

Shedding light on the brain oxygen and metabolic regulation

Patient brain tissue well being monitoring for enhancing clinical prognosis and care

Dr Ilias Tachtsidis is a Wellcome Trust Career Development Fellow and heads the Multimodal spectroscopy group (MMS) in the biomedical optics research laboratory (BORL) in UCL. Ilias' main research interests are both in the development and use of optical techniques in medicine to monitor brain tissue oxygenation and mitochondrial metabolism. His most recent developed optical system (called pHOS) is being used by clinicians at the National Hospital for Neurology and Neurosurgery to monitor non-invasively brain tissue oxygenation and metabolism in brain injury patients. Currently Ilias work is centred in the development of the next generation of brain multimodal spectroscopy technologies through combination of optics and MR techniques to investigate hypoxic-ischaemia and neonatal encephalopathy.

Monitoring the tight balance of brain oxygen delivery and brain tissue metabolic rate is a major aim in patient care. Using light in the near infrared region of the spectrum (between 700-1000nm, just beyond the red end of visible light), biological tissue, with water as its major constituent, exhibits relatively low absorption, enabling multiply-scattered light to penetrate several centimetres into the brain. The relative absorption of different wavelengths of this light allows us to determine the colour of the blood, which is dependent upon the amount of oxygen it is carrying. In addition using multiple wavelengths other chromophores can be resolved such as cytochrome-c-oxidase an enzyme that its redox state provides information on oxygen metabolism. Using a technique known as near infrared spectroscopy (NIRS), it is possible to exploit these colour differences to non-invasively measure oxygenation and metabolism.

Other technologies that Dr Tachtsidis is currently working on include: optical detection of nanoparticles for the multi-analyte investigation of incidents of bacterial infection at clinical level towards evidence-based individualized treatment



Dr Ilias Tachtsidis, Medical Physics and Bioengineering

Dr Tachtsidis' areas of expertise include:

- Biomedical optics.
- Near-Infrared Spectroscopy.
- Signal Processing.
- Modelling.

Supported by EPSRC (EP/D060982/1)
The Wellcome Trust (088429/Z/09/Z)
MRC (MR/J00457X/1)

Applicable to:

- Medicine
- Medical Instrumentation
- Photonics

Partner Companies:

- Hamamatsu Photonics
- Hitachi Medical Systems



Contact Details:

Dr Ilias Tachtsidis
Room 3.18
Dept. Medical Physics and Bioengineering
Malet Place Engineering Building
University College London
Gower Street, LONDON
WC1E 6BT
Email: iliastac@medphys.ucl.ac.uk
Tel: +44 (0)20 7679 7305
Fax: +44 (0)20 7679 0255