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Through the optics of the eye to a window on the brain

Tuesday 17 June 2014 11:45 (30 minutes)

Measurements of the optical quality of the eye have increased in precision and repeatability as a result of adaptive optics techniques adapted from astronomy. We have used these techniques to identify signals to the direction of eye growth which are up regulated in the presence of myopia (short-sightedness), induced by defocussing lenses. These and other optical changes measured in myopia have led to a greater interest in the role of the optics of the eye in understanding and treating myopia.

As well as measuring the optical quality more precisely, we can correct optical blur and acquire high resolution in vivo images of individual retinal cells. We are using this instrumentation to explore the earliest ocular changes in Type I diabetes and changes in degenerative diseases affecting the photoreceptors of the human eye. This may lead to earlier and improved interventions in these diseases. I will also briefly discuss the potential use of precisely focussed light in the treatment of ocular disease.

Currently, definitive diagnosis of Alzheimer's disease only occurs after death. Amyloid beta, a protein marker which produces plaques is found in the brains of those with the disease. Recently we have confirmed the presence of amyloid beta in the ex vivo neural retina of those with the disease and not in age matched normal subjects without the disease. We are developing an in vivo polarization imaging technique which we hope will become a more accessible, less invasive and less expensive technique than others under development for the diagnosis of Alzheimer's disease.

Session Classification: (T-MEDAL2) CAP Medal Talk - Melanie Campbell, U. Waterloo (CAP-INO Medal Recipient for Outstanding Achievement in Applied Photonics / Récipiendaire de la médaille de l'ACP-INO pour réalisations exceptionnelles en photonique appliquée)