Combining skills

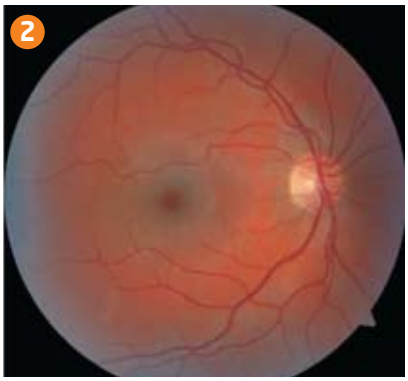
The latest instrument in the Cirrus family combines a fundus camera with OCT. **Bill Harvey** finds it ticks most of the boxes

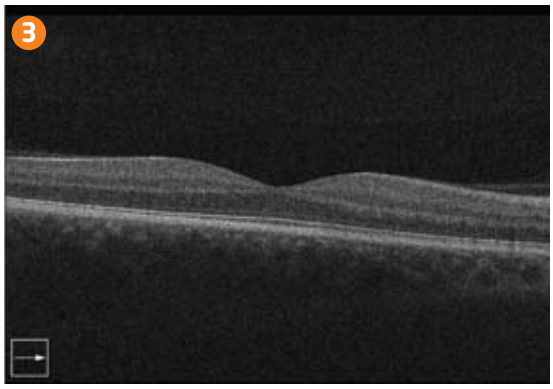
The Cirrus Photo is a high specification fundus camera combined with the Cirrus OCT allowing simultaneous retinal imaging and spectral domain OCT analysis. I recently loaned one to put through its paces at the City University eye clinic. If I was thinking of investing in a new imaging unit I would expect a number of things. Ease of use is essential, as I would hope that an ancillary member of staff might, with the appropriate training and support, be perfectly able to capture all the images and data I would want. I also like the idea of combined units – they would minimise the 'footprint' so help in ensuring the smooth running of the practice, and also allow a single operator to offer a variety of assessments each of which might form part of a professional fee plan. I would expect the unit to be accurate and repeatable as a matter of course, for the capture process to be minimally disturbing for the patient, and for the data gathered to be easily interpreted and transferable, both to adjacent consulting rooms to the instrument position and to other professionals within a community network or scheme. The Zeiss Cirrus Photo passes all of these tests.

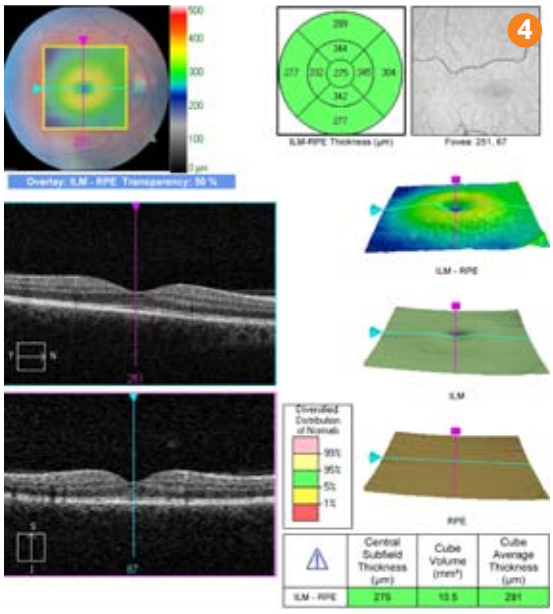
Operation

The unit I used was the Cirrus Photo 800 (Figure 1). This is the same as the 600 unit, recommended for optometrists, but also includes fluorescein angiography and ICG functions, unlikely to be required by a community optometrist. The 800 also includes autofluorescence, which can also be included as an extra feature on the 600. I would very much recommend this function for anyone looking to develop a macular health clinic, as autofluorescence imaging is a very useful way of detecting early tissue changes related to lipofuscin aggregation prior to atrophy.

