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PhD – Pre-clinical testing of multimodal spectral imaging for intra-operative evaluation of resection margins during Mohs micrographic surgery

Supervisors: Dr Ioan Notingher (School of Physics and Astronomy), Prof Hywel Williams (School of Medicine)

Positions available: 1

Subject Area: Biophotonics/Dermatology

Mohs micrographic surgery is the most efficient treatment for non-melanoma skin cancers. This surgical technique aims to only remove cancerous tissue and leave healthy tissue in place. Typically, one layer after another of tissue is cut away and examined under the microscope to make sure that all the cancer is out. This process is stopped when only healthy tissue is left. Successful removal of all cancer cells is the key to achieving lower rates of the cancer returning. There is always a balance to be struck between making sure that all the cancer is removed (which might involve removing some healthy tissue) and preserving as much healthy tissue as possible in order to reduce scarring and disfigurement. The real challenge however is to know where the cancer starts and ends when looking at it during an operation so that the surgeon knows when to stop cutting.

Recently, we have developed a new multimodal spectral technique based on tissue auto-fluorescence and Raman spectroscopy that can accurately detect tumour cells at the margins of skin layers removed during surgery. Our preliminary studies (PNAS 2013, 110 (38), pp. 15189-15194; Biomed Opt Exp 2015, 6(1) pp. 98–111) show that this technique promises to achieve the diagnosis accuracy and speed required in Mohs micrographic surgery.

The aim of this PhD project is to carry out a pre-clinical investigation of multimodal spectral imaging based on a dedicated prototype instrument developed by University of Nottingham. The study will include skin samples gathered from several Mohs centres in the UK. The role holder will be based in

the School of Physics and Astronomy and will carry out experiments at the Nottingham University Hospitals.

This project is based on a long-term collaboration between the Biophotonics Group in School of Physics and Astronomy at the University of Nottingham (<http://www.biophotonics-nottingham-nanoscience.net>), the Centre of Evidence Based Dermatology at the University of Nottingham, (<http://www.nottingham.ac.uk/dermatology>) and the Nottingham University Hospitals NHS Trust. For further information about the projects please contact Ioan Notingher (ioan.notingher@nottingham.ac.uk)

The candidates should have a 1st or 2:1 degree in physics (ideally medical physics), chemistry, or biomedical engineering. They should have experience in data analysis using computer software (e.g. Matlab), statistics, and excellent understanding of optics. The candidates must be able to work in multi-disciplinary teams and have excellent communication skills. .

The PhD position is planned to start on the 1st of October 2015. However, these dates are flexible to accommodate the candidates. The studentship is fully-funded and covers fees and stipend for a period of 3.5 years.

Applications should be directed to Ioan Notingher (ioan.notingher@nottingham.ac.uk) and should include a two page CV and cover letter stating your reasons for wanting to complete a PhD, your academic and non-academic strengths and any other background information that you wish to include. Deadline: 31/5/2015.

Applicant qualification requirements

The candidate should be confident in the basic sciences and would typically have a 1st or 2:1 degree in physical sciences, engineering, chemistry, or similar subject area.