& OCT GLAUCOMA

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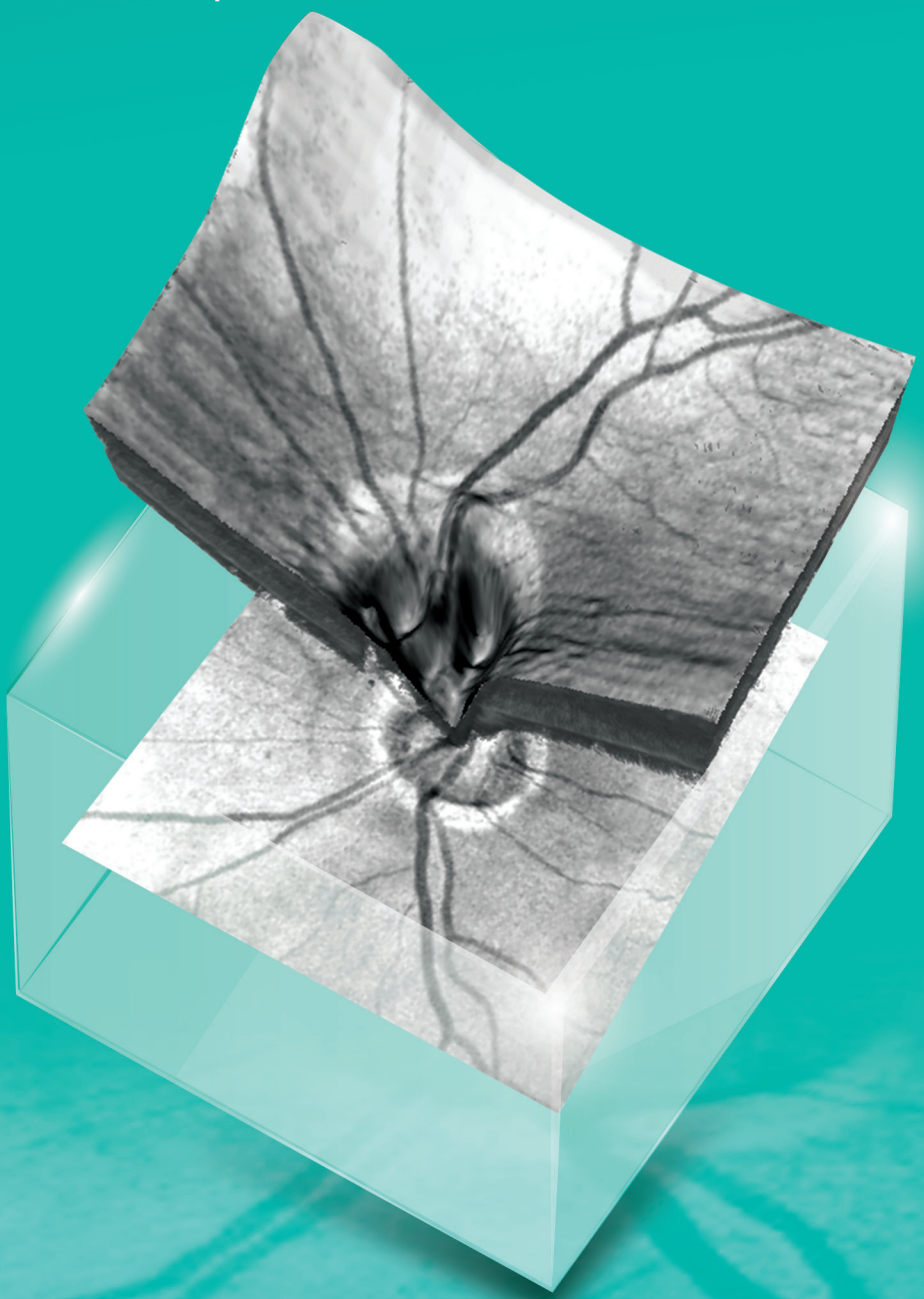

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Posterior segment OCT in glaucoma

Introduction

Identification of structural changes of the retinal nerve fibre layer (RNFL), optic nerve head (ONH) and macular ganglion cell complex (GCC) is an essential component of the diagnosis and management of glaucoma.

Optical coherence tomography (OCT), which has been used in ophthalmology for more than 25 years, allows in vivo examination of all layers of the retina.

New SD-OCT (Spectral-Domain OCT) systems now provide continually improving objective quantification of lesions of these structures.

The use of recently available new image acquisition and new image analysis algorithms on larger tissue volumes now allows a higher level of diagnostic precision of the parameters obtained, as well as more reliable interpretation of the features of certain clinical forms at the various stages of glaucomatous optic neuropathy.

