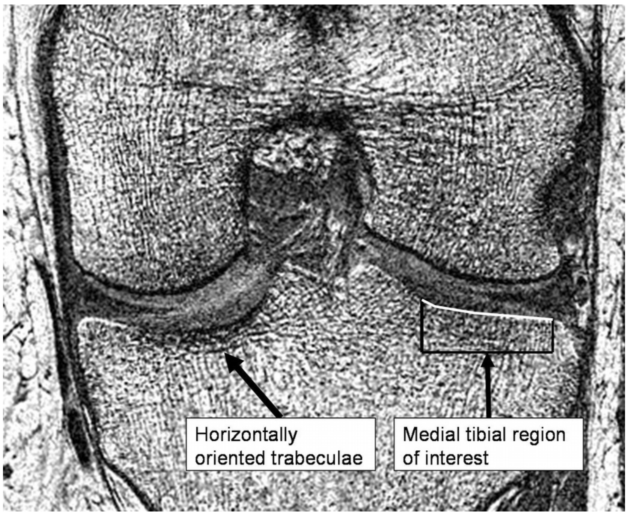

ial plateau using Bone Signal Topography (BeST) appeared to discriminate between the healthy and OA knees (Fig. 1).

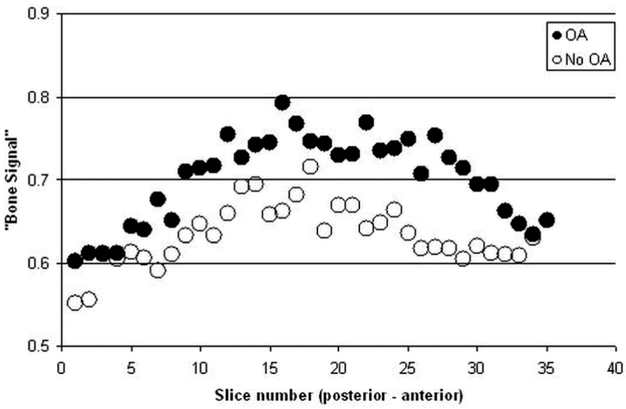

Fig. 1. Bone signal topograph.

Conclusions: High quality images of trabecular bone are feasible using coronal 3T MRIs and have potential to provide qualitative and quantitative measures of the subchondral bone in OA knees. While preliminary, these MR findings are compatible with disrupted architecture and increased volume of subchondral bone in OA.

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THE ACUTELY ACL INJURED KNEE ASSESSED BY MRI - NATURAL HISTORY OF POST TRAUMATIC BONE MARROW LESIONS IN AN RCT OF SURGICAL VS. NON-SURGICAL TREATMENT

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Purpose: ACL injuries are common with an annual incidence of 0.81 per 1000 inhabitants aged 10-64 years. MRI gives the opportunity to assess bone marrow lesions (BML), suggested to be a footprint of the injury mechanism. The consequences of BML in acutely ACL injured knees, or their contribution to the development of knee OA is not known.
Using quantitative MRI (qMRI), we measured BML volumes and joint fluid volumes at baseline, 16 weeks, 30 weeks, and 1year in patients with an acute ACL injury. We compared findings between knees treated surgically and non-surgically.
Methods: In an RCT of surgical vs. non-surgical treatment of acute ACL injuries (KANON study) we recruited patients aged 18-35 years, having a high to moderate physical activity level and a not more than four weeks old ACL rupture in a previously uninjured knee (n=120). 52 consecutive patients (13 females) with increased antero-posterior (A-P) laxity (Lachmann grade 2-3) and a fresh ACL rupture as visualized on MRI were included in the present study. In addition, 4 healthy, previously uninjured controls were examined. Randomization was done using fixed blocks of 20 following a computer generated randomization table. 20 patients (5 females) were randomized to non-surgical treatment and 32 (8 females) to surgical treatment. There were no differences between the two groups in patient characteristics such as age, gender, activity level, etc.MRI scans were performed using a 1.5 T imager (Gyroscan, Intera, Philips) with a circular polarized surface coil. All knees were examined with a dual-echo turbo spin-echo sequence (tSEPdT2) and a T2-weighted turbo short tau inversion recovery sequence (tSTIRT2) in the coronal and in the sagittal views. A quantitative analysis of MRI was performed where a multi- spectral image data set was created and computer analyzed.
Four regions of the tibiofemoral joint were assessed: medial and lateral tibial condyle; medial and lateral femoral condyle. Cross sectional comparisons of BML and joint fluid volume at different time points were made with the Mann-Whitney U test.
Results: There were no differences in joint fluid volume or BML volume for any anatomical region between the two groups at baseline. At 16 weeks, the surgically treated group had significantly more joint fluid ($p<0.001$) and larger BML volume in the

