Comparison of qualitative assessment of knee osteoarthritis on three 3.0T MR systems from different manufacturers.

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Introduction: The National Institute of Health Osteoarthritis Initiative (NIH OAI) is a large, longitudinal, multi-centre study targeted at discovering biomarkers of osteoarthritis (OA). A motivation behind the study is to obtain accurate non-invasive markers of cartilage degradation which can assess progress in clinical trials of disease-modifying drugs for OA. The NIH OAI MR knee protocol has been optimised for detection of features of OA at 3.0 Tesla on the Siemens platform. There are two other major manufacturers of MR scanners – Philips Medical Systems and GE Healthcare. The aim of the study is to demonstrate whether detection of OA pathology in the knee is comparable between three MR scanners of different manufacturers at 3.0T. The acquisition of images for this study on all three scanners is based on the quadrature NIH OAI protocol [1].

Method: 11 subjects with a history of knee symptoms had their symptomatic knee scanned on each of the three scanners of different vendors. Subjects had a mean age of 49.3±10 years (range 32-59y) with mean BMI 28.3 ±6.2 (range 22.1-44.2) and had one or more risk factors for OA. The three 3.0T MR systems employed in this study are located as follows: Manchester (Philips), York (GE), Liverpool (Siemens). With collaboration of clinical scientists at Philips and GE, corresponding quadrature OAI protocols were devised and optimised for the respective platforms. The protocol for the Siemens scanner was essentially identical to the NIH protocol for this study. A summary of parameters for three selected sequences is given in Table 1.

Results: The subjects demonstrated a broad range of OA pathology from almost normal to severe OA. Statistical analysis using Kendall’s tau-b correlation is shown in Table 2.

Discussion: Similar comparison studies have previously been performed but this is the first to compare all three manufacturers at 3.0T and use subjects with knee pathology [2,3]. This pilot study demonstrates that comparable NIH OAI protocols can be implemented on Philips and GE scanners with similar duration as the Siemens protocol. Qualitative ranking of subjects produces comparable results on all three scanners. The inter-scanner variability was found to be greatest at the lower end of the OA severity spectrum. This may be due to variability in depiction of milder pathology.