affected and contralateral hip are the most important predictors of hip osteoarthritis progression (p < 0.01). (Figure 1, area a and b). Similarly, there are size differences between progressors and non-progressors in the superior part of the femoral head and trochanter major. However the KL score of the affected side was still the most relevant variable in the prediction of OA progression.

**Conclusions:** DXA parameters can significantly contribute to predict future progression of joint space narrowing or total hip replacement in patients with (beginning) hip osteoarthritis. The analysis of the DXA differences between two hips of the patient represents a small but significant contribution to this prediction. These analyses show the importance of bone density changes in the etiology of OA. Accurate measurements of bone density and bone shape can help to diagnose OA and predict its chances of fast progression.

![Figure 1. Important areas of division of the hip using DXA analysis. These areas show differences with respect to its contralateral side in those OA patients where the disease will progress.](image)

**SIDE-DIFFERENCES OF FEMOROTIBIAL CARTILAGE LOSS IN KNEE OA**

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**Purpose:** Osteoarthritis of the knee is often considered to be a bilateral disease, in which one knee (i.e. the functionally dominant one) may be more advanced than the contralateral knee. Also, in studies testing intra-articular DMOADs, the question arises to what extent the contralateral (untreated) knee can be used as a control. It is, however, currently unclear to what extent cartilage loss correlates in left and right knee, and whether cartilage loss in the dominant knee precedes or is greater than that in the non-dominant knee. Here we study the correlation of femorotibial cartilage loss in bilateral knees of community-recruited persons with knee OA using quantitative MR imaging, and we test the hypothesis that cartilage loss in the dominant knee is greater than in the non-dominant knee due to the higher mechanical loading encountered by dominant knees.

**Methods:** We studied the left and right knees of 124 participants (age 72±9 years [mean±SD], BMI 29.9±5.5, 72% women), with mild to moderate symptomatic OA at least at one knee. Double oblique coronal FLASHw MRI sequences were acquired bilaterally at baseline and 26.6±5.4 months later. Segmentation of the cartilage was performed by tracing the total subchondral bone area (tAB) and the cartilage surface (AC) throughout the weight-bearing femorotibial cartilage plastes with baseline and follow up scans being processed in parallel (readers blinded to acquisition order). All segmentations were quality controlled by one observer. The cartilage thickness (ThCtAB) was determined using proprietary software (Chondrometrics, Airring, Germany). Progression was expressed as change in ThCtAB per annum in the medial (MT) and lateral tibia (LT), in the medial (cMF) and lateral weight-bearing femur (cLF) and for aggregate values in the medial and lateral femoro-tibial compartment. Medial cartilage loss was 0.8% annually in non-dominant and 1.1% in dominant knees (r = 0.23); with the rate of change not being significantly different (Table 1).

<table>
<thead>
<tr>
<th>Dominant Knee</th>
<th>Non-dominant Knee</th>
<th>p value (dom. vs. non-dom.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MT</td>
<td>−1.1%</td>
<td>−0.9%</td>
</tr>
<tr>
<td>cMF</td>
<td>−1.2%</td>
<td>−0.7%</td>
</tr>
<tr>
<td>LT</td>
<td>−1.1%</td>
<td>−1.4%</td>
</tr>
<tr>
<td>cLF</td>
<td>−0.7%</td>
<td>−1.0%</td>
</tr>
</tbody>
</table>

In the lateral femorotibial compartment, the rate of change was 1.2% in non-dominant and 0.9% in dominant knees (r = 0.46), again the rate of change not being significantly different (Tab. 1).

**Conclusions:** It is known that cartilage morphology (thickness, volume) in healthy persons is highly symmetric between dominant and non-dominant knees (no significant difference) and displays a high correlation. However, bilateral cartilage loss in OA has not been studied systematically using quantitative MR imaging. In this study of participants with symptomatic and radiographic OA of at least one knee, we do not find significant differences in cartilage loss between dominant and non-dominant or between left and right knees. The correlation of cartilage loss between dominant and non-dominant knees was only modest. These data provide no evidence that cartilage loss in functionally dominant knees is greater than in contralateral (non-dominant) knees and that the mechanical loading associated with limb dominance is a risk factor for OA progression.

**421 STATISTICAL SHAPE MODELLING REVEALS FOCAL PATTERN OF CARTILAGE LOSS IN OAI PROGRESSION COHORT**

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**Purpose:** MRI offers the opportunity to assess the integrity of articular cartilage directly. However, in order for this information to be of most value, it is important to understand the pattern of change as the disease progresses. The objective is to determine (1) the change in cartilage thickness and (2) the distribution of any such change in a 12-month progression group of individuals with knee OA, comparing the pattern in men and women.

**Methods:** A convenience group of 50 individuals (29 male) was identified from the OAI progression group 0.B.1 and 1.B.1. The subjects chosen had K-L scores of 2 or 3; medial JSN greater than lateral JSN, evidence of medial osteophytes and knee alignment of >1° of varus mal-alignment measured using the anatomic axis. BMI and varus (average) were for females (32.7, −3.1°) and males (31.3, −3.9°). Pairs of images were manually segmented using EndPoint software (Imorphics, Manchester, UK), by trained segmenters blinded as to time point, but not to subject. A dense set of anatomically corresponded points was automatically identified on the femur (n = 6000) and tibia (n = 5000) bone surface of each image, allowing mapping of cartilage change both within and across subjects. Average thickness (ThCtAB) of the cartilage for each major compartment of the femur and tibia was calculated and loss between the baseline and 12m follow-up assessed using paired t-tests with results expressed as a percentage of the baseline value. At each point at which the thickness of cartilage was measured, the standardized response mean at each point across the population were calculated.

**Results:** The percentage change in average thickness for males and females by compartment, and by sex of subject is shown in Table 1. Distribution of SRM values plotted on mean bone shapes for males and females is shown in Figure 1.