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93 - Properties of Retinal Amyloid Deposits in Association with Alzheimer's Disease

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Background: In Alzheimer's disease (AD), amyloid deposits have been reported primarily in the far peripheral retina. In polarimetry images, we examine signal strength, location of retinal deposits and predictions from these deposits of AD associated disease changes in the brain.
Methods: The severity of AD associated brain pathology was assessed (NIA guidelines) and retinas from donors diagnosed with AD (n=26) and those not (n=4) were stained with 0.1% Thioflavin-S, counter-stained with DAPI and imaged using a fluorescence microscope fitted with a polarimeter. Polarization properties of amyloid deposits were calculated. Variation in deposit density with radial distance from the optic nerve head was determined. Ignoring the far periphery, we tested the prediction of severity of AD associated changes in the brain by retinal deposits.
Results: Amyloid deposits had linear retardance signals much stronger than the background retina. The 1014 deposits with polarization signals occurred more frequently in the peripheral retina. However, the retinal area increases with radial distance from the optic nerve head. The normalized deposit densities versus radial distance were not statistically different (K-S test) for differing brain pathologies. For low and high severities of pathology, the retinal deposit densities were non-uniform with higher density in the central retina. Ignoring the far periphery, the number of retinal deposits still correlated significantly with the cumulative score of severity of AD associated brain changes ($p<0.05$).
Conclusions: Retinal deposits imaged using polarized light have high contrast against the retina. The density of retinal deposits decreases slightly from the centre of the retina to the periphery. To predict the severity of AD pathology in the brain, deposits in the far periphery of the retina need not be imaged. This simplifies the design of live eye imaging as a biomarker of AD.

Primary author: CAMPBELL, Melanie (University of Waterloo)

Co-authors: REN, Ji (University of Waterloo); MASON, Erik (University of Waterloo); Ms REDEKOP, Rachel (University of Waterloo); Ms EMPTAGE, Laura (University of Waterloo); HIRSCH-REINSHAGEN, Veronica (University of British Columbia); HSIUNG, Ging-Yuek Robin (UBC Hospital Clinic for Alzheimer Disease and Related Disorders); MACKENZIE, Ian (University of British Columbia)

Presenter: CAMPBELL, Melanie (University of Waterloo)

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