The patient is positioned as per usual and a minimum of data fields filled out. Interestingly, even though the system includes the normative database included in the Cirrus, the inclusion of ethnicity is not essential. You are, however, prompted to state whether the patient is male, female or other. Pressing the 'acquire' button takes you straight to the capture screen where you can select either the OCT function, the photo function or the combination. The OCT/photo function allows both assessments to be carried out in one go with no loss of data or any information as if the two were run separately. Having the option to run each separately will allow you to charge accordingly – for example, if a patient wants a retinal photo but no OCT then the single operations allow you to charge for the one function.







The OCT operation is essentially that of the Cirrus HD-OCT with which many readers will be familiar. Initially one can specify whether a macular scan or a disc scan is to be undertaken and the subsequent data from high-density OCT cubes, thickness and layer maps may be correlated with results from the camera capture. The camera may be set for a 45 or 30 degree field depending on the pupil size, and there is an option for a 30 degree SP (small pupil) capture which I found most useful with the patients I saw. I was able to get adequate retinal photo images (the OCT capture does not rely on pupil size) with even the smallest of pupils by a simple adjustment of the flash setting and use of the SP setting. The camera also allows you to preset to colour capture, or individual red, green or blue, and also autofluorescense if included in your package. There is also the option to change the fixation target to help with disc assessment, to use an external rather than internal target if a very particular area needs to be captured, or a multi-position setting is to be used to allow for a mosaic image of the retina.

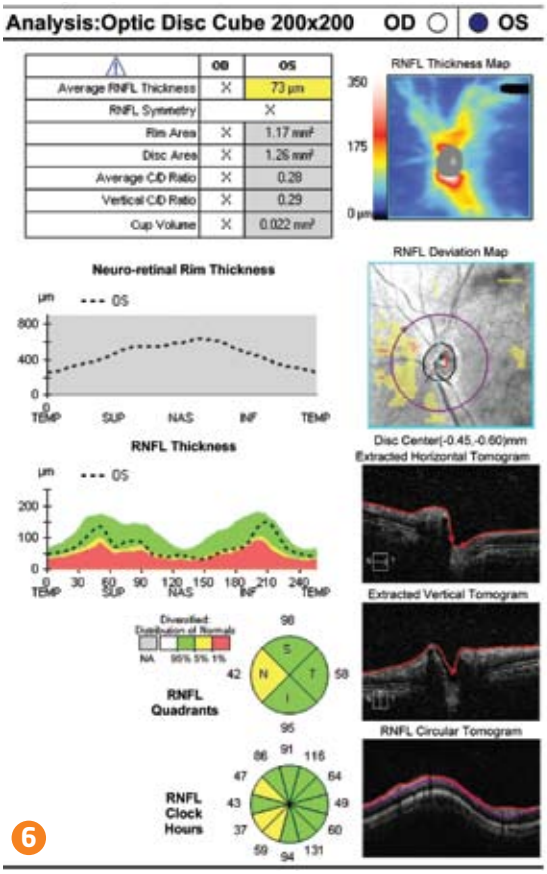
Patient 1

Patient 1 was a healthy 39-year-old man with no obvious ocular problems. Figure 2 shows the printout for his 45 degree field retinal photo. A macular map scan on the OCT (Figure 3) shows

how even with a multiple raster scan the resolution shows retinal layer detail – a single raster scan is available for even higher definition. I always prefer the black and white view to see retinal detail but this is personal preference and a colour option is always available. Note how the outer ends of the image show the posterior vitreous face moving away from the retina. Using the cube scan rather than a single raster allows a thickness map to be generated which would be useful for monitoring any changes to retinal thickness (inner limiting membrane to the retinal pigment epithelium) over time. The normative data shows this patient to be well within expected parameters for the macular area (Figure 4).

