which include BML depth as well as size may be more valid than scoring systems not including BML depth.

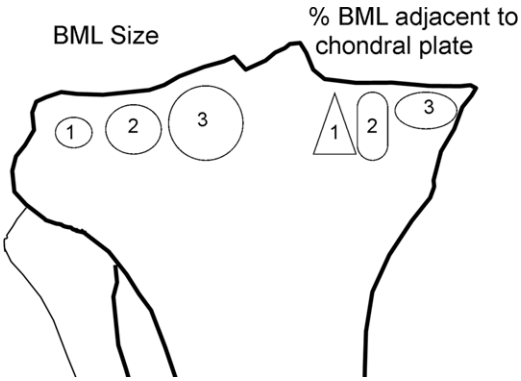

Figure 1. Diagram of BML scoring system (tibia).

Table 1: Comparison of mean change in cartilage parameters by BML category

		CMT			CMF	
	n	volume normalized (mm, 95% CI)	denuded area (mm^2, 95% CI)	n	volume normalized (mm, 95% CI)	denuded area (mm^2, 95% CI)
Large and distant	43	−0.06 (−0.1, −0.02)	35.5 (17.7, 53.3)	27	−0.10 (−0.2, 0.02)	64.25 (32.0, 96.5)
Large and close	9	−0.05 (−0.1, 0.03)	12.2 (−26.3, 50.8)	4	0.03 (−0.2, 0.2)	−29.00 (−112.8, 54.9)
Small and distant	34	0.02 (−0.03, 0.1)	**−2.94*** **(−22.7, 16.8)**	43	−0.05 (−0.1, 0.01)	**4.56*** **(−21.0, 30.2)**
Small and close	64	0.01 (−0.02, 0.03)	**0.29*** **(−14.2, 14.8)**	76	−0.02 (−0.1, 0.03)	**6.50*** **(−12.8, 25.8)**

*$p < 0.05$ compared to large and distant after controlling for age, gender and BMI. CMT = central medial tibia; CMF = central medial femur.

428 REGIONAL KNEE CARTILAGE THICKNESS ANALYSIS IN OSTEOARTHRITIS – A MULTIVENDOR MR SCANNER COMPARISON STUDY AT 3.0T

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Purpose: The aim of this study is to investigate whether cartilage thickness, measured from MR, is comparable between 3 different vendors' 3T scanners. The ability to use different centres/vendors' scanners would facilitate patient recruitment and data acquisition in studies of Osteoarthritis (OA). The NIH OA Initiative uses Siemens scanners, but both Philips Medical Systems and GE Healthcare also manufacture 3T scanners.
Methods: 12 subjects with knee symptoms of OA and one or more risk factors had their symptomatic knee scanned on each of the 3 vendor's scanners. Mean age 49.3±10 years (range 32−59 y); mean BMI 28.3±6.2 (range 22.1−44.2). The MR systems are located in three sites in the UK: Manchester (Philips), York (GE), Liverpool (Siemens). The NIH OAI study protocol was used for the Siemens scanner and corresponding protocols were developed for the Philips and GE scanners in collaboration with the vendors. The RF coils used were transmit-receive (GE), receive-only (Siemens) and 8-channel phased-array (Philips). To enable intra-scanner analysis, following the Philips acquisition, subjects were repositioned and the sagittal 3D sequence repeated.
Manual cartilage segmentation of the sagittal 3D sequence was performed by a single observer, blinded to subject identity, using EndPoint software (Imorphics, Manchester, UK). Subchondral bone was automatically segmented using a statistical appearance model to define a reference bone shape in each image which provided a dense set of 60,456 and 39,238 anatomically corresponding points on the subchondral bone surfaces of the distal femur and proximal tibia respectively. Cartilage thickness was measured above each corresponding point and mean thickness (ThCtAB) was computed within anatomical trimmed regions, also defined using the correspondences.
Results: The figure shows intra-scanner (Philips) and inter-scanner agreement for all scanner pairs for ThCtAB within the trimmed central medial femur (cMF) region and demonstrates small systematic differences. The intra-scanner mean difference was 0.03 mm. Inter-scanner mean differences ranged from 0.05 mm to 0.2 mm. The table shows the intra-scanner and inter-scanner root mean square coefficient of variation (RMS CoV) for the ThCtAB measure for a selection of regions. These range from 2.4%-4.6% (intra-scanner) and 4.2% to 7.7% (inter-scanner).

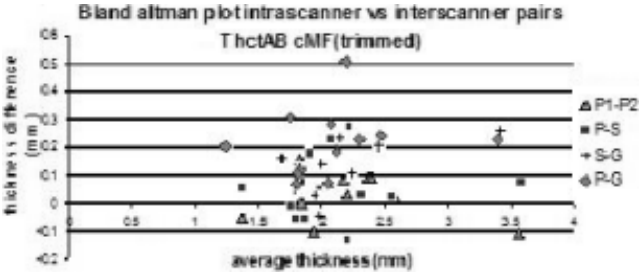

Figure 1. Bland and Altman plot demonstrating intra-scanner and interscanner agreement. P1 = Philips 1st scan, P2 = Philips 2nd scan, S = Siemens, G = GE.

ThCtAB: RMS COVs. (c)MF/T= (central) medial femur/tibia, (c)LF/T= (central) lateral femur/tibia

Region	RMS CoV (%)				
	Intra-scanner	*Inter-scanner*			
	P	G&S	P&S	P&G	P&G&S
MF	2.77	5.15	5.81	7.31	6.11
cMF	3.21	5.62	5.41	9.61	7.16
LF	3.61	4.20	4.90	7.19	5.57
cLF	2.63	5.11	4.11	6.58	5.34
MT	4.64	7.65	5.77	5.36	6.30
LT	4.08	7.69	4.00	8.07	6.95

Conclusions: This is the first report which compares knee cartilage thickness measures taken from 3T MR images acquired using three different vendors' scanners in OA subjects. Intra-scanner precision errors are in line with other studies. Systematic differences between vendors' cartilage thickness results are comparable with intra-scanner variability. Increased variability was exhibited between the Philips and GE scanners which may be due to differences in RF coil technology or image post-processing.
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Inflammation, Angiogenesis & Synovial Tissue Biology

429 ANGIOGENIC INDUCTION BY MECHANICAL SIGNALS REQUIRES ACTIVATION OF AKT PATHWAY VIA VEGF RECEPTOR-2 IN OSTEOARTHRITIC JOINTS

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Purpose: A rapid increase in the angiogenic invasion of the pannus and synovial membrane caused by mechanical trauma is a critical event necessary for the initiation of cartilage and subchondral bone destruction in osteoarthritis (OA). However, the exact intracellular mechanisms of angiogenic responses induced by trauma remain unclear. In this study, we hypothesize that unbalanced mechanical forces applied to the synovial joint can drive angiogenesis through the activation of Akt pathway via VEGF receptors and is necessary for the development of OA.
Methods: Well characterized CD31+/vWF+ human dermal microvascular endothelial cells (HDMEC) were grown on flexible bottom Bioflex II plates (Flexcell Int, NC). HDMEC were exposed to various magnitudes (3%, 6%, 12%) and frequencies (0.25 Hz, 0.1 Hz, 0.05 Hz) of dynamic equibiaxial tensile strain (DTS) for different time intervals. Il-1β (2 ng/ml) was used to mimic inflammatory conditions of the OA joints. Inhibitors to various kinases were used to confirm the actions of mechanical signals. Subsequently, proteins or RNA were extracted. Activation of kinases involved in Akt pathway were examined by Western blot analysis and