Quantitative Optic Nerve Head Nerve Fiber Layer Estimation

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Introduction

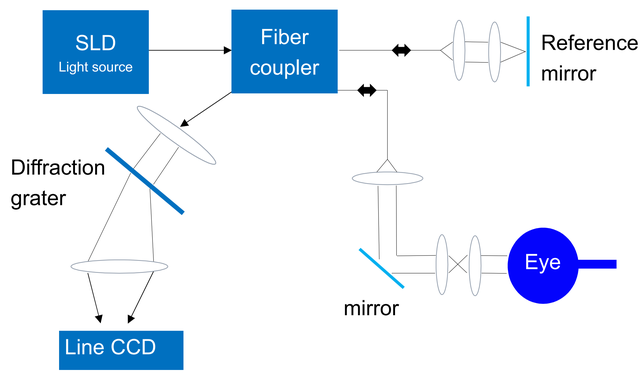
Glaucoma

- second leading cause for irreversible blindness in the world

- Death of retinal ganglion cells leads to:
  - Decrease of retinal nerve fiber layer
  - Morphological change of optic nerve head
  - Visual field defects

Methods

Simultaneous 3D capture of optic nerve head, through dilated pupil, with commercial Ocular Coherence Tomograph, 3D OCT 2000 Topcon (OCT).



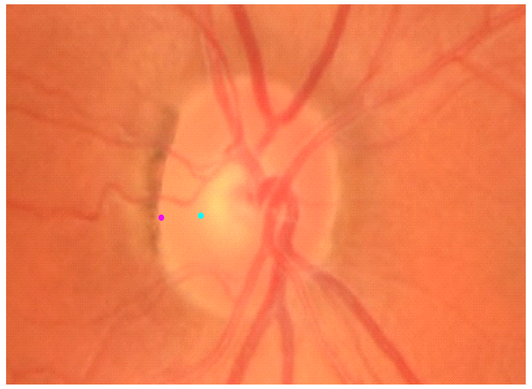
Export of data to a study computer containing custom made software.

Analysis of data with custom made semi automatic algorithm.

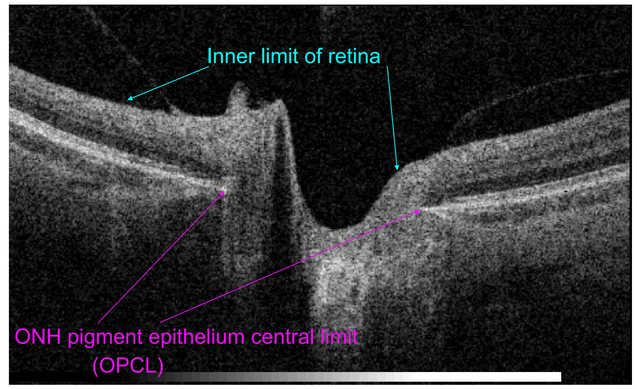
Purpose: To quantitatively estimate the nerve fiber layer within the optic nerve head

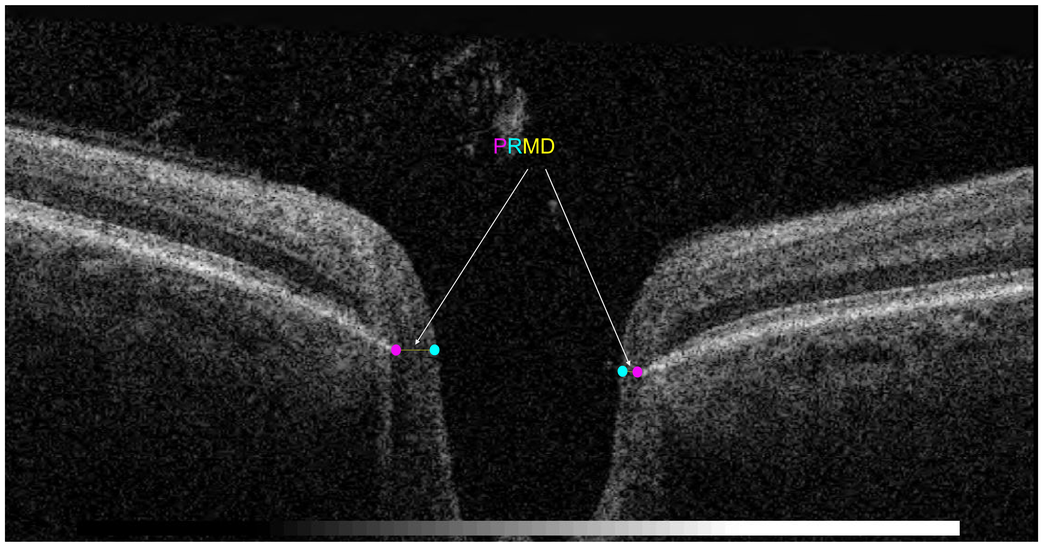
Results

Photograph of optic nerve head



Cross section
OCT B scan of optic nerve head with critical boundaries indicated





OCT B scan of optic nerve head with the minimal distance between the optic nerve head central limit of the pigment epithelium (OPCL) and the inner limit of the Retina, central limit of the Pigment epithelium, inner limit of Retina Minimal Distance, (PRMD).

The custom made algorithm quantitatively estimates the nerve fiber layer content within the optic nerve head by determining the mininmal distance between the Optic nerve head Pigment epithelium Central Limit (OPCL) and the inner limit of the retina, integrated over 360° and reduced for noisy angles, and normalized to angle of measurement.

Significance and Future Plan

OCT allows for rapid noninvasive simultaneous 3 D capture of the optic nerve head with a minimum of patient co-operation. OCT provides imaging of the optic nerve head with the best resolution of currently available methods. The custom made algorithm uses structures easily detected by OCT to quantitatively estimates the minimal cross section of the nerve fibers within the optic nerve head.

A study on glaucoma patients with early to moderate glaucoma is planned.

GULLSTRAND LAB

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