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Presentation Abstract

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Abstract Title:	**Three-dimensional OCT-Reconstruction in a Novel Virtual Reality System**
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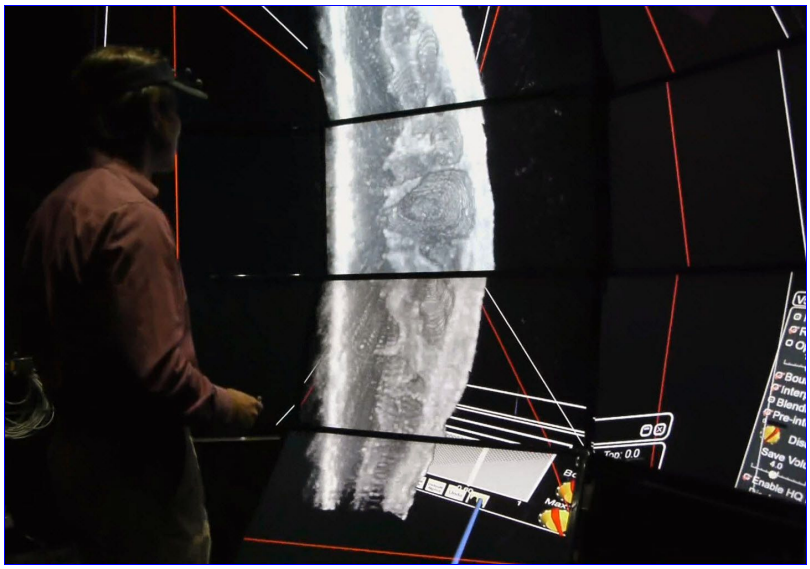
Abstract Body:	**Purpose:** Three-dimensional (3D) reconstruction of optical coherence tomography (OCT) images is a modern technique that helps interpret the images and understand the underlying disease. However, the 3D reconstruction displayed on commercial devices is of limited quality: it is difficult or impossible to adjust the view point and capture the data set from a meaningful perspective. We did a pilot study to evaluate the applicability and impact of a novel virtual reality (VR) system and improved software on clinical diagnostics and research. **Methods:** We used the images of a tightly spaced (11-30 µm) macular cube of different retinal pathologies acquired with the Heidelberg spectral-domain OCT system. For the 3D reconstruction we used our own volume rendering software, which can drive PC cluster-based VR display systems. No segmentation or pre-classification is required. Data from an OCT can be viewed within minutes of scanning the patient's eye. Changes of opacity, brightness and contrast can be made in real-time directly from within the VR system. We viewed our data sets in a novel VR system, which is based on a 3 by 3 array of off-the-shelf passive stereo LCD television (TV) sets. Our VR system is brighter and has an order of magnitude higher contrast than projector-based VR environments, which makes it particularly attractive for medical use. The images were compared with the single OCT slides and the 3D reconstruction available on the commercial devices.

Results: The 3D reconstructions show details which are hard to discern on conventional OCT images and the 3D view on the devices. For example, the wall of a macular hole can be seen at an exceptional level of detail, and the visualization of cysts of a diabetic macular edema is greatly improved because the cysts can be viewed from the inside.
Conclusions: Extraordinary 3D-OCT image reconstruction can be achieved with modern visualization systems, which is a significant improvement for their clinical analysis. These systems can process OCT image stacks instantly into high-quality 3D pictures. New 3D TV based VR systems are sufficiently compact and affordable to be installed in a medical unit.



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