Multi-disciplinary Networking Event:
Emerging Technology to Transform Cancer Early Detection

Maxwell Centre, 20th March 2023
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Speakers
Ulrich KEYSER
Professor of Applied Physic
Cavendish Laboratory

Prof Keyser's research focuses on understanding all transport processes through membranes of both biological and technological origin. Specifically, his team is interested in the physics of ions, macromolecules and particles in confined geometries at the single molecule or particle level. They aim to exert maximum control over all parameters in the experiment using techniques such as: DNA (origami) self-assembly, optical trapping, particle tracking, fluorescence microscopy, electrophysiology, or micro-/nanofluidics.

Solid-state nanopore sensing for counting native miRNA, ncRNA and mRNA

Solid-state nanopore sensing is ideally suited for the rapid analysis of structured nucleic acid molecules. We use DNA nanotechnology to build unique molecular identifiers that allow for the specific identification of RNA molecules. We adapt the design of the DNA nanostructures to the target length of native RNA. Our technique allows for the rapid, multiplexed counting of native RNA directly from nucleic acid extracts for disease detection and RNA isoform identification.

Emerging Technology to Transform Cancer Early Detection
Russell COWBURN

Professor of Experimental Physic
Cavendish Laboratory

Prof Cowburn, a fellow of the Royal Society, has research interests in nanotechnology and its application to magnetism, electronics, optics and healthcare. He is a master at translating discoveries into technologies. One of his key achievements is designing a sensitive laser instrument with the ability to measure magnetism. His work has important applications, including novel cancer therapies, new types of computer memory chip, anti-counterfeiting technology ‘Laser Surface Authentication’.

Magnetic nanostructures for early detection of renal cell carcinoma

Certain proteins are known to be over expressed in the urine of patients with RCC. Urine is easily accessible and a good medium for bioassays. The concentration levels of proteins that need to be detected are very low, however, and therefore make a mass screening programme for RCC unfeasible using current technology. We are working with Prof Grant Stewart at Addenbrookes to develop a rapid, high sensitivity urine test for RCC using magnetic nanostructures developed in the Cavendish. In this talk Prof Cowburn will explain the underlying principle and show initial clinical results.
Robert RINTOUL
Consultant Physician in Thoracic Oncology
Lead Clinician for cancer at Royal Papworth Hospital

Robert Rintoul is Professor of Thoracic Oncology in the Department of Oncology, University of Cambridge and Honorary Respiratory Physician, Royal Papworth Hospital where he is lead clinician for cancer and Director of the Papworth Trials Unit Collaboration. He co-leads the CRUK Cambridge Centre Thoracic Cancer Programme facilitating thoracic oncology research across Cambridge.

Prof Rintoul's research is focused on clinical trials, translational research and tissue banking in malignant mesothelioma and early-stage lung cancer. He has a particular interest in biomarker research (genetic predisposition; circulating tumour DNA and exhaled volatile organic compounds) for detection of early-stage disease/CT screening. In 2014 he founded Mesobank UK, the UK national bioresource for malignant mesothelioma (www.mesobank.com) which supplies many research groups nationally and internationally with QC biosamples.

Blood based biomarkers for early detection of lung cancer
Panel Discussion
Prof Rebecca FitzGerald

Early Cancer Institute

Prof FitzGerald's group focuses on oesophageal and gastric cancer by understanding the underlying clinical, genetic and cell environmental factors, developing and evaluating new diagnostic tools to identify patients' cancer development risk, and improving the molecular characterisation of oesophago-gastric cancer to inform patient management.

Prof Sarah Bohndiek

Precision Health Initiative

Prof Bohndiek's research focuses on advancing the understanding of tumour evolution using next-generation imaging sciences. She is particularly interested in the study of blood vessel formation in early cancer. Her team is also active in translating the findings into first-in-human clinical trials.