A fully-detailed assessment of the condition and evolution of structural damage in the optic nerve is essential for diagnosing and following up glaucoma. A detailed and thorough examination of the papilla and the nervous fibre layer (NFL) in slit lamp with a contact lens (Goldmann) or without contact lens (60, 78, 90 diopters or broad field) is very useful and also necessary to assess glaucoma patients or suspected glaucoma cases. However, it is also important to know the limitations of this examination. Clinical exploration is completely dependent on the evaluation technique and on the experience and knowledge of the examiner. Accordingly, it is very difficult to compare different assessments, particularly in a lifelong disease.

Colour photographs of the papilla are very recommendable for comparing findings in different points in time. In addition, black and white photographs of the NFL are one of the most sensitive methods for early detection of glaucomatous damage. However, photographs do not provide quantitative data, do not compare with normal data or allow statistical calculations to assist the ophthalmologist to interpret the findings observed in the papilla of the NFL, as both structures are characterised by high individual variability.

At present, there are several instruments in the market which can obtain images of the papilla and the NFL in a relatively simple manner without needing to dilate the pupil and allow for a quantitative analysis of said structures which has proved to be useful in diagnosis and follow-up (1). Of the available imaging methods, confocal laser ophthalmoscopy (HRT, Heidelberg), laser polarimetry (GDx-VCC, Humphrey-Zeiss) and Optical Coherence Tomography (OCT Stratus, Humphrey-Zeiss) are probably the most developed devices that this date. Their advantages are multiple and can be summarised in five. First, they are easy to handle for the operator and comfortable for the patient, who must only maintain his gaze for one or two seconds. Second, they provide an objective and quantitative assessment of NFL (HRT, GDx and OCT) and of the papilla (HRT and OCT). Third, they compare the results of each patient with a database of normal cases, which allows for an immediate assessment of the papillar or NFL variability. Fourth, they provide an acceptable sensitivity and specificity in the order of 80-90% (2-4), for diagnosing glaucoma without requiring the involvement of a trained professional. Fifth, they allow the evaluation of changes which take place in the course of time, while the reproducibility of the measurements suggests that this may be its greatest clinical usefulness.

However, said instruments, being in the midst of a continuous and ongoing development and improvement process, also have limitations. There is a number of them in all devices which can be summarised as follows. First, their sensitivity and specificity for diagnosing glaucoma does not reach the ideal number of 100%. Accordingly, they cannot be used in isolation for diagnosing glaucoma but as an addition to clinical assessments and visual field studies. In fact, Greaney et al (5) have demonstrated that none of these methods is more precise and require a careful interpretation of stereoscopic photographs of the papilla by a glaucoma specialist. Second, the quality of images is an essential requirement for obtaining useful results. Technicians should be adequately trained about the operation and principles of each instrument as well as on quality control of images. Third, their evaluation is completed day after day due to the work of multiple
research groups, but this task is sometimes made difficult due to the continuous production of new versions. Above all, a longitudinal evaluation is necessary in order to determine their capacity and limitations in the detection of progressions. Fourth, all the measurements have a certain degree of variability which must be taken into account when interpreting the results, making it advisable to obtain at least two consecutive images to confirm the results. Finally, they require an adequate interpretation of results. But perhaps one of their greatest drawbacks (which is common to all instruments) is not within the devices but in the lack of knowledge of technicians and doctors about their limitations and the information they provide. There is no doubt that the result sheets of HRT, GDX and OCT provide extremely useful information if interpreted as an additional data in the general context of the case, the ophthalmological assessment of the patient and the functional tests. Frequently, the information source of ophthalmologists about these instruments is supplied by the manufacturer which, inevitably, will have a marketing rather than scientific bias.

The reader may wonder whether said imaging methods are really useful considering the above limitations and other restrictions of particular devices which cannot be commended in this brief text. These sophisticated instruments do not substitute, and I think they never will, detailed eye fundus exploration with slit lamp, but they are an important supplement of clinical exploration and functional tests. They provide objective measurements of the papilla and the NFL which are quantitative and reproducible and facilitate comparisons between eyes and between different explorations at different points in time. They allow to identify structural damages in cases in which functional tests are doubtful, erroneous, unreliable or simply impossible to obtain. Said devices are in a continuous development process in order to improve the assessments of progression detection methods in longitudinal studies. The results of these studies could increase their relative weight in the follow-up of glaucoma above that of functional tests which are highly variable, small and patient-dependent. The utilisation of imaging methods in glaucoma assessments is growing due to its usefulness in diagnosing the disease, but probably their greater usefulness lies in providing an objective and quantitative methods to assess changes in different points in time.

**REFERENCES**