Ultra-widefield retinal and choroidal vascular architecture in mild cognitive impairment and normal cognition

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INTRODUCTION

- Mild cognitive impairment (MCI) is currently a clinical diagnosis[1]
- Referral clinic studies have found that MCI patients progress to AD at rates of 10-15% per year[2,3]
- Exploratory studies using optical coherence tomography angiography have reported alterations in the retinal capillary plexus vessel density and attenuation of the retinal nerve fiber layer but the results are mixed[4,5,6]

PURPOSE

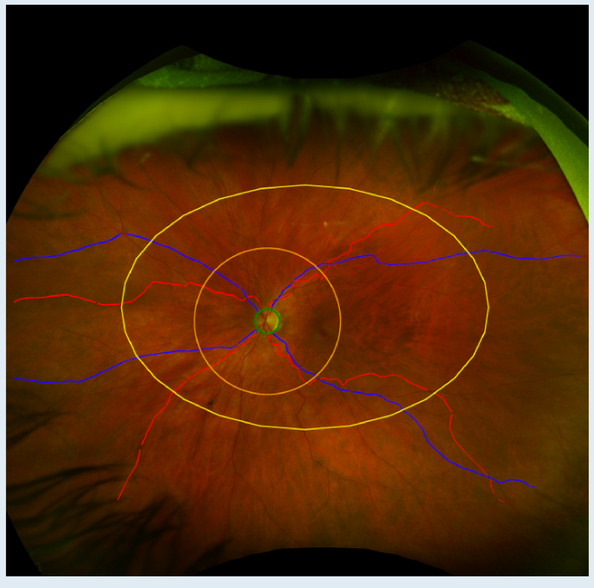
To evaluate retinal and choroidal vasculature and structure in individuals with mild cognitive impairment using ultra-widefield (UWF) imaging

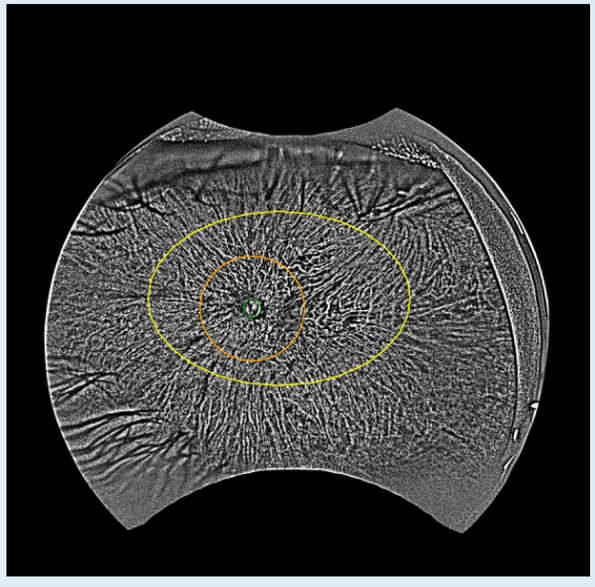
METHODS

- Scanning laser ophthalmoscopy (SLO) (California, Optos Inc, Marlborough, MA) was used to obtain UWF fundus color images
- Vasculature Assessment Platform for Images of the Retina (VAMPIRE) software was used to analyze the images
- Measured metrics included vessel width gradient, vessel width intercept, large vessel choroidal vascular density, vessel tortuosity, and vessel fractal dimension.

RESULTS

- One hundred thirty-one eyes of 82 MCI patients and 231 eyes of 133 cognitively normal participants from the Eye Multimodal Imaging in Neurodegenerative Disease (iMIND) database.
- Arteriolar and venular width gradients were less negative in MCI patients compared to controls ($p < 0.001$, $p = 0.027$)
  - Decreased rates of vessel thinning towards the periphery in MCI participants
- Arteriolar and venular width intercepts were smaller in MCI patients compared to controls ($p < 0.001$, $p = 0.017$))
  - Overall thinner vasculature in MCI participants
- The efCVI was greater in MCI patients compared to controls ($p = 0.025$).
  - greater vascular area vs. total choroidal area in MCI participants





CONCLUSION

- When compared to controls with normal cognition
  - MCI patients had **thinner retinal vasculature** manifested in both the retinal arteries and in the veins
  - In MCI, these thinner arteries and veins **attenuated at a lower rate** when traveling towards the periphery
  - MCI patients also had **increased choroidal vascular density**

FINANCIAL DISCLOSURES

- The Optos California scanning laser ophthalmoscope was a loaner provided by Optos Inc.
- Optos Inc also provided some research support to allow image analysis.

SOURCES

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