AB091. A novel method for the measurement of pulsatile choroidal blood flow based on video-rate OCT imaging and automated segmentation of the choroid: description and reproducibility

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Background: Over the years, a variety of non-invasive techniques have been developed to allow the measurement of blood flow in living human eyes. However, none of the existing techniques has yet been adopted in clinical practice due to their limitations and lack of standardization. Moreover, no reliable technique is currently available to measure the pulsatile choroidal blood flow (PCBF). We propose a novel method based on video-rate optical coherence tomography (OCT) imaging and automated segmentation to measure the pulsatile component of choroidal blood flow *in vivo*, and demonstrate its repeatability.

Methods: Adapted from our earlier work (Beaton *et al.*), this method uses video-rate OCT with enhanced depth imaging and automated segmentation of the choroid to measure the pulsatile choroidal volume change. Imaging is carried out at the fundus for less than a minute at 7 Hz. In each frame, choroidal thickness (CT) is measured by a segmentation algorithm based on graph cuts using an edge-probability weighting scheme. The algorithm computes the CT change corresponding to choroidal filling over the time-series and subsequently derives the pulsatile choroidal volume change through an approximate model of the eye. Fifty-eight subjects were recruited from the Maisonneuve-Rosemont Hospital and PCBF was measured twice in one eye within the same session and by a single examiner. Repeatability was assessed using the Bland-Altman plot and Intraclass correlation coefficient as calculated with SPSS.

Results: Two measurements of PCBF were successfully obtained for each eye using our technique. The average measures ICC for choroidal volume change was 0.929 (95% CI, 0.881, 0.958), showing good to excellent repeatability. The Bland-Altman plot and Pearson coefficient ($r=0.840$, $P<0.001$) showed agreement and a strong correlation respectively between intra-session measurement of OR in all examined eyes.

Conclusions: This study confirms the high repeatability of pulsatile choroidal blood flow measurements obtained with our optical method, allowing further investigation of blood flow in ocular diseases such as glaucoma and AMD.

Keywords: Pulsatile choroidal blood flow (PCBF); optical coherence tomography (OCT); novel technique; repeatability

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