**Studentship Form**

The Precision Imaging Beacon wishes to promote cross-disciplinary interaction between Schools, with an expectation of at least two supervisors.

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| First Supervisors name | Professor Sue Francis | School Addresses | Physics and Astronomy |
| Co Supervisors name | Professor Maarten Taal | School Addresses | School of Graduate Entry Medicine |
| Co Supervisors name | Dr Nicholas Selby | School Addresses | School of Graduate Entry Medicine |
| Start date  | Sept 2019 | Duration  | 3.5 years |
| Student  | TBC following selection process |
| Project Title | Quantification of novel MR imaging biomarkers in Kidney Disease. |
| Project Abstract | This PhD studentship will run in conjunction with a MRC-funded Partnership research project *UKRIN-MAPS* (UKRIN MRI Acquisition and Processing Standardisation https://www.nottingham.ac.uk/research/groups/spmic/research/uk-renal-imaging-network/ukrin-maps.aspx). UKRIN-MAPS aims to develop and validate quantitative multiparametric renal MRI measures such that these can be used as biomarkers for the development of effective and personalized treatments for Kidney Disease.**This PhD studentship offers an inter-school partnership to strengthen precision medicine in renal MRI to develop novel imaging modalities that have clinical relevance for future clinical trials, focussing on a disease area (Chronic Kidney Disease, CKD) where there are a range of novel therapeutics in active development.** This PhD project will have three objectives to develop efficient methods for quantification of novel imaging biomarkers in the kidney from multi-centre, multi-parametric magnetic resonance imaging (MRI) data. * Firstly, it will focus in healthy controls and the harmonisation of multiparametric protocols (ASL, R2\*, diffusion, T1/T2 mapping). It will also explore the implementation of more advanced multiparametric measures, and will include the harmonisation of measures between Philips scanners in Nottingham and clinical scanners in Derby, and between Philips and GE Research scanners in Nottingham in collaboration with the UKRIN Cambridge partner GE site.
* Secondly, the project will develop new and innovative algorithms for quality assurance, automated segmentation of kidneys and post-processing of multi-parametric MRI data, thereby ensuring high accuracy, precision and reproducibility for translation across partner sites involved in the study.
* The third stage of the project will evaluate multiparametric MRI data in disease, optimising acquisition and analysis measures for patients, and assessing the relation to outcomes and histology parameters from a Chronic Kidney Disease cohort.

These three objectives are each important aspects of multicentre trial set-up for future studies of CKD including clinical trials of novel therapies. **Benefits and Training*** Strong benefit from established collaborations within the UKRIN-MAPS project, both at the University of Nottingham and with co-applicants at University College London (UCL), University of Cambridge and University of Leeds, spanning clinicians and basic scientists from broad backgrounds (MRI physics, AI for deep learning methods, nephrology, physiology). The project also draws heavily on collaborations with industry (Philips, Siemens, and GE), providing an excellent opportunity to scout out different possible career paths.
* The project provides the opportunity to collaborate with clinical academic nephrologists to gain insight into clinical aspects of kidney disease and clinical trials.
* Opportunity to participate and present at international conferences, attend summer schools and workshops on new developments in renal MRI, machine learning methods and MRI processing techniques.
* The student will be provided with an excellent training environment through the Schools of Medicine and Physics. The student will attend MRI postgraduate lectures in the School of Physics and Astronomy, computational work will be expedited by access to HPC facilities. The Faculty of Medicine postgraduate training programme covers generic skills through workshops including: research ethics, data handling, research methods, statistics, exploitation and commercialisation, clinical trials, software skills including a wide range of transferable skills. Interdisciplinary supervision will ensure that appropriate theoretical developments are tailored to, and incorporate, relevant biology and experimental developments.
* Technical training encompasses both subject-specific and broader research activities, such as attendance at conferences, workshops/sandpits, and journal clubs. Other activities include training in outreach, research and presentation techniques, and career development support via the graduate school.
* Project-specific research skills will include:
* Development of imaging methods and cross-site standardisation, and analysis pipelines using in-house MATLAB scripts, XNAT software and development of deep learning methods through UKRIN-MAPS.
* Repeatability and validating the protocols.
* Informed consent and clinical study conduct.
* Research governance and ethics approval.
* Consent and record keeping.
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| Graphic for Advertising(Must be high resolution) |  |