group compared to those in a control group for radiological OA (ROA) incidence; and 2) to determine if cartilage T2-relaxation-parameters can predict which subjects will develop ROA.

**Methods:** In the Osteoarthritis Initiative (OI), only right knees were imaged with T2. Cases were knees with X-ray KL scores at baseline that were either zero or one and that developed incident ROA (KL 0–2) at the 12 through 48 month visits. Control knees were KL 0 or 1 at baseline and that did not develop ROA by the 48 Mo. visit. Controls contained about 50% gender-age-KL exact matches to cases supplemented with roughly similar non-matches to the remaining cases. The MESE T2 series at the time of incidence ROA (P0), the 1 year prior to incidence (P-1) and the BL were segmented and T2 maps were computed at the femur, tibia, CMF, cLT, TM, LT, medial trochea and lateral trochea using atlas-segmentation software (Qnernetes, Rochester, NY). Descriptive T2 parameters (mean, variance, skewness, top 5% value) and Gray-Level Co-Occurrence Matrix (GLCM) texture parameters (entropy, mutual information, ASM, and contrast) were extracted for each cartilage region at three cartilage layers: superficial, medial and deep. All T2 features were adjusted by gender, BMI and age, and then standardized using a rank-inverse-normal procedure. Finally, each parameter was categorized as being low (<10%), high (>90%) or mid-range (10% to 90%) based on the control group values. A forward parameter selection algorithm based on Integrated Discriminant Improvement (IDI) on logistic regression models was used to select internally cross-validated multivariable models that characterized the differences between cases and controls at BL, P-1 and P0. All logistic models included height and baseline KL status as covariates.

**Results:** 179 incident ROA right knees with T2 Map series developed ROA, and 175 control subjects did not. Cases and controls had similar incidence; and 2) to determine if cartilage T2-relaxation-parameters can predict which subjects will develop ROA.

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correlation between cartilage loss throughout the entire femorotibial compartment (MFTC) with extrusion area in JSN knees; however, the correlation did not attain statistical significance in no-JSN knees (Table 1). Also, the extrusion distance measured 4 mm posterior to the central slice was not significantly correlated with MFTC cartilage loss. The strongest (negative) correlation between meniscus position and subregional femorotibial cartilage loss was observed for the external meniscal compartment (eMT; Table 1). In contrast, no significant relationship was seen in the central meniscus (cMT; Table 1). No significant relationship was found in other Tibial subregions, except for the anterior medial tibia, but only in JSN knees (r = −0.27; Table 1). Correlation coefficients for the femoral subregions were generally smaller than those for tibial subregions, with only the internal meniscal weight-bearing femur (icMF) attaining statistical significance (r = −0.26; Table 1).

Conclusions: The current results show that the relationship between meniscal extrusion and cartilage loss differs substantially between femorotibial subregions. The correlation was strongest for the external meniscal compartment (eMT), a region that is physiologically covered by the meniscal capsule. It was less for other tibial and femoral subregions, including the central meniscal meniscus (cMT), a region that exhibited similar rates of cartilage loss as eMT (data not shown). The findings suggest that external tibial meniscus may be particularly vulnerable to cartilage tissue loss once the meniscus extrudes and the surface is “exposed” to direct, non-physiological, cartilage-carteilage contact.

**437 DO SCORES ON WOMAC PAIN AND FUNCTION SUBSCALES VARY WITH DIFFERENT DEFINITIONS OF KNEE OSTEOARTHRITIS?**

D. Schiphof, E.J. Waarsing, E.H. Oei, S.M. Bierma-Zeinstra. Erasmus MC, Rotterdam, Netherlands

**Purpose:** The MRI definition for knee osteoarthritis, developed in 2011, has not yet been validated in other populations. In previous work, we showed that if this MRI definition of tibiofemoral (TF) OA (TFOAMRI) is applied, more cases of knee OA are detected than with the radiographic Kellgren and Lawrence grading (K&L). With a better content validity and at least equal construct validity, we concluded that the TFOAMRI is more sensitive in detecting structural knee OA. However, it is unknown whether women defined with TFOAMRI differ in pain and disability from those who are not, or those who have a radiographic K&L grade ≥2. Furthermore, with the available MRI definitions, a distinction between patellofemoral (PF) OA and TFOA can be made, and the debated contribution to pain and disability by PF OA can be assessed. Therefore the aim of the present study was to investigate if women with knee OA defined with PF- or TFOAMRI report different pain and function scores measured with the Western Ontario and McMaster Universities Arthritis Index (WOMAC), or report different scores than women with knee OA defined by K&L-grading.

**Methods:** Of 891 females aged 45–60 from a random subpopulation of the Rotterdam Study, radiographs and MRIs of both knees were assessed for knee OA: radiographs with the K&L-grading (K&L ≥ 2 was defined as OA) and MRIs with a comprehensive semi-quantitative scoring system. Based on these scored features we applied the proposed MRI definition. We distinguished a PFOAMRI-definition from a TFOAMRI-definition. All women filled in the WOMAC questionnaire. With multivariable regression analysis we tested if the definitions (K&L ≥ 2, PFOAMRI or TFOAMRI) reported different WOMAC pain and function scores independently from each other. Analyses were adjusted for BMI, age and bilaterality (if women had knee OA in one or both knees).

