Advanced magnetic resonance imaging of osteoarthritis

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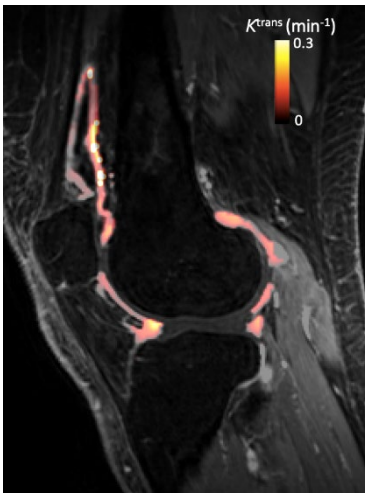
EMI industry partner - GlaxoSmithKline

EMI PhD student Dr James (Jamie) MacKay is the first recipient of EMI programme funding to successfully complete his PhD studies. Funded by the Addenbrooke's Charitable Trust and GlaxoSmithKline through the EMI programme, Jamie's research aimed to examine the potential use of magnetic resonance (MR) quantitative imaging biomarkers (QIBs) of knee osteoarthritis (OA) for rapid assessment of treatment efficacy in experimental medicine studies.

Using a combination of retrospective analysis of existing imaging data and a prospective observational study of OA patients, Jamie was able to identify then compare candidate imaging biomarkers for their utility in characterising disease progression in OA patients. The figure (right) shows a knee MRI image with overlaid quantification of inflammation in the joint lining (synovitis). Synovitis is an important treatment target in knee OA. MRI methods developed in Jamie's PhD allow non-invasive measurement of changes in synovitis in response to treatment.



Throughout his PhD, Jamie met regularly with the GSK Experimental Medicine Imaging Group and provided imaging expertise on two GSK project teams. Commenting on experience gained through the EMI programme, Jamie said:

"The high quality research that I have been able to conduct with the help of EMI funding has allowed me to establish myself as a young investigator in the field of musculoskeletal imaging. The knowledge I have gained from the EMI programme about what is required of a good imaging outcome measure in clinical trials [has been] critical to making this work a success."

Jamie's views are supported by Prof Ian Wilkinson (EMI Programme Director) who commented:

"Jamie's research is a perfect example what the EMI Programme is aiming to do - create the next generation of clinical investigators who can help bring innovative new therapies to patients, by using new biomarkers at the earliest stages of the development process."

Jamie has presented his research findings at several major conferences which has, in turn, led to discussions and opportunities for collaboration with other major centres, such as Stanford University

where he recently extended his research through an OARSI (Osteoarthritis Research Society International) scholarship. Ultimately, it is hoped that the imaging biomarkers identified through Jamie's EMI PhD research will receive FDA qualification for use in clinical trials and clinical practice with a selection of these measures being used in future industry early phase trials of OA compounds.

Commenting on the application of Jamie's research in an industry setting, Dr Nicolas Wisniacki (EMI-GSK industry partner) concluded:

"The EMI programme exemplifies how a collaboration between academia and industry supporting new clinical investigators provides clear mutual benefits. Jamie delivered an innovative clinical study providing novel methodologies and reproducibility data that will enable future design of osteoarthritis experimental medicine studies. We benefited from working closely with a musculoskeletal radiologist at critical times for optimising our OA clinical trials, and the interaction enabled Jamie to experience clinical trial needs from an industry perspective."