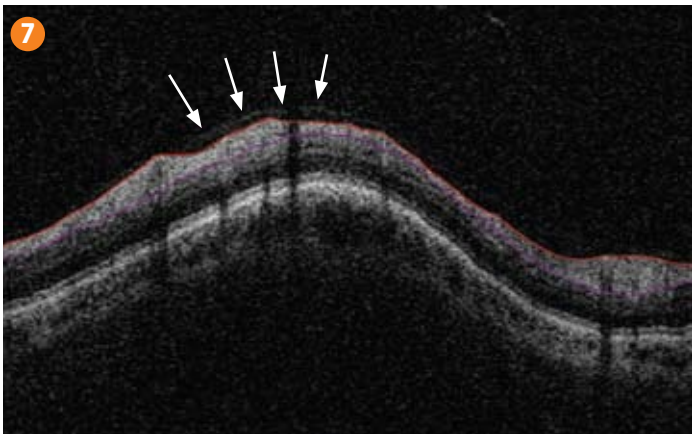
Patient 2

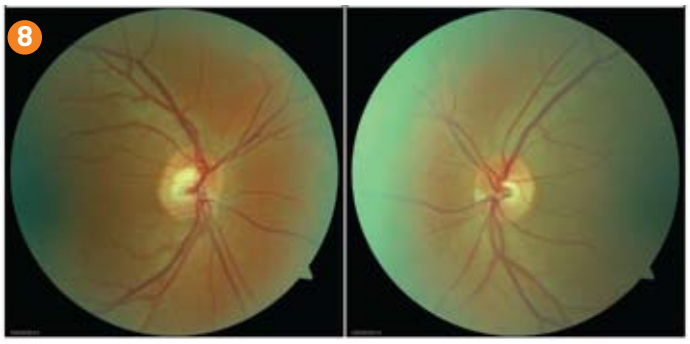
Patient 2 was a 59-year-old myope aware of some floaters but little else of concern. I centred the image on the disc and the poorer media along with tiny pupils required a brighter flash setting to get the photo (Figure 5). Note the peripapillary atrophy around the disc. Myopic discs have been known to give anomalous results on OCT scans of the disc and surrounding tissue, so I also used the disc cube scan which allowed an analysis of the retinal nerve fibre layer and optic nerve head regions (Figure 6). Just the left eye results are shown and you can see from the RNFL thickness 'twin peaks' plot how the retinal nerve fibre layer appears to fall within normal parameters. Figure 7 shows the cross-section of retina around the disc as if it were rolled out into one straight line. The arrows mark the posterior face of the vitreous and the red and purple lines the outer edges of the nerve fibre layer. Some machines in the past have picked up on the posterior face to give an artificially wide layer reading and perhaps therefore masked a suspicious patient. This image reassures you that the nerve fibre layer itself is the thickness being measured.