**Results:** Data of 871 women were analyzed. Of 20 women data was missing due to insufficient quality of images (radiographs or MRIs). Table 1 shows the mean and the standard deviation (sd) of age, BMI, WOMAC pain and function scores per definition. 21 women met the K&L ≥ 2 and TFOAMRI definition in one or both knees: 3 women met the K&L ≥ 2 and PFOAMRI definitions; 35 women met the TF- and PFOAMRI definitions; 17 women met all three definitions of knee OA in one or both knees. All three definition contributed significantly (p < 0.001) to higher WOMAC pain scores (K&L ≥ 2: β = 1.61; 95% confidence interval (95% CI): 0.79–2.44), PFOAMRI: β = 1.32 (95% CI: 0.69–1.95) or TFOAMRI: β = 1.15 (95% CI: 0.52–1.77); and to WOMAC function score (K&L ≥ 2: β = 5.21 (95% CI: 2.56–7.86), p < 0.001; TFOAMRI (β = 2.75 (95% CI: 0.74–4.75), p = 0.007; PFOAMRI: β = 4.06 (2.02–6.10), p < 0.001).

**Conclusions:** The MRI definitions show differences in WOMAC pain and function scores between women with and without knee OA. Those women with all definitions positive had the highest pain and disability scores, and those with none K&L ≤ 2 the lowest. The TF- and PFOAMRI definitions, but also the K&L-definition, all contributed significantly and independently from each other, to the higher pain and disability scores.

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**Table 1**

<table>
<thead>
<tr>
<th>Women met the definition</th>
<th>N</th>
<th>Age mean (sd)</th>
<th>BMI mean (sd)</th>
<th>Uni- or bilateral</th>
<th>WOMAC pain mean (sd)</th>
<th>WOMAC function mean (sd)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No OA</td>
<td>676</td>
<td>54.0 (3.8)</td>
<td>26.3 (4.3)</td>
<td>25/36</td>
<td>1.0 (2.4)</td>
<td>3.0 (7.5)</td>
</tr>
<tr>
<td>K&amp;L ≥ 2</td>
<td>61</td>
<td>56.2 (3.3)</td>
<td>30.1 (6.3)</td>
<td></td>
<td>4.2 (4.7)</td>
<td>12.9 (16.1)</td>
</tr>
<tr>
<td>- Only K&amp;L ≥ 2</td>
<td>17</td>
<td>56.1 (3.8)</td>
<td>27.1 (3.3)</td>
<td>11/6</td>
<td>1.8 (2.3)</td>
<td>5.7 (8.2)</td>
</tr>
<tr>
<td>- K&amp;L ≥ 2 + TFOAMRI</td>
<td>21</td>
<td>55.7 (3.4)</td>
<td>30.1 (7.2)</td>
<td>7/14</td>
<td>3.8 (4.9)</td>
<td>11.8 (17.6)</td>
</tr>
<tr>
<td>- K&amp;L ≥ 2 + PFOAMRI</td>
<td>3</td>
<td>57.5 (1.3)</td>
<td>34.8 (7.7)</td>
<td>0/3</td>
<td>5.7 (6.4)</td>
<td>21.3 (25.3)</td>
</tr>
<tr>
<td>TFOAMRI</td>
<td>125</td>
<td>56.6 (3.3)</td>
<td>29.4 (6.2)</td>
<td>96/56</td>
<td>3.5 (4.7)</td>
<td>10.3 (14.7)</td>
</tr>
<tr>
<td>- Only TFOAMRI</td>
<td>51</td>
<td>55.9 (2.6)</td>
<td>27.7 (6.2)</td>
<td>42/9</td>
<td>2.2 (3.4)</td>
<td>7.0 (11.2)</td>
</tr>
<tr>
<td>PFOAMRI</td>
<td>106</td>
<td>56.9 (2.9)</td>
<td>30.1 (4.1)</td>
<td>30/47</td>
<td>3.5 (4.0)</td>
<td>10.6 (15.4)</td>
</tr>
<tr>
<td>- Only PFOAMRI</td>
<td>51</td>
<td>56.1 (2.9)</td>
<td>29.2 (4.1)</td>
<td>40/11</td>
<td>2.3 (3.4)</td>
<td>8.2 (11.7)</td>
</tr>
<tr>
<td>- TF + PFOAMRI</td>
<td>35</td>
<td>57.7 (2.8)</td>
<td>29.5 (5.8)</td>
<td>15/20</td>
<td>3.5 (5.1)</td>
<td>8.9 (14.0)</td>
</tr>
<tr>
<td>K&amp;L ≥ 2</td>
<td>17</td>
<td>57.3 (2.6)</td>
<td>32.4 (6.6)</td>
<td>4/13</td>
<td>6.7 (5.2)</td>
<td>19.2 (17.8)</td>
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