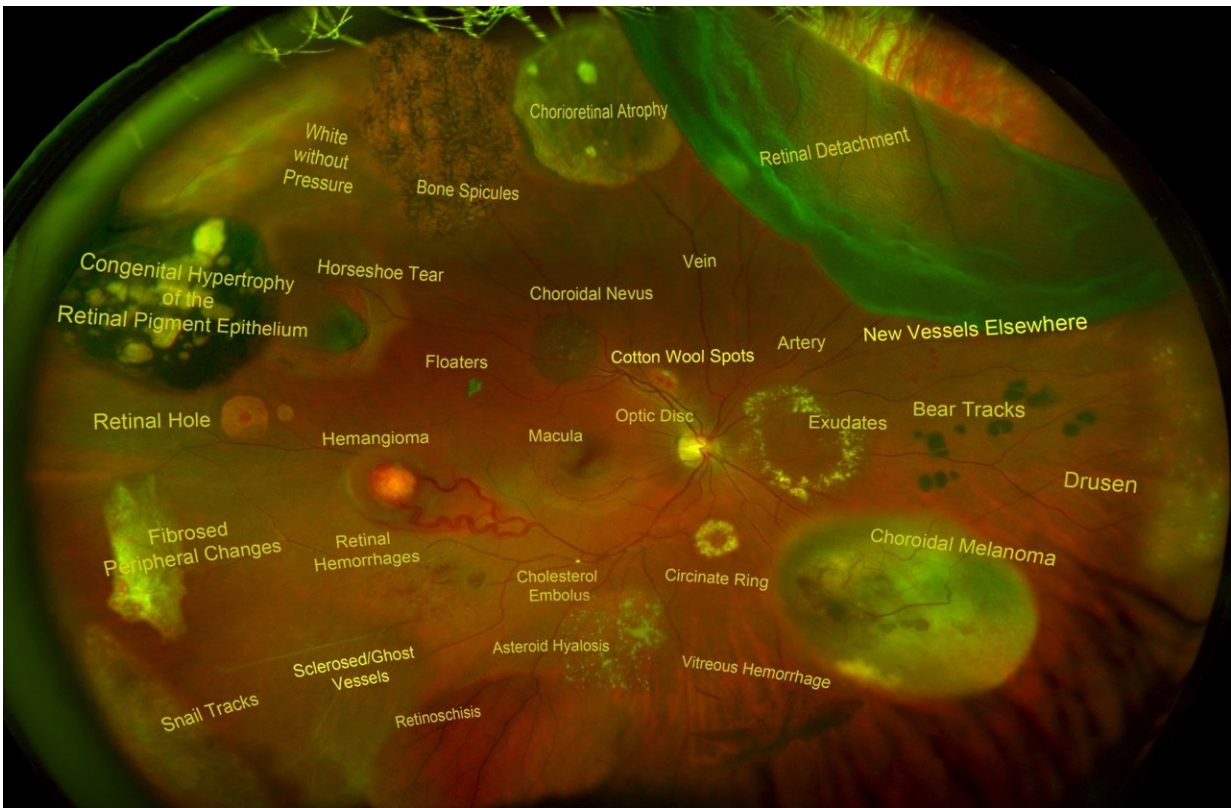


Why the eye could be the window to brain degeneration such as Alzheimer's disease

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Credit: Queen's University Belfast

Researchers from Queen's University Belfast have shown for the first time that the eye could be a surrogate for brain degeneration like Alzheimer's disease (AD).

This [research results](#) have recently been published in the *Journal of Ophthalmic Research* and is the first clinical study showing a potential for peripheral retinal imaging to be used in monitoring AD and potentially other neurodegenerative diseases.

The team, led by Dr. Imre Lengyel, Senior Lecturer and Researcher at the School of Medicine Dentistry and Biomedical Sciences at Queen's University have found that by examining the eye we might be able to reflect on what might be taking place in the brain.

The work was carried out alongside health professionals and care providers for AD patients and explored whether there are manifestations of AD in the eye.

Based on laboratory observations the team hypothesized that changes in the peripheral retina could be important to explore the association between the eye and the brain.

Using ultra-wide field imaging technology developed by Optos Plc, the team found that there are indeed several changes that seems to be, especially in the peripheral retina, associated with this debilitating condition.

One of the changes in the eye that the study observed was a higher than normal appearance of drusen, the yellow 'spots' identifiable on retinal images, in people with AD. Drusen are small deposits of fat, proteins and minerals, including calcium and phosphate deposits that form in a layer underneath the retina. These spots are a symptom of ageing and often seen in people over 40. A few of these deposits are harmless, but once they increase in number and size they contribute to the degeneration of the retina.

Dr. Lengyel explains: "These exciting research results suggests that our

original hypothesis was right and wide field eye imaging could indeed help monitoring [disease progression](#) in patients with AD."

Another significant change observed in the study was measured in the peripheral retinal blood circulation in AD. The research team found that people with AD have wider blood vessels close to the optic nerve, but these thin faster than in control subjects towards the retinal periphery. Both of these are likely to slow blood flow and impair nutrient and oxygen flow in the peripheral retina.

Dr. Lengyel continues: "Eye imaging is quick, simple, well tolerated and costs a fraction to that of brain scans so there are tremendous benefits to both the professional and the patient."

While peripheral retinal imaging is not a diagnostic measure for AD, the simple, quick and inexpensive monitoring of change in the eye could serve as a tool for disease progression in the brain.

Professor Craig Ritchie, Professor of the Psychiatry of Ageing at the University of Edinburgh is co-author on the study. He comments: "Changes in the eye are very easy to measure relative to other measures of brain health.

"Our research team, led by Queen's University, was able to identify early markers in people many years before dementia develops. We have opened a window to identify high risk groups who may benefit from specific prevention advice."

To extend these observations, the research team is currently involved in several further dementia related studies. They will be examining and following patients with very early stage AD through the Deep and Frequent Phenotyping study, the world's most in depth study to detect early signs of Alzheimer's disease progression conducted in the UK.

Research in Dr. Lengyel's laboratory is supported by the Medical Research Council, Economic and Social Research Council, National Institute for Health Research, and Northern Ireland Clinical Research Facility as well industrial partners Optos Plc.

More information: Lajos Csincsik et al. Peripheral Retinal Imaging Biomarkers for Alzheimer's Disease: A Pilot Study, *Ophthalmic Research* (2018). [DOI: 10.1159/000487053](https://doi.org/10.1159/000487053)

Provided by Queen's University Belfast

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