

OCT Gonioscopy with Custom Goniolens to Image Fine Structures of the Human Iridocorneal Angle In Vivo

Purpose:

To enhance the capabilities of a clinical ocular coherence tomography (OCT) system to image fine structures of the human trabecular meshwork (TM) using a customized goniolens. The TM is located in the iridocorneal angle (ICA) and regulates outflow of the aqueous humor. Therefore, it is of importance in the understanding of glaucoma and its management. Current clinical imaging techniques lack the resolution required to image finer details of the TM.

Methods:

A custom two-mirror (59° and 63°) goniolens was designed and built in-house to closely match the refractive index of the human cornea. Imaging was obtained via the retina module of the Heidelberg™ Spectralis OCT which was possible due to a focusing air-spaced doublet placed on the anterior surface of the lens. After instillation of Proparacaine Hydrochloride USP 0.5%, the goniolens was placed on one eye of each subject coupled with gonioscopic gel and aided with a 3D adjustable mount fixed to the head mount of the OCT device for stability. Dense scans were acquired tangential and orthogonal to the iris and ICA. Volumes were segmented along the posterior uveal meshwork. Reconstructed en face images were used to make anatomical measurements.

Results:

Five eyes of 5 subjects were successfully imaged without complications. The custom goniolens allowed imaging of the fine detailed structures of the uveal and corneoscleral meshwork, revealing thin striations deeper into the TM. The thin striations measured in 2 of the 5 subjects averaged 15.65 μm .

Conclusion:

A commercial OCT coupled with a custom goniolens was able to image fine details of the ICA. Thin striations deep to the uveal meshwork were measured and may represent corneoscleral laminae of the TM.

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