wards the femoral shaft. Fractional water content was highest in cysts, 89.3 (2.3%), lower in the surrounding region, which had a similar appearance to a Bone Marrow Lesion (BML), 67 (14%), reducing to 52 (17%) and 45 (19%) in regions further from the cyst.

Conclusions: Significantly lower FF content was found in bone marrow close to the hip joint in patients with severe OA compared with those with milder disease. The distribution of lipid in these regions also changed, shown by increased standard deviation and entropy, suggesting that the bone marrow composition in severe OA may be more varied and possibly more disorganized. These data indicate that the cellular environment in the bone marrow does alter with disease progression but this appears to be a late event rather than a predisposing factor. Cysts had the highest, and the surrounding BML-like region a higher than the local average, fractional water content.

Sponsor: This study was supported by an award from the Translational Medicine Research Collaboration.

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QUANTIFICATION OF JOINT SPACE NARROWING IN OA HANDS USING SEMI-AUTOMATED SEGMENTATION SOFTWARE: ANALYSIS OF RADIOGRAPHS FROM THE OSTEOARTHRITIS INITIATIVE (OAI)
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Purpose: Osteoarthritis (OA) of the hand causes damage to the interarticular cartilage, which is observed on a radiograph as a decrease in joint space width (JSW). The purpose of this study was to validate a quantitative software assessment tool for radiographic JSW by measuring differences between OA and normal populations.

Methods: The study used 100 randomly selected baseline hand radiographs from the Osteoarthritis Initiative (OAI). Fifty subjects (25 male, 25 female, average age of 61.8 years) with no reported pain or diagnosis of OA were defined as normal, and 50 subjects (25 male, 25 female, average age of 62.4 years) with a reported physician diagnosis of OA, were defined as diseased. A semi-automated software tool was used to quantify JSW in the MCP,PIP, and DIP joints of digits 2 to 5. JSW was measured in a central region of width equal to half the distance between the outer margins of the base of the phalanx. This region was separated into 5 equally spaced areas as shown in Figure 1. The software provided a measure of JSW in each region (JSW1, JSW2, JSW3, JSW4, JSW5), and a measure of central JSW defined as JSWC = (JSW2 + JSW3 + JSW4)/3. Measures of joint asymmetry were defined as JSWas1 = (JSW1 – JSW2)/JSWC and JSWas2 = (JSW2 – JSW4)/JSWC. Due to anatomical considerations, JSW1, JSW5, and JSWas1 could not be measured consistently for the MCP joint.

Statistical analysis was performed for each joint type and the p-value from a Students T-Test was used to quantify the difference between the normal and diseased groups. The readings were performed blinded to disease state.

Results: The results are given in Table 1. Significant differences (p<0.05) were observed for all three joint types. JSW1 and JSW5 were the most discriminating measures for the PIP and DIP joints, while JSW3 and JSW4 were optimal for the MCP. Measures of joint asymmetry and central JSW were less discriminating than the raw JSW.

Conclusions: This quantitative measure of JSW appears to have a high level of discriminate validity for hand OA. The observations that all joint types were predictive (including MCPs), and that raw JSW was more predictive than joint asymmetry, suggest that hand OA may have a basis in generalized cartilage loss.

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RISK FACTORS FOR MRI-DETECTED PATELLO-FEMORAL AND TIBIO-FEMORAL CARTILAGE LOSS OVER A 6-MONTH PERIOD: THE JOG STUDY
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Purpose: Cartilage damage is one of the hallmark features of osteoarthritis (OA) and may be assessed indirectly by radiography or directly by MRI. Risk factors for tibiofemoral (TF) and patellofemoral (PF) cartilage loss differ slightly and have only rarely been explicitly studied.

Cartilage loss over observational periods of less than 12 months is rare but not uncommon and has not been described to date. Aim of the study was to assess several non-MRI and MRI-features as baseline (BL) risk factors that may predict PF and TF cartilage loss over a 6 months follow-up (FU) period.

Methods: The JOG study is a double-blind randomized trial investigating the effect of oral glucosamine supplementation. 177 subjects aged 35-65 with chronic, frequent knee pain were included. 3 T MRI of both knees was performed at BL and 6 months FU using the same pulse sequence protocol as in the Osteoarthritis Initiative (OAI). Knees were semi-quantitatively assessed according to the WORMS system by one expert MSK radiologist.

Cartilage status was scored on a scale from 0-6 in each of 5 subregions of the medial and lateral TF compartments and in 4 subregions comprising the PF joint. A change of >0.5 in any subregion, indicating within-grade progression, was defined as the minimum requirement for cartilage loss. Bone marrow lesions (BMLs), meniscal damage, meniscal extrusion, synovitis and effusion were scored in addition and assessed as baseline risk factors. All MR features were divided into two categories: present (score ≥1) and absent (score=0). Logistic regression models were applied to assess the risk of cartilage loss for knees exhibiting risk factors when compared to knees without the risk factor at baseline. Risk of cartilage loss in the PF joint was assessed separately from the TF joint. We performed a subregion-based analysis using general estimating equations (GEE) to account for the clustering of subregions within a knee and knees within an individual. Multivariate models were adjusted for age, gender, treatment (oral glucosamine) and BMI. In addition MRI-based risk factors were adjusted for each other in a multi-adjusted model.

Results: 51.2% of participants were men, mean BMI was 29.1 (±4.1). Baseline Kellgren/Lawrence grades were (worst K/L grade for either left or right knee): K/L 0: 37 (20.9%) knees, K/L 1: 14 (7.9%) knees, K/L 2: 26 (14.7%) knees, K/L 3: 81 (45.8%) knees K/L 4: 19 (10.7%). Of the 353 knees, 304 knees (85.7%) and 1,153 subregions (23.3%) exhibited prevalent cartilage damage at baseline. 56 (1.1%) subregions showed incident or worsening cartilage damage at 6 months FU (Figure 1). Predictors for PF cartilage loss

Figure 1. Tibio-femoral cartilage loss in the medial compartment over 6 months. Left: Superficial cartilage damage is depicted in the central subregions of the medial femur and tibia (arrows). Right: 6-month follow-up. Progression to full-thickness damage is visualized (arrowheads).