Imaging retina to study dementia and stroke

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A R T I C L E   I N F O

Article history:
Received 26 August 2016
Received in revised form 7 November 2016
Accepted 1 January 2017
Available online 3 January 2017

Keywords:
Retinal imaging
Retinal microvasculature
Retinal ganglion cell
Dementia
Alzheimer’s disease
Stroke
Cerebrovascular disease

A B S T R A C T

With increase in life expectancy, the number of persons suffering from common age-related brain diseases, including neurodegenerative (e.g., dementia) and cerebrovascular (e.g., stroke) disease is expected to rise substantially. As current neuro-imaging modalities such as magnetic resonance imaging may not be able to detect subtle subclinical changes (resolution <100–500 µm) in dementia and stroke, there is an urgent need for other complementary techniques to probe the pathophysiology of these diseases. The retina - due to its anatomical, embryological and physiological similarities with the brain - offers a unique and accessible “window” to study correlates and consequences of subclinical pathology in the brain. Retinal components such as the microvasculature and retinal ganglion cell axons can now be visualized non-invasively using different retinal imaging techniques e.g., ocular fundus photography and optical coherence tomography. Advances in retinal imaging may provide new and potentially important insights into cerebrovascular neurodegenerative processes in addition to what is currently possible with neuro-imaging. In this review, we present an overview of the current literature on the application of retinal imaging in the study of dementia and stroke. We discuss clinical implications of these studies, novel state-of-the-art retinal imaging techniques and future directions aimed at evaluating whether retinal imaging can be an additional investigation tool in the study of dementia and stroke.

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http://dx.doi.org/10.1016/j.preteyeres.2017.01.001
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