Imaging Retinal Densitometry: MacuMap

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Technology description

STFC and Cardiff University have developed a novel imaging ophthalmic instrument, known as MacuMap. MacuMap delivers a unique insight into the functional performance of the retina and it is anticipated that the instrument could enable earlier AMD diagnosis. The project has applied engineering expertise from the field of astronomy to develop a new approach to imaging retinal densitometry. Using optical and data processing technology usually found in space exploration, the instrument gives real-time imaging and analysis of biochemical events and physiological cellular interactions in both the retina and the underlying retinal pigment epithelium cells.

Early research findings for MacuMap are extremely promising and the technology is expected to enter clinical trials in the near future. Subject to successful clinical trials, the instrument will be sold to clinicians and researchers across the ophthalmology market.

TECHNICAL DESCRIPTION

MacuMap makes use of a new technique known as Imaging Retinal Densitometry (IRD). This is an extension of retinal densitometry and gives a repeatable, objective assessment of the functional response of the retina to illumination. The outputs are topographic retinal images providing data about retinal light sensitivity. The functional nature of the data makes it highly complementary to the structural data available via fundus cameras or optical coherence tomography (OCT) techniques.

The rate-limiting step in photo-pigment regeneration, also known as the visual cycle, is the enzymatic conversion of all-trans-retinol to 11-cis-retinal in the RPE. It is believed that areas identified as “unhealthy” are where retinal pigment endothelial (RPE) cells are compromised and unable to support the retinal photoreceptors above. The events measured and imaged by Macumap may be associated with, and objective markers for, the development and progression of degenerative retinal diseases like Age Related Macular Degeneration (AMD) and Geographic Atrophy (GA).

A prototype instrument has been constructed and is currently undergoing extensive testing. A small preliminary study has been undertaken and revealed encouraging results. At present, no regulatory filing has been completed although preparations are underway to enable a larger clinical trial in the near future.

Application area

- Retina research
- AMD treatment development

• Potential for disease diagnosis – subject to clinical trial outcomes

Institution

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