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**OCT Angiography Multifractal Analysis of Alzheimer’s Disease, Mild Cognitive Impairment, and Healthy Controls**

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**Purpose:**
Multifractal fractal dimension (FD), a number between 1 and 2, has been shown to be useful for measuring the branching complexity of the retinal vasculature, with larger FD values reflecting greater branching complexity. We assessed for differences in multifractal FD from macular OCT angiography (OCTA) scans among subjects with Alzheimer’s disease (AD), subjects with mild cognitive impairment (MCI), and cognitively healthy controls aged >50 years.

**Methods:**
We compared multifractal FD of 3x3 mm macular superficial capillary plexus OCTA (Zeiss Cirrus HD-5000 AngioPlex, Carl Zeiss Meditec, Dublin, CA) scans among the above 3 diagnostic categories. We also assessed the impact of age, sex, and FAZ area on multifractal FD within our control cohort. OCTA scans of inadequate quality for reliable FD analysis were excluded. Multifractal FD was computed from skeletonized vascular networks of OCTA scans using a customized automated program. Generalized estimating equations were used to compare multifractal FD across the three groups, controlling for age, sex, and FAZ area, as well as to assess the associations between FD and demographic features in the control cohort.

**Results:**
The analysis included 129 eyes from 95 controls, 67 eyes from 48 subjects with MCI, and 39 eyes from 39 subjects with AD. Mean age of the entire study cohort was 68.8±7.6 years, and 27% were male. Mean multifractal FD adjusted for age, sex, and FAZ area was not significantly different among groups: 1.851±0.008 for controls, 1.853±0.010 for MCI, and 1.853±0.007 for AD. Among controls, FD was significantly associated with FAZ area (β=-0.05495; P<0.001) but not with age (β=-0.0000356; P=0.549) or sex (β=0.0003077; P = 0.752).

**Conclusions:**
OCTA multifractal FD of the superficial capillary plexus was not associated with AD or MCI status. In cognitively healthy older adults aged >50 years, FD may not be significantly affected by aging. FD results should be adjusted for FAZ area.