AIM: Automated Imaging of bone marrow in Myeloma using whole body magnetic resonance imaging (WBMRI) & dual energy computed tomography (DECT) with deep learning

Keywords:
Medical Imaging, Biomedical Engineering, Bioinformatics, Medical / Biomedical Physics, Medical / Clinical Science, Computer Science and IT, Deep Learning

Project description:
This is a fully funded PhD position (co-funded by Siemens Healthcare) in applied medical imaging, suited to candidates with a medical imaging, biomedical engineering, applied mathematics, computer science, physics or equivalent undergraduate degree. Please note this position is for UK / EU nationals only.

Myeloma is a haematological cancer. It is debilitating causing unremitting bone pain & pathological fractures with a 5-year survival rate of 47%. Since myeloma can affect any marrow-containing bone, assessment of the whole skeleton is required to determine the optimum treatment.

The Challenge: No imaging techniques currently available allow for accurate whole-body skeletal delineation and fat quantitation. No standardised automated post processing tools are available for assessment of whole skeletal metrics. Manual skeleton delineation for quantifying skeletal fat fraction is time consuming (5+ hours) & requires clinical expertise.

There is an opportunity that quantitative whole-body imaging may address the real clinical need to rethink how we acquire and quantify marrow disease. This project aims to develop integrated whole-body UTE multi-echo Dixon MRI combined with Deep Learning of quantitative whole skeleton imaging metrics of bone marrow disease. The overall hypothesis is that whole body quantitative skeletal metrics will improve the diagnosis, characterisation of tumour burden as well as improve therapy response assessment. In addition, we will define whether quantitative CT is comparable to MRI for disease burden as a cost-effective alternative technique.

For more details about the project, see here

The Centre for Doctoral Training
This project spans multiple disciplines: Physics/Mathematics (image acquisition, reconstruction) Computer Science (image analysis, machine learning), & Cancer Biology (biology of myeloma). It will generate new medical imaging approach, addresses a real clinical problem, and its success, the development of a novel streamlined acquisition and
analysis method for quantitation and automated segmentation will impact significantly on current myeloma care and other cancers.

The candidate will be part of our Centre for Doctoral Training (CDT). The CDT has a comprehensive capability to train and nurture the next generation of imaging scientists and research and industry leaders. It offers a unique four-year PhD programme to graduates from a wide range of disciplines who are interested in this cutting-edge research area that is becoming indispensable to healthcare all over the world. Students will undertake an MRes in the first year of the programme, giving students the opportunity to develop key research skills before embarking on their three-year PhD projects. Throughout the program they will participate in Advanced Skills Training alongside their research. For more details about the CDT see http://www.imagingcdt.com

Your profile:
Please note this position is for UK / EU nationals only. Candidates are preferred who have experience with medical imaging, in particular MR and/or CT, image processing, programming (e.g. C/C++, Matlab, Python), machine learning techniques, non-linear optimisation, analysing clinical data sets and working in a multi-disciplinary environment.

Please email your CV to Dr Isabel Dregely at isabel.dregely@kcl.ac.uk