Lastly, the development of OCT angiography, providing *«en face»* visualization of the capillary architecture and clear distinction of the deep and superficial capillary plexuses, provides perspectives with various interesting extensions. The contribution of OCT angiography, in terms of its objective to evaluate the dynamic aspects of the tissues in addition to tissue morphology, needs to be more clearly defined.

1. Principle and objectives

Principle and objectives

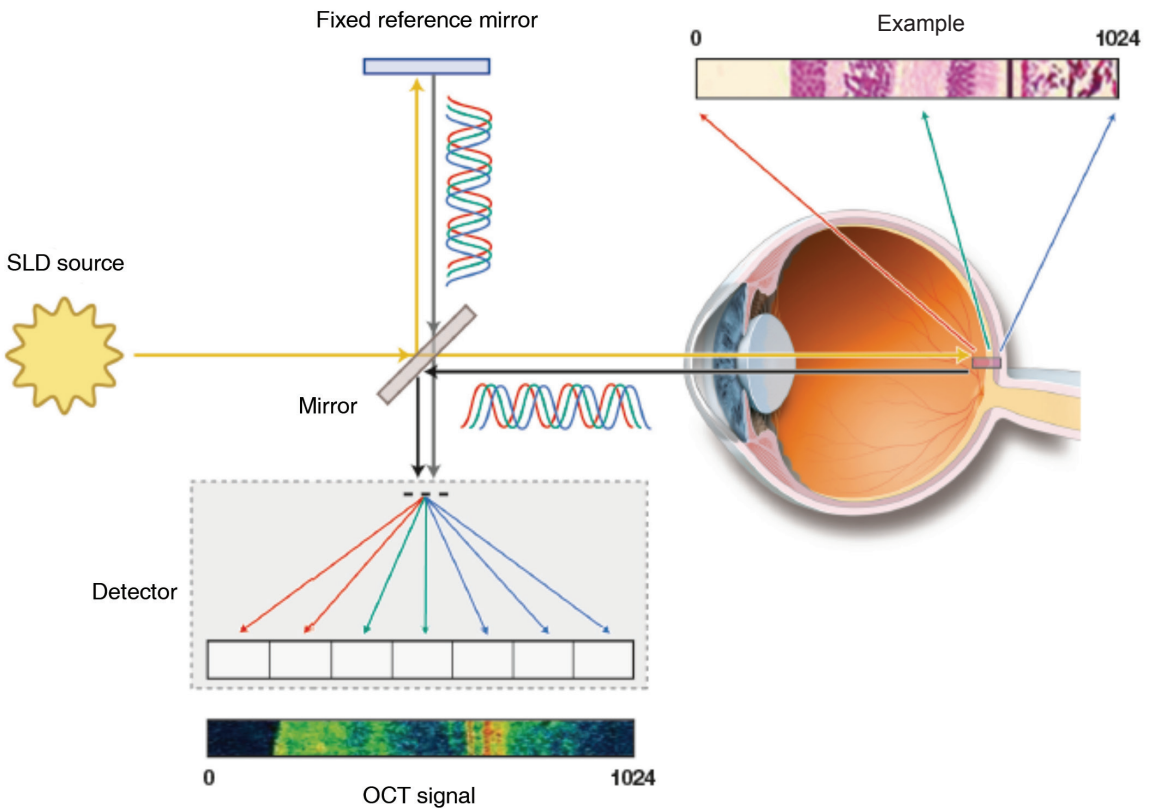
The reconstituted image obtained by optical coherence tomography depends on the absorption and reflection of light by the tissues. The very rapid light propagation (backscattered) over distances of several micrometres that separate posterior structures of the eye can be measured by means of interferences. The light reflected by retinal layers is therefore made to interfere with that of another beam derived from the same source that has travelled over a reference optical path. Interferences only occur over a certain distance: the coherence length, leading to the name of optical coherence tomography.

Spectral-Domain OCT (SD-OCT) is a form of low coherence interferometry, in which the light source is a superluminescent diode (SLD) between 840 and 880 nm and the detector is a spectrometer, which immediately resolves interference signals throughout the entire depth of each axial examination of the tissue without needing to vary the length of the reference path (mirror).

The spatial representation of the reflectivity values obtained allows the construction of two- or three-dimensional images that are closely correlated with histological images of the retina.

SD-OCT now scans tissues at a speed between 25,000 and 70,000 A-scans/s, allowing very rapid acquisition of volumetric data sets with an axial resolution of about 3-5 µm and a transverse resolution of 12-20 µm depending on the SD-OCT device.

OPTICAL DIAGRAM OF SPECTRAL-DOMAIN OCT



Study of the frequencies of refracted light (spectrometer)