Correlation of brain structural MR imaging and retina SDOCT imaging across the aging-MCI-AD continuum: A cross sectional ONDRI study

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INTRODUCTION

Estimating brain health in a cost-effective way scalable for population-wide screening may aid in early detection of Alzheimer disease. To aid in identifying a biomarker for estimating brain health we aim to investigate the correlation of retina spectral domain optical coherence tomography (SDOCT) imaging biomarkers with brain structural magnetic resonance (MR) imaging biomarkers at baseline across the aging-mild cognitive impairment-Alzheimer disease continuum.

METHOD

Data on brain and retina measures were provided from the Ontario Neurodegenerative Disease Initiative. Regional volumes of normal appearing grey and white matter, as proportion of head size, were derived from structural MR imaging and retina thickness from SDOCT images for macula and peripapillary retina nerve fiber layer (pRNFL). The relationship of brain and retina measures is investigated using canonical correlation analysis. Strength of correlation in canonical dimension 1 is assessed with Roy's Largest Root, using F-approximation.

RESULTS

Participants (N = 135) living with Alzheimer disease (n = 30), mild cognitive impairment (60) as well as normal controls (45) were included with 57% (77/135) being women. The entire cohort mean (SD) age was 69.8 (8.1). Canonical dimension 1 showed a moderate correlation between proportional brain volumes and retina thickness (macula: $F(12, 122) = .20$, $p = .006$; $r = .45$); pRNFL: ($F(12, 122) = .25$, $p < .001$; $r = .50$), with occipital, frontal, parietal lobes, and fovea, parafovea and superior pRNFL contributing the most (**Fig 1**).

CONCLUSION

Overall, there appears to be a moderate association between brain and retina imaging measures. Future investigation can determine the degree of association between specific brain regions and retina measures, and the impact of age and sex on these associations.

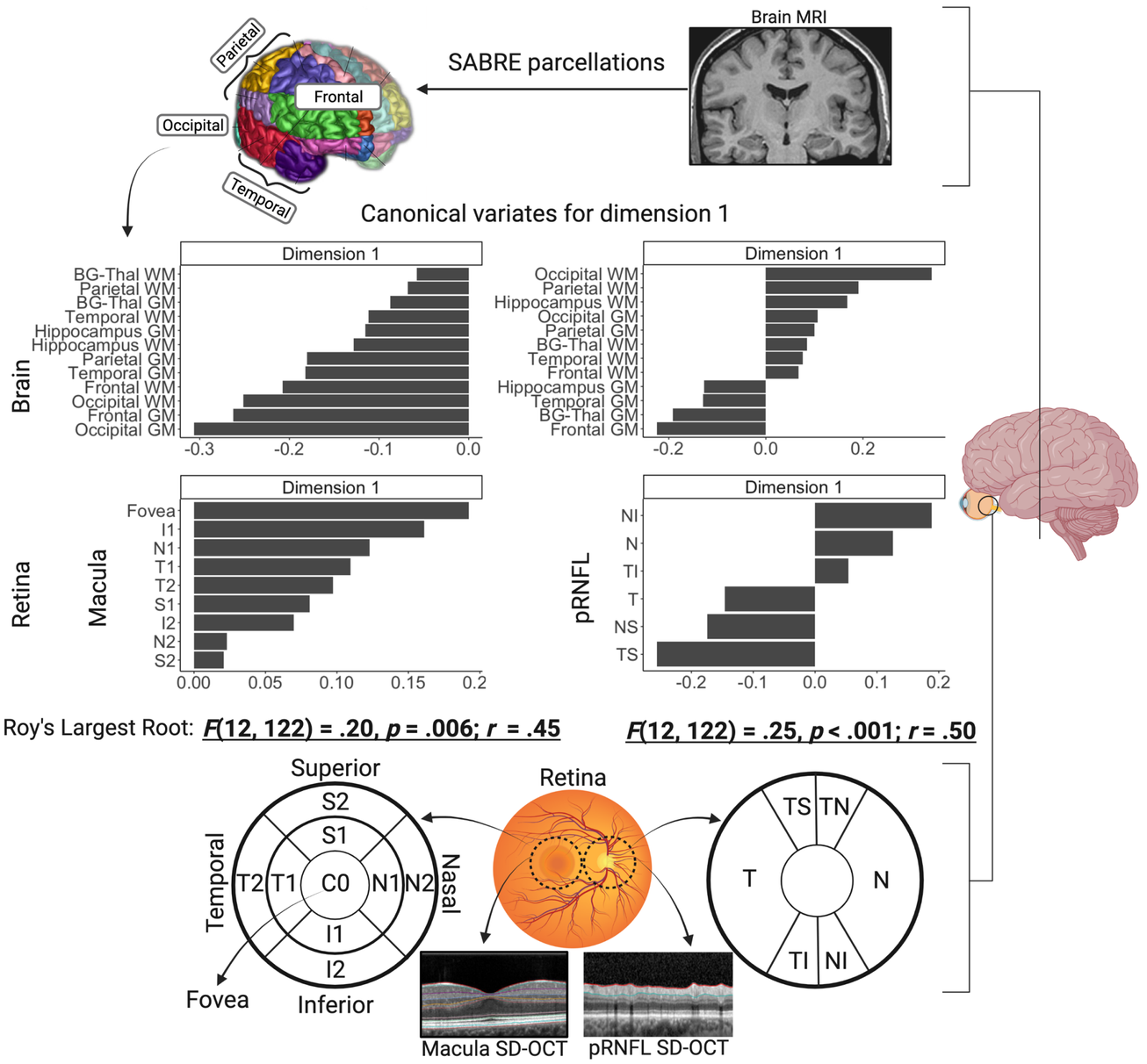

FIGURE 1

Created with Biorender.com

Top left SABRE brain image modified from: Ramirez, J., et al. (2020). Front Neurol, 11, 847. https://doi.org/10.3389/fneur.2020.00847

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