

BRACCO FELLOWSHIPS EDUCATION IN RESEARCH ENROLMENT FORM

Name of Institution LIVERPOOL HEART AND CHEST HOSPITAL NHS FT

City and Country of Institution LIVERPOOL, UK

RESEARCH GROUP

Brief description of the research group and of its mission:

A multidisciplinary group of cardiovascular imaging (clinical and academic team members, Radiologists and Cardiologists) following LHCH research mission: to deliver research of the highest quality into new and improved therapies, techniques and models of care, whilst maximising the potential of innovation to improve patient care.

Liverpool Heart and Chest Hospital (LHCH), the largest single site specialist heart and chest hospital in the UK, is a twice outstanding rated Foundation Trust, dedicated to the diagnosis and treatment of cardiothoracic diseases. LHCH serves a catchment area of 2.8 million people, spanning Merseyside, Cheshire, North Wales and the Isle of Man, and increasingly receives referrals from outside these areas. The department provides state of the art technology for cardiothoracic imaging, with two MRI scanners, including a wide bore, 1.5T cardiac optimized Siemens Sola MR scanner and a 3T Vida Siemens Scanner, two dual energy CT Siemens Force scanners, and it is fully integrated with PACS.

The Trust has its own research department which provides excellent support for colleagues interested in research and innovation. The Liverpool Centre for Cardiovascular Science (LCCS) is a strategic research platform, bringing together world-leading research and clinical specialists in cardiovascular biology and medicine. University of Liverpool, Liverpool Heart and Chest Hospital Trust, Liverpool John Moore's University and Liverpool Health Partners have allied their forces to tackle the stark issue of Cardiovascular health.

TITLE OF PROPOSED RESEARCH PROJECT Machine learning Utilisation to enHance the Yield of Plaque Evaluation in AtheroSclerosis (MUSHY PEAS)

OBJECTIVES

- To determine if focused ML quantification of coronary atherosclerosis plaque, or comprehensive deep learning cardiac CT analysis can predict major adverse cardiac outcomes and all-cause mortality
- To assess the accuracy of coronary volume normalised Total Plaque Volume (TPV) for the prediction of Myocardial infarction, cardiovascular deat
- To assess the accuracy of a CT based Deep Learning Algorithm for the prediction of Myocardial infarction, cardiovascular and all-cause death

APPLICANT'S DUTIES

- Coronary plaque analysis for interobserver variability
- Attendance of research meetings

- Contribution to data analysis and manuscript drafting as necessary

APPLICANT'S BENEFITS

- Contribution to presentations to conferences or publications of papers
- Knowledge and skills in coronary atherosclerosis analysis
- Knowledge and skills in ML applications in clinical practice
- Clinical radiology knowledge in coronary CT acquisition and interpretation

- Project Leader: Dr Tim Fairbairn (Cardiologist, MRC Fellow and Honorary Senior Lecturer, University of Liverpool) Dr Monika Radike (Radiologist, NIHR Research Scholar)
- Members: Cardiovascular imaging team, LHCH Research and Innovation department and the wide LCCS team, including experts in AI.