## CRUK Cambridge Centre Clinical PhD project

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| **PhD Project Title** | **Developing non-invasive point-of-care tests for prostate cancer for earlier detection of aggressive disease** |
| **Head of Laboratory (PI) Name** | Charlie Massie |
| **Second supervisor if applicable** | Andrew Flewitt |
| **Programme** | Early Detection |
| **Supervisor's Email** | Cem45@cam.ac.uk |
| **Laboratory Location** | Hutchison-MRC<br>Department of Oncology |

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| **Project Outline** | **Aims and objectives**<br>Prostate cancer management currently relies on low specificity assessments, such as PSA and DRE. Recent advances in image-guided biopsies [1] and improved clinical risk stratification [2] will have a positive impact on patient management. However, there remains uncertainty around the best strategy for clinical management of a large number of men with prostate cancer. For example, 1-in-4 men with intermediate risk disease will progress during active surveillance and delaying treatment for these men may affect their outcome. An equally important consideration is the 3-in-4 men whose prostate cancer will not progress in their lifetimes and who should be spared radical treatments that often have severe side effects.<br>This PhD project aims to address the need for better assays and closer monitoring of men with intermediate risk disease by combining expertise in prostate cancer molecular signatures (C. Massie [3]), point-of-care engineering solutions (A. Flewitt [4]) and clinical studies and risk profiling (V. Gnanapragasam [1,2]). |
| **Experimental plan** | Specifically aims of this project:<br>1. Develop specific assays for molecular analysis of tissue and liquid biopsy samples<br>2. Implement these markers on acoustic wave sensors to develop low cost, point-of-care devices<br>3. Test these detection devices alongside SOC on active surveillance to assess sensitivity and specificity<br>4. Statistical analysis to assess discriminative power and 'lead-times' in large sample collections |

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| **Main Techniques** | Translational implementation of genomics and molecular biology techniques, to include:<br>• allele specific analysis of cell–free tumour DNA (e.g. probes or label incorporation)<br>• functionalization of target molecules for efficient detection on sensor surface<br>• running clinical samples on POC devices and classical molecular assays<br>• statistical analysis of cell-free tumour DNA analysis methods and clinical data (+FU) to test the utility of these methods and inform design of clinical trials. |
| **Key References** | **1. Hansen N, et al.** *Magnetic Resonance and Ultrasound Image Fusion Supported Transperineal Prostate Biopsy Using the Ginsburg Protocol: Technique, Learning Points, and Biopsy Results. Eur Urol. 2016 Aug;70(2):332-40.*<br>**2. Gnanapragasam VJ, et al.** *Improving Clinical Risk Stratification at Diagnosis in Primary Prostate Cancer: APrognostic Modelling Study. PLoS Med. 2016 Aug 2;13(8):e1002063.*<br>**3. UK Prostate ICGC Group.** *Analysis of the genetic phylogeny of multifocal prostate cancer identifies multiple independent clonal expansions in neoplastic and morphologically normal prostate tissue. Nat Genet. 2015 Apr;47(4):367-72.*<br>**4. Chen G, et al.** *Film bulk acoustic resonators integrated on arbitrary substrates using a polymer support layer. Sci Rep. 2015 Mar 31;5:9510.* |