

# The New Age of Retinal Imaging

Could high-resolution images obtained without dilation open up new opportunities for early diagnosis?

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For many retinal conditions, such as diabetic retinopathy (DR) and age-related macular degeneration (AMD), early diagnosis and treatment can help delay or prevent vision loss, slow progression of the disease, and alleviate symptoms.<sup>1-7</sup> Diagnosis of these diseases generally begins with visual acuity tests and a dilated eye exam, but many elderly patients are taking tamsulosin or other pharmacologic agents that cause pupil constriction. Others may have had cataract surgery that resulted in anterior capsular opacification, allowing limited visibility of the retina.

Traditional fundus cameras are red-saturated, which may cause images to appear homogeneous or washed out, distorting them and making measurement of the cup-to-disc ratio difficult. Consequently, diagnosing retinal conditions becomes problematic.<sup>8</sup>

Scanning laser ophthalmoscopy is in many ways superior to conventional fundus photography—it works through smaller pupils using confocal imaging, and it provides better contrast—but it is unable to capture true color information. The Eidon confocal scanner (CenterVue) addresses this deficiency and offers several welcome benefits, which are reviewed in this article.

## EIDON: AN OVERVIEW

The Eidon consists of a user-friendly software interface and its intuitive commands allow it to be used in fully automated or fully manual mode. Through the use of a high-resolution, multitouch, color display tablet, it operates as a standalone unit, with local storage of patient information and images. The device's imaging and viewing features are described in more detail below.

### Imaging Modalities

Whereas other confocal scanning systems such as the Spectral OCT/SLO device (Optos) use monochromatic lasers, the Eidon uses white light to provide true

## At a Glance

- Although scanning laser ophthalmoscopy has advantages over traditional fundus photography for retinal imaging, it does not capture true color information.
- The Eidon confocal scanner obtains real color images with automated, dilation-free operation.

color imaging with three confocal imaging modalities: true color (obtained using white illumination), red-free (which can be used to enhance visibility of the retinal vasculature and retinal nerve fiber layer), and infrared (for choroid information).

High-resolution 60° images can be captured even in undilated eyes and without optic bleaching. Because the device can obtain images through a pupil as small as 2.5 mm, it allows capture of excellent images in almost any patient. The white light illumination allows increased perception of retinal pathologies and affords an enhanced view of the optic nerve, providing images that are on par with what would be observed directly. These true color images are essential in determining an accurate diagnosis.

Eidon is also capable of capturing multifield acquisitions, up to 110° automatically and 150° in manual mode. An option allows multiple images to be stitched together into mosaics to provide a widefield view that enables detection of pathology in the periphery of the retina (Figure).

### Other Viewing Capabilities

The Eidon can be used to document pathology including macular degeneration, epiretinal membranes, macular holes, and peripheral lesions. In our general clinic, it doubles as the camera we use to take disc photos for

glaucoma. We also use it as a screening tool in the clinic to take images of all patients coming through the door, dilated or not, because screening requires a widefield view. The camera is capable of capturing images in approximately 3 minutes, and this has sped up our patient flow.

Some patients do not require fluorescein angiography but need a fundus photo to document pathology. In such cases, patients can have a fundus image taken with the Eidon platform, which is more staff- and time-efficient and helps cut the cost of staff overhead.

### Image Sharing Near and Far

Eidon's touchscreen tablet interface is built to communicate with an office's computer system so that images taken with the scanner can be accessed from any computer with an Internet connection. This is helpful in educating patients because one can bring up images on any Wi-Fi-capable tablet to better explain their pathology and what treatments will be necessary to combat the condition.

The remote viewing function also makes this technology ideal for telemedicine applications, as primary care physicians in rural areas can upload captured information for a retina specialist to review, enabling early disease detection.

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### A PRACTICAL CHOICE

Most cameras require operation by a highly skilled technician, but the Eidon will walk patients through the exam. It features automatic pupil alignment and retinal focusing, allowing any staff member to efficiently run tests. Specifically, it auto-aligns to a patient's pupil; focuses the retina; and captures images, both infrared and color, using a soft light source to ensure patient comfort. If necessary, it is also possible to switch to manual mode and use a virtual joystick to



**Figure.** An example of a widefield mosaic view obtained with the Eidon confocal scanner.

focus and align with specific areas to capture particular pathologies in greater detail.

While similar devices on the market such as the Daytona (Optos) may provide comparable results, in my experience the Eidon is easier to use in terms of patient positioning and image capturing, and it is less than half the cost. For these reasons, this confocal scanner has been a welcome addition to our practice. ■

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