in cartilage thickness between BL and 12 months FU. A decreased dGEMRIC over time (between BL and 12 months FU) at the cMF was significantly associated with an increase in cartilage thickness over time (between 12 months and 24 months FU) at both cMF and MT (Table 1).

Conclusions: In this sample of middle-aged women, worsening of the dGEMRIC indices over 12 months predicted an increase in cartilage thickness at 24 months in the medial tibiofemoral compartment. Researchers must be aware that an increase in cartilage thickness over time may be related not only to improvement of cartilage, but also with loss of proteoglycan content (degeneration) as demonstrated in our study. Ideally, a combination of morphologic and compositional MRI techniques should be applied for cartilage assessment in the knee when monitoring the effects of different therapies.

361 COMPARISON OF A NOVEL QUANTITATIVE ASSESSMENT SCORE WITH ESTABLISHED SEMI-QUANTITATIVE SCORING SYSTEMS FOR CARTILAGE LESIONS IN EARLY OSTEARTHRITIS – DATA FROM THE OSTEARTHRITIS INITIATIVE


Purpose: MRI based semi-quantitative scoring systems such as Whole-Organ Magnetic Resonance Imaging Score (WORMS) and Boston-Leeds Osteoarthritis Knee Score (BLOKS) have been established for quantification of morphological changes associated with osteoarthritis (OA). However, these scores are not ideal for measuring progression of cartilage lesions in early stages of OA. The aim of this study was (i) to describe a novel quantitative scoring system for cartilage lesions (UCSF score), (ii) to determine the new score’s intra- and inter-observer reproducibility and (iii) to compare with WORMS and BLOKS in terms of detection of cartilage defect progression.

Materials and Methods: Fifty-eight individuals with risk factors for knee osteoarthritis were randomly selected from the OAI incidence cohort. Inclusion criteria were 45–55 years of age, BMI of 19–27 kg/m², no knee pain in either knee (WOMAC score of zero) and a Kellgren-Lawrence (KL) score equal or less than one in right knee radiographs at baseline. We used the baseline and 24 month follow-up right knee 3T MR images, which were acquired using conventional clinical sequences including sagittal intermediate-weighted fat-saturated turbo-spin echo, 3D water excitation double-echo steady state and coronal intermediate weighted turbo-spin echo. Images were analyzed by two radiologists using WORMS, BLOKS and UCSF Score for quantification of cartilage defects with an interval of 3 weeks between analyses using each scoring system. In addition 10 studies were analyzed twice by two of the radiologists to measure intra-observer reliability. The percent progression of cartilage lesions was calculated for each reader using each scoring system. In addition 10 studies were analyzed with the UCSF score progressed while 21% progressed with WORMS and 13% with BLOKS; the UCSF score was found to have a higher detection rate for cartilage lesion progression than both the WORMS and the BLOKS (p < 0.0001). The difference between BLOKS and WORMS regarding detection of progression was not significant (p = 0.284).

Conclusions: The UCSF Score is a novel reproducible quantitative scoring system for cartilage lesions, which provides an improved detection rate for monitoring OA disease progression compared to the semi-quantitative WORMS and BLOKS. Early recognition of cartilage lesion progression makes it an important tool with applications in both the clinical setting and for scientific studies, in particular for early OA.

362 MENISCAL TEARS ARE RELATED TO UNDERLYING CARTILAGE AND TRABECULAR BONE CHANGES

D. Kumar, Z.A. Zarins, J. Schooler, W. Virayavanich, X. Li, T.M. Link, S. Majumdar. Univ. of California San Francisco, San Francisco, CA, USA

Purpose: Meniscal tears are a common finding in asymptomatic healthy people as well as people with knee osteoarthritis (OA); and they are associated with increased cartilage loss. Recently, it has been shown that meniscal tears are also associated with higher T1 and T2 relaxation times of underlying cartilage indicating altered load sharing in that region. It is yet unknown if the altered loading due to meniscal tears and cartilage insufficiency affects underlying trabecular bone. Purpose of this study was to examine the relationship between cartilage, meniscus and trabecular bone quantitative MRI parameters in subjects with meniscal tears compared to those without tears.

Methods: 16 healthy subjects (age: 39.3 ± 10.4y, BMI: 23.4 ± 3.4 kg/m²), 20 subjects with mild knee OA (KL≤2, age: 52.8 ± 8.9 y, BMI: 25.8 ± 4.5 kg/m²) and 14 subjects with severe knee OA (KL>2, age: 61.9 ± 10.5y, BMI: 29.4 ± 6.4 kg/m²) participated. MRI was done using a 3T GE Excite Signa-MR scanner. Sequences used were: (i) high-resolution fat suppressed spoiled-gradient-echo (SPGR) (for cartilage thickness), (ii) T2-weighted fat-saturated FSE (for clinical WORMS grading), sagittal 3D (iii) T1p, (iv) T2 mapping and (v) axial 3D FIESTA-c (for trabecular bone). T1p and T2 relaxation times were quantified for the medial and lateral tibial and femoral condyles. Trabecular bone parameters (Bone volume fraction: app. BV/TV, Trabecular number: app. Tb.N, Trabecular separation: app. BV/TV, Trabecular thickness: app. Tb.Th) were calculated for medial and lateral femur, all femur and all tibia. Modified WORMS scoring was used to grade meniscal tears. Subjects were stratified based on the presence of posterior horn medial meniscus (PHMED) tear (WORMS ≥ 2) or absence of tear (WORMS < 2) since PHMED was the most common site for tear. One way ANOVA was used for differences in variables between the two groups. Trabecular bone differences were limited to 38 subjects with complete data.

Results: 2 controls, 7 mild OA and 10 severe OA subjects had PHMED tears. Subjects with PHMED tears had significantly lower cartilage thickness, higher T1p and T2 times for PHMED and medial tibia, compared to those without tears (Table 1).

<table>
<thead>
<tr>
<th>Compartments</th>
<th>T1p (ms)</th>
<th>T2 (ms)</th>
<th>Th_AC (mm)</th>
<th>T1p PHMED (ms)</th>
<th>T2 PHMED (ms)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patella</td>
<td>34.73</td>
<td>38.15</td>
<td>26.33</td>
<td>31.47</td>
<td>1.35</td>
</tr>
<tr>
<td>Trochlea</td>
<td>3.75</td>
<td>5.43</td>
<td>5.67</td>
<td>4.02</td>
<td>0.29</td>
</tr>
</tbody>
</table>

p = 0.012

Subjects with PHMED tears also had higher app. TbTh and lower app. TbN in tibia compared to those without tear (Table 2).