

# Zero-dilation scanning laser ophthalmoscopy for the early diagnosis of diabetic retinopathy: Results from the DRIVE study

Dirk De Brouwere,<sup>1</sup> Peter van Etten<sup>2</sup> and Jose Martinez,<sup>3</sup>

<sup>1</sup>i-Optics bv, The Hague, The Netherlands

<sup>2</sup>Rotterdam Eye Institute, Rotterdam, The Netherlands

<sup>3</sup>Rotterdam Eye Hospital, Rotterdam, The Netherlands

The incidence of diabetic retinopathy (DR) is projected to escalate as the number of people diagnosed with diabetes increases. Regular DR screening, often performed using a traditional fundus camera, enables early intervention and significantly reduces the risk of vision loss.<sup>1</sup> However, fundus imaging requires pharmacologic mydriasis for small pupil diameters, which is time-consuming, expensive and often uncomfortable for patients. A confocal line scanning laser ophthalmoscope (cSLO) has been developed by i-Optics (The Netherlands) for non-mydratric diagnosis of DR. In the Diabetic Retinopathy Initial Validation Enrolment (DRIVE) study, performed at the Rotterdam Eye Hospital, the clinical performance and ophthalmologist referral rates obtained following DR screening by zero-dilation cSLO and conventional fundus imaging were compared.

## Methods

Sequential eye examinations were conducted in 100 patients with diabetes (age  $60 \pm 11$  years) using the cSLO imaging device (EasyScan v1.2, i-Optics, The Netherlands) and a standard fundus camera (Topcon TRC-NW6) (Figure 1). cSLO imaging used green (532 nm) and infrared (785 nm) laser light to illuminate a narrow line on the retina through a 2.0 mm pupil and across a 45- by 45-degree retinal central and nasal field. Following cSLO imaging, mydriasis was performed to allow imaging with the fundus camera. Acquisition time was recorded for EasyScan. Referral for DR was assessed, based on The Netherlands Guidelines,<sup>2</sup> by two licensed graders using images from both devices.

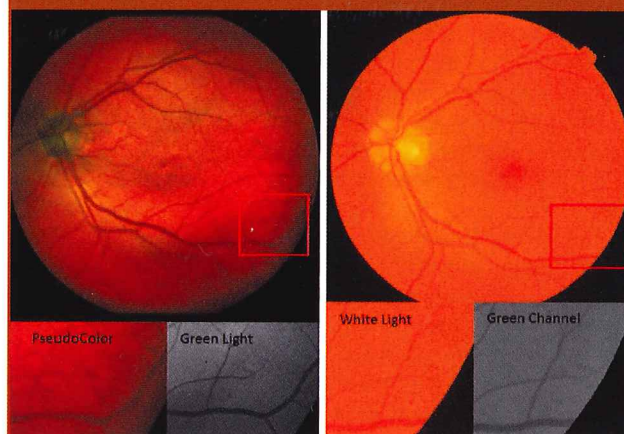
## Results

Gradeability of cSLO images was in line with the criteria for diabetic diagnosis devices specified by the British Diabetic Association. Median image acquisition time using cSLO was less than 3 minutes. 33% of patients imaged with the cSLO had a pupil diameter of less than 3.3 mm and would require mydriasis before fundus imaging. DR referral rates obtained using cSLO and fundus imaging showed strong agreement (88.6%) after device-blinded evaluation. Normalized sensitivity for detection of DR lesion characteristics was greater with cSLO imaging than with fundus imaging (100% versus 85%). Normalized specificity was equivalent for the two techniques (96%).

## Conclusions

The DRIVE study found cSLO imaging to be an efficient

Figure 1: Zero-dilation cSLO and conventional fundus imaging



technique for DR diagnosis which demonstrated improved sensitivity over traditional fundus imaging and no requirement for time-consuming pharmacologic mydriasis. Zero-dilation cSLO can be performed relatively quickly and has the potential to improve efficiency and reduce appointment times, with consequent benefits for both patients and healthcare providers. cSLO imaging may facilitate screening of DR in primary care centres and thereby promote early diagnosis and treatment.

## Reference

1. S. Garg and R.M. Davis, *Clin. Diabetes*, 2009;**27**:140–145.
2. Nederlands Oogheekundig Gezelschap. *Richtlijn: Diabetische retinopathie. Screening, diagnostiek en behandeling*. Accessed at <http://www.oogheekunde.org/uploads/Vs/qr/VSqAwWsMsiAu4bXQLv1uQ/Richtlijnen-Diabetische-Retinopathie-.pdf>, 15 November 2011.

**easyScan**  
by i-Optics.com

**i-Optics**

Mauritskade 35 2514 HD, The Hague, The Netherlands

Tel.: +31 70 3993 112

Website: [www.i-optics.com](http://www.i-optics.com)

## EasyScan

### Smart retinal imaging based on scanning laser ophthalmoscope (SLO) technology

EasyScan is a breakthrough zero-dilation retinal imaging system that is ideal for the diagnosis of retinal pathologies, for example, diabetic retinopathy, age-related macular degeneration and glaucoma.

EasyScan makes retinal imaging fast, easy and patient-friendly. It is the first to pack high contrast confocal SLO into a compact, affordable and patient-friendly device. And it weighs just 7 kg, so it opens up high-end eyecare to patients all over the world.

Check the benefits of confocal imaging in our clinical atlas

[www.i-optics.com/library](http://www.i-optics.com/library)

### Features:

- Optical engine: Confocal SLO
- Capture mode: Green (532 nm), near infrared (785 nm) and combined, (pseudo colour)
- Field angle: 60 degrees horizontal, 45 degrees vertical
- Minimum pupil size: 2.0 mm
- Alignment help: 'See what you get' with IR live imaging
- Fixation targets: 3 internal targets
- Autofocus and autocapture: YES
- Flash settings: Auto Exposure
- Emmetropia compensation:  $\pm 10$  D
- Unique movie loop feature showing multiple frames
- Easy switching between capture, review, archive and export
- Networking capabilities including telediagnosis
- Image formats: TIFF, JPEG, PNG, BMP, DICOM, PDF
- Compact, portable, USB-powered
- Weight < 7 kg

i-Optics pioneers smart and superior eye diagnosis solutions. Our innovations also include Cassini Color Led Topography and EyePrevent, retinal screening programs.

SEE THINGS DIFFERENT.



**easyScan**  
by i-Optics.com

### i-Optics

Mauritskade 35, 2514 HD The Hague,  
The Netherlands

Tel.: +31 7039 93112

Website: [www.i-optics.com/DRIVE](http://www.i-optics.com/DRIVE)

A reprint from issue 2 of

Products in  
**PRACTICE**

Published by

**Ophthalmology Times**  
EUROPE

 **ADVANSTAR**