

Astronomy technology used for early detection of age-related macular degeneration

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(Phys.org) —Engineers used to designing state of the art instruments for ground and space based telescopes are now applying their expertise to the development of a diagnostic test for the developed world's most common form of sight loss in adults, Age-Related Macular Degeneration (AMD).

AMD leads to the loss of the vision used when looking at something directly ahead, at another person for example, or when reading or watching television. In the UK alone, by 2020 the number of AMD sufferers is expected to rise to 750,000 and currently more than 1% of over 60s suffer from some sort of AMD. In the US, there are more than 10 million already living with AMD –more than all cancers combined and twice as many as those with Alzheimer's disease.

Engineers at the UK Astronomy Technology Centre (UK ATC), part of the Science and Technology Facilities Council (STFC) normally design and make instruments to detect faint light from distant stars and galaxies. They are also currently collaborating with scientists from Cardiff University's School of Optometry and Vision Sciences to develop a unique instrument, a 'retinal densitometer', which can pick up the earliest stages of AMD by measuring, in the minutest of detail, how the eye responds to light.

Minister for Universities and Science David Willetts said: "Space

technology doesn't just tell us more about the universe – it also has applications right here on earth. This project is very promising for patients and shows that by working across disciplines scientists and engineers can develop innovative new solutions for a whole range of issues, including healthcare."

Dr Dave Melotte, Innovation Manager at the UK ATC said: "This is a fantastic example of how fundamental science, technology and engineering can have a huge positive effect on society when working in collaboration with academia and experts in the relevant fields.

Astronomy technology and [vision science](#) might seem poles apart but put the right experts together and they are able to achieve things that would be impossible by either group in isolation."

AMD affects a small part of the retina at the back of the eye, the macula, which is used to see detail and colour. One of the earliest signs of AMD is a change in the way that the light sensitive pigments in the macula regenerate after exposure to light. The densitometer can assess this change by measuring, over time, the very small changes in the amount of light reflected by the retina after exposure to light.

Cardiff University's Dr Tom Margrain, said: "The benefits to patients here are huge, but the benefit is not just societal, it is also economic. We may be living longer but this in turn increases the pressure on healthcare services. Our next steps will now be to get the densitometer ready for official clinical testing and then to take this through to full commercialisation. Ultimately our densitometer could be used in any optician's clinic."

Until very recently there have been few treatment options available for AMD, but some treatments to delay developments of early forms of the disease, and to manage it, are now being developed. Early diagnosis is

the one of the most crucial factors for developing new treatments and improving the management of this disease, but it is extremely hard to detect in the early stages and current tests are relatively crude. Previous attempts at early detection techniques have been limited by the performance of the technology used to make the measurements.

The Retinal Densitometer works by measuring the way the eye "dark adapts" after exposure to a bright light. It has several distinct advantages when compared to existing detection techniques in terms of its sensitivity and ability to measure responses to light from different parts of the retina. It is also completely non-invasive unlike some techniques.

Early tests already carried out by the project team, on 10 patients with early stage AMD and 10 controls, have shown that the light changes on the macula can be highly accurately measured using this patented technology, and that it has a high ability to distinguish between affected and non-affected groups.

Provided by Science and Technology Facilities Council

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