A paradigm change to health service and health research:

The MRC-NIHR National Phenome Centre and the iKnife surgical development

Lecture Theatre G3, Education Centre, Fiona Stanley Hospital
Monday 22nd June 1.00pm – 2.00pm

Professor Jeremy K. Nicholson

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Professor Jeremy Nicholson is Director of the MRC & NIHR funded National Phenome Centre.

The National Phenome Centre

The National Phenome Centre, led by Imperial College London and King's College London, aims to deliver broad access to a world-class capability in metabolic phenotyping, that will benefit the whole UK translational medicine community.

The establishment of the Centre took advantage of an unprecedented opportunity offered by the legacy of the 2012 Olympics state-of-the-art drug testing/analytical laboratory. The National Phenome Centre is based at the IRDB building on the Hammersmith Hospital campus, with NMR facilities located at South Kensington. In addition to the £10m grant, there are also significant contributions of staff, equipment and technical support from major instrument suppliers of both MS (The Waters Corporation) and NMR (Bruker Biospin GmbH). The companies will work with the National Phenome Centre to develop the technology and establish a major training centre.

The Centre is structured to offer broad and deep phenotyping on both large (over 5,000 samples) and small (fewer than 300 samples) human sample cohorts with a current operational capacity of 200,000 assays per year with the intention to significantly expand capacity in the next two years.

iKnife

The iKnife connects an electrosurgical knife to a mass spectrometer, an analytical instrument used to identify what chemicals are present in a sample. Different types of cell produce thousands of metabolites in different concentrations, so the profile of chemicals in a biological sample can reveal information about the state of that tissue. In a new study, the researchers first used the iKnife to analyse tissue samples collected from 302 surgery patients, recording the characteristics of thousands of cancerous and non-cancerous tissues, including brain, lung, breast, stomach, colon and liver tumours to create a reference library. The iKnife works by matching its readings during surgery to the reference library to determine what type of tissue is being cut, giving a result in less than three seconds. In all 91 tests reported to date, the tissue type identified by the iKnife matched the post-operative diagnosis based on traditional methods.

Professor Jeremy K. Nicholson

Professor Nicholson obtained his PhD in Biochemistry from St Thomas's Hospital Medical School, London University (1980) and after several London University academic appointments in Pharmacology and Chemistry (Full Professor, 1992) he became Head of Biological Chemistry at Imperial College London (1998) and then Head of the Department of Surgery and Cancer (2009-present) which has recently expanded and is now named as the Department of Surgery, Oncology and Interventional Medicine. He is the Director of the MRC-NIHR National Phenome Centre and the Imperial-Institute of Cancer Research joint Centre for Systems Oncology and Director of the Centre for Gut and Digestive Health (Institute of Global Health Innovation at Imperial). He also has a new coordinating role as Director of the Institute of Translational Medicine and Applied Therapeutics which bridges the Imperial AHSC and the Faculty of Medicine research programmes in Stratified Medicine for optimising patient safety and healthcare delivery. Nicholson has authored over 600 peer-reviewed papers on metabolic biochemistry, molecular aspects of complex system failure and systems medicine. A major research focus is on microbiome-host metabolic signalling and the role of the microbiome-host interactions in personalised healthcare and disease risks for diabetes, autism and cancer. He is an ISI Highly-Cited Researcher (2014) in Pharmacology and Toxicology (ISI H index = 100). His work has been recognised by international awards including: The Royal Society of Chemistry Silver (1992) and Gold (1997) Medals for Analytical Science and Analytical Chemistry respectively; The Chromatographic Society Silver Jubilee Medal (1994); The Pfizer Prize for Chemical and Medicinal Technology (2002); The RSC medal for Chemical Biology (2003); The RSC Interdisciplinary Prize (2008); The RSC Theophilus Redwood Lectureship (2008); The Pfizer Global Research Prize for Chemistry (2006); The NIH Stars in Cancer and Nutrition Distinguished Lecturer (2010) and The Semelweiss-Budapest International Prize for Biomedicine (2010). In 2010 he was elected Fellow of The UK Academy of Medical Sciences; elected as an Honorary Lifetime Fellow of the International Metabolomics Society (2012); elected Honorary Member of the US Society of Toxicology (2013); elected as an Albert Einstein Honorary Professor of the Chinese Academy of Sciences (2014). He currently holds honorary professorships at 8 other international Universities. He is also a founder director of Metabometrix, an Imperial spin-off company (founded 2001) specializing in molecular phenotyping, toxicological screening and clinical diagnostics.

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