Final Report Summary

The use of novel fluorescence technologies in medical diagnostics for the measurement of eye protein fluorescence properties

Edinburgh Instruments Ltd
www.edinst.com

Heriot Watt University
www.hw.ac.uk

Edinburgh Instruments (EI) was founded in 1971 and manufactures single photon counting sensitive steady state and time resolved fluorescence and phosphorescence spectrometers. The company is recognized as world leaders in the field of optical instruments.

In this project Heriot-Watt University (HWU) and EI, with assistance from Prof Bal Dhillon, Consultant Ophthalmic Surgeon, Princess Alexandra Eye Pavilion, carried out a feasibility study on the use of novel fluorescence technologies in medical diagnostics for the measurement of eye protein fluorescence properties. This collaborative work opened up the possibility of long term collaboration between EI and HWU.

Project Aims

The major aim of this project was to determine whether tryptophan fluorescence of Crystallin, which comprises ca 90% of the total protein content in the lens, can be utilized for non-invasive cataract diagnostics. Such diagnostics would be a crucial tool for ophthalmologists to enable earlier diagnosis of cataract before lens damage occurs and opens up the possibility of non-surgical interventions to prevent lens deterioration. In addition, measurements of Crystallin fluorescence in the lens would be useful in early diagnostics for other diseases as Diabetes etc. To this end we investigated fluorescence properties of tryptophan emission of Crystallin in homogeneous solution and in isolated pig lenses. Specifically, we measured:

1) Fluorescence emission spectra of Crystallin with excitation at the maximum of tryptophan absorbance (280nm) and on its red edge (315nm)
2) Fluorescence anisotropy spectra on Crystallin emission.

Project Outcomes

The project has proven to be very successful. It has allowed the generation of a set of pilot data looking at the fluorescent properties of the proteins in the eye in vitro and in vivo under differing conditions. With the data generated from this TTOM project, HWU and EI are now seeking larger funding from the research councils with the aim of ultimately bringing a diagnostic instrument to market. This would not have been possible without the support of SOA. The TTOM funding has also allowed a strong working relationship to develop between EI and HWU.