- ***A novel device provides detailed true colour confocal imaging, giving a retinal image as it looks when directly observed and providing a better chance to an early diagnosis for many retinal diseases. A physician shares early experience with the device.***



(FIGURE 2) **Conventional colour fundus photography of geographic atrophy due to age-related macular degeneration.**



(FIGURE 3) **The device's 60° image of geographic atrophy due to age-related macular degeneration.** *(Images courtesy of Dr Valentina Sarao)*

and alignment to capture specific pathologies in detail. It works with a dedicated software and operates as a stand-alone unit through the use of a high-resolution, multi-touch, colour-display tablet. No additional personal computer is required.

The device also offers network connectivity for remote data viewing and secure data backup. Images can be shared or printed on the spot with minimal effort.

Diagnosis, monitoring of disease

The device represents a significant breakthrough in diagnosing and monitoring retinal diseases compared with fundus camera and scanning laser ophthalmoscope (SLO) systems.

Conventional fundus camera captures colour retinal images over-exposed in red channel, showing an optic disc that looks washed-out and uniform. Acquisitions may be limited by media opacities, such as cataracts or corneal opacities, and the capture flash can be disturbing for the patient. Compared with a conventional fundus camera, this device offers higher-resolution and higher-contrast imaging, enhancing image quality in presence of any media opacities and with a pupil-dilation-free system.

In comparison with other portable non-mydriatic fundus cameras currently on the market, this device also permits a superior accuracy and sensitivity for the detection of posterior pole pathologies. (Figures 2 and 3)

SLO systems are able to achieve better contrast than conventional fundus photography, but typically use a single wavelength laser and provide monochromatic images, unable to extract colour information from the retina.

As previously noted, the widest possible angle is 110°, but some peripheral abnormalities may be difficult to clearly photograph or may be not detected. Moreover, the device is equipped with an optical system that operates within the range of -12D to +15D. In eyes with a myopic refractive error of more than 12 D, the device may be unable to focus the posterior pole and detect retinal conditions related to pathological myopia.

In conclusion, this novel device could be widely used as a screening tool in the primary-care setting for the detection of ophthalmic diseases, such as diabetic retinopathy, glaucoma, and age-related macular degeneration.

Moreover, this device may be introduced in the daily practice for detecting posterior segment diseases and helping retinal physicians in the diagnosis and management of several retinal conditions. It can be easily used by any type of personnel thanks to the automatic mode.

Further studies are needed to evaluate its promising performance in comparison with other devices currently on the market in the field of retinal imaging.

DR VALENTINA SARAO
E: *valentina.sarao@uniud.it*
Dr Sarao is affiliated with the Department of Medical and Biological Sciences, Ophthalmology, at the University of Udine, Italy, and the Istituto Europeo di Microchirugia Oculare (IEMO), Udine, Italy. She did not indicate any financial interest.