ABSTRACT

TITLE: Flow Void Analysis: Multiscale Quantitation and Visualization of Choriocapillaris Alterations in Age-Related Macular Degeneration Using OCT Angiography

ABSTRACT BODY:

Purpose: The choriocapillaris (CC) is important in the pathophysiology of age-related macular degeneration (AMD). This study aims to develop optical coherence tomography angiography (OCTA) techniques for quantifying and visualizing CC alterations.

Methods: We developed a novel metric for quantifying CC flow voids (areas of no/low blood flow), as well as a display method: multiscale flow void mapping (MFVM). The metric was tested on normal controls (13 eyes, 9 subjects; 68.2±6.89 y/o), eyes with small drusen (volume<0.02 mm³; 8 eyes, 7 subjects; 69.3±11.22 y/o), large drusen (volume≥0.02 mm³; 6 eyes, 5 subjects; 80.0±5.37 y/o), nascent geographic atrophy (nGA: lesions showing hypertransmission over a linear dimension >125µm but not evident on routine fundus imaging) and/or drusen-associated geographic atrophy (DAGA) (10 eyes, 9 patients; 74.0±7.39 y/o), and geographic atrophy (GA) (6 eyes, 3 subjects; 81.7±9.40 y/o).

Results: There was a trend of increasing CC alteration with age, though this was only significant (p<0.05) in controls (Fig 1A). There was also a trend of increasing CC alteration with disease state (Fig 1C): Mann-Whitney U testing
(without Bonferroni correction) showed significantly (p<0.05) different metric values between nGA/DAGA and all other groups, and GA and all other groups (Fig 1D); with Bonferroni correction nGA/DAGA could not be distinguished from large drusen. This analysis did not account for inter-group age variations (Fig 1B), or multiple eyes from the same patient. MFVM was useful for visualizing CC alterations (Fig 2).

**Conclusions:** Quantitative analysis and MVFM may be useful for monitoring CC alteration as a marker of disease progression.
Figure 1. (A) Scatter plot of metric vs. age, evaluated over entire 6x6mm field. Spearman’s rho and p-values are shown top left. (B) p-values for age comparisons. (C) Box plots of flow void analysis metric. (D) p-values for metric comparisons.
Figure 2: Multiscale flow void mapping (MFVM). (A) 80 y/o control eye. (B) 85 y/o large drusen eye. (C) 74 y/o nGA/DAGA eye. (D) 71 y/o GA eye. 1st Row: Color fundus photo. 2nd Row: sub retinal pigment epithelium OCT slab. 3rd Row: 6x6mm en face CC OCTA slab. 4th Row: metric heat map with 0.3mm² kernel. 5th Row: metric heat map, with 0.6mm² kernel. 6th Row: metric heat map with 1.2 mm² kernel. Blue (red) corresponds to less (more) CC alteration.
**DETAILS**

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**TRAVEL GRANTS and AWARDS APPLICATIONS**

**AWARDS:** ARVO and ARVO Foundation Travel Grants|ARVO Members-in-Training Outstanding Poster Award  

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