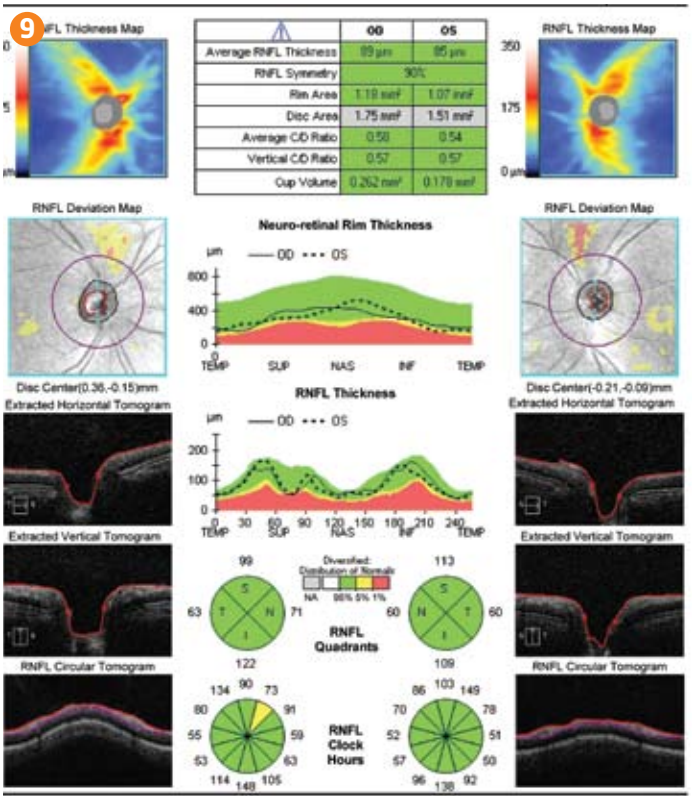


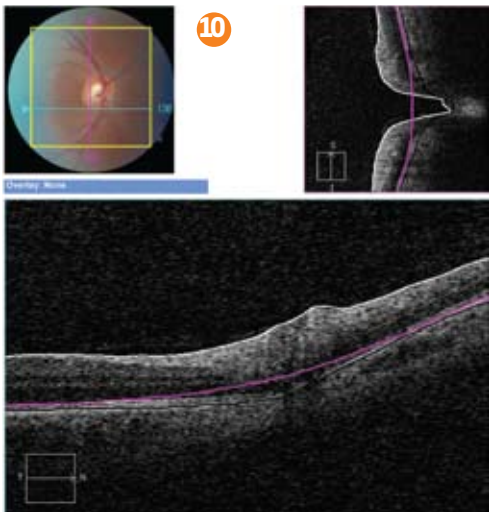
Patient 3

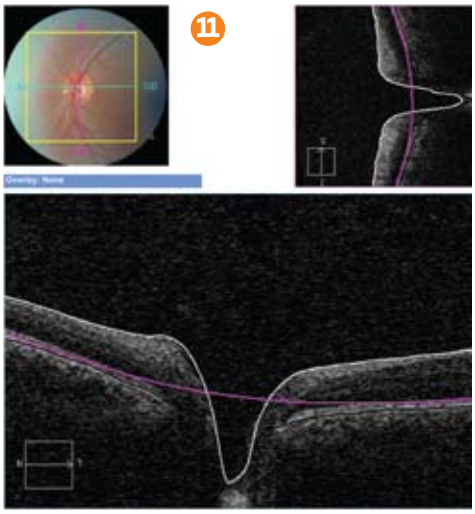
Patient 3 is someone I have seen several times before and who has in the past been referred for his disc asymmetry. Figure 8 shows the two discs positioned side by side and you can clearly see the asymmetry. The neuroretinal rims appear healthy and perfused and there is certainly no apparent loss of inferior rim structure, but any asymmetry deserves further attention and in many cases warrants referral. Figure 9 shows the optic nerve head and retinal nerve fibre layer analyses for each eye next to ▶











each other on a single data sheet clearly demonstrating here that the structures fall within normal expected values, albeit with some minor variation. More importantly, the results tally nicely with previous measurements on this patient suggesting no significant disease process. Figures 10 and 11 show how you can display specific cross-sections of the disc cube by moving the horizontal and vertical cursors. Figure 12 shows the macular map and disc data displayed on one composite sheet for the right eye.

Other patients

Figure 13 shows the disc analysis data for a 66-year-old African-Caribbean patient with a strong family history of glaucoma. The data here warrants referral as you can clearly see thinning of the RNFL for the right eye (OD) and a significant asymmetry in tissue structure. Figure 14 shows a mosaic image of a patient with atrophic macular degenerative changes using a four fixation position capture setting. Figure 15 shows a patient aged 96 after a wet macular degenerative event. Note the faint streaks indicative of epiretinal membrane – a good indication of high resolution capture.

Combination

I found the instrument very easy to use, the manipulation of data excellent and the combination of photography and OCT most helpful and likely to pay for itself more quickly than a single function instrument. The Forum software allows integration with other data, such as from a Humphreys and I predict that such integrated functioning will be a big theme in the instrument world in the coming year.

● Thanks to Zeiss Instruments for loan of the Cirrus Photo 800. More details at customercare@zeiss.co.uk 01223 401450