

Ex vivo optical coherence tomography imaging of collector channels with a scanning endoscopic probe

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PURPOSE: To achieve high-fidelity optical coherence tomography (OCT) imaging of ex vivo collector channels (CCs) exiting Schlemm's canal (SC) using a paired-angle rotating scanning endoscopic probe.

METHODS: An endoscopic probe was developed to guide an OCT laser beam onto human cadaver eye tissue samples to detect CCs. The prototype probe consisted of two gradient-index (GRIN) lenses that were housed in two stainless steel needles, respectively. The probe scanned the laser beam across a fan shape area by rotating the two GRIN lenses. The authors built a swept source OCT system to provide the depth scans. Human cadaver eye tissue was prepared for imaging. OCT images were acquired while the wall of SC was scanned. After successfully locating the opening of a CC on the SC wall from the OCT images, the authors applied scanning electron microscopy (SEM) to image the sample for comparison.

RESULTS: The prototype probe focused the laser beam to a working distance of approximately 1.4 mm (in air) , with spot sizes ranging from 12 to 14 μm . The fan shape scan area had a radius of 3 mm and an arc angle of approximately 40°. Acquired OCT images clearly showed a CC opening on the wall of SC with the channel going into the sclera, from which quantitative measurements were made. Results from OCT and SEM show good agreement with each other.

CONCLUSIONS: The resolving power of the scanning endoscopic probe is sufficient to locate CCs and to observe their shape.

Invest Ophthalmol Vis Sci. 2011 Jun 6;52(7) :3921-5. Print 2011.

<http://www.ncbi.nlm.nih.gov/pubmed/21357387>