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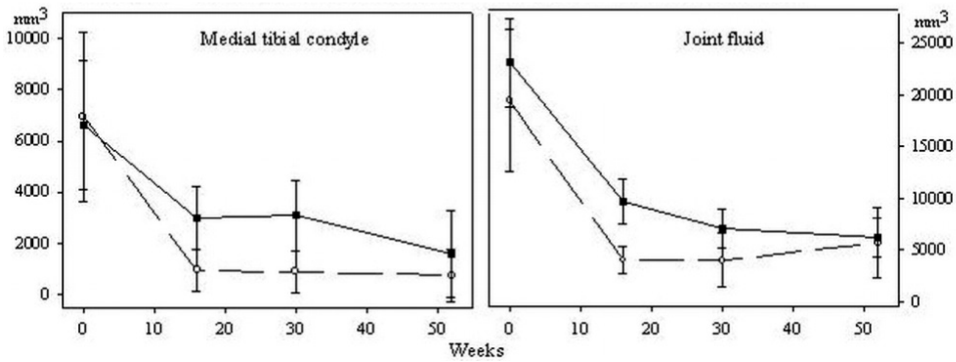

Fig. 1. First year development of BML volume in the medial tibial condyle (left) and joint fluid volume (right). Solid & black squares for surgical (n=32); dashed lines for non-surgical treatment (n=20).

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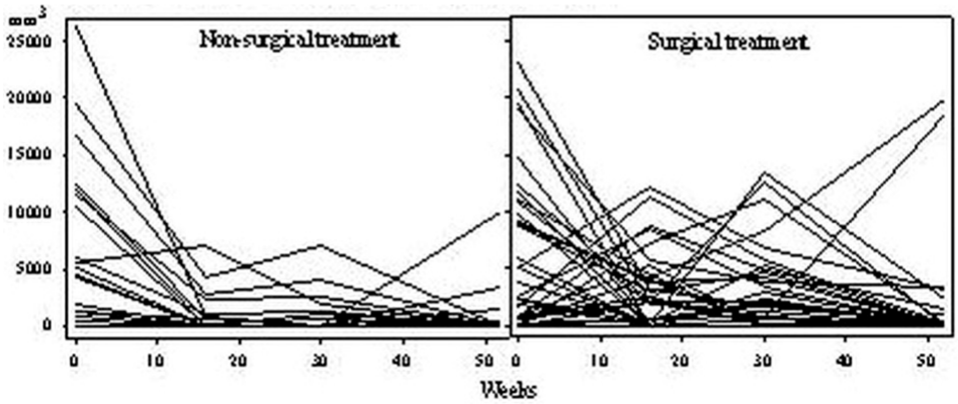

Fig. 2. First year development of BML volume (mm^3 in the medial tibial condyle. Each line represents one patient.

medial tibial condyle (p=0.020) and these differences persisted at 30 weeks ($p<0.001$ and p=0.012, respectively) (Fig. 1). There were no differences between the two groups at the 1 year follow up.

Plotting BML volume for each knee over time showed consistent differences between the two groups for all four regions, statistically significant in the medial tibial condyle (Fig. 2). None of the controls had, or developed any BML for any region throughout the one year period.

Conclusions: The majority of post traumatic BML seen in this study were resolved within the first year. However, the resolution of BML was delayed in surgically treated knees. Furthermore, a prolonged period of joint effusion was seen in ACL reconstructed knees as compared to non-surgically treated knees. The importance of these early differences for knee function or future risk of osteoarthritis is unclear. We continue to monitor post traumatic changes to the bone marrow, sub-chondral bone plate and cartilage following acute ACL injury within the KANON study.

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KNEE CARTILAGE MORPHOLOGY IN RELATION TO RADIOGRAPHIC OSTEOARTHRITIS STATUS: A CROSS-SECTIONAL STUDY USING 3 TESLA MR IMAGING

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Purpose: Quantitative MR imaging not only permits visualizing cartilage tissue directly, but also accurate determination of cartilage morphology three-dimensionally. Here we explore how measures of cartilage morphology differ between patients with various grades of radiographic OA and healthy control subjects.

Methods: 157 female participants, aged $\geq$ 40 years, were recruited at 7 clinical centers. Conventional standing AP knee radiographs were obtained to determine Kellgren Lawrence grades (KLG) by a central reader. 79 subjects had a BMI $\leq$ 28, no symptoms, and a KLG = 0 bilaterally. 78 subjects had a BMI $\geq$ 30, symptoms in at least one knee, and mild to moderate radiographic OA (16 = KLG 1, 35 = KLG 2, 27 = KLG 3). Coronal MR images were acquired using 3.0 Tesla scanners from two vendors and SPGRwe sequences at 1.0 x 0.31 x 0.31 mm^3 resolution. Cartilage volume (VC), mean cartilage thickness (ThC.Me), area of cartilage surface (AC), area of subchondral bone covered with cartilage (cAB), and total area of subchondral bone (tAB) were quantified in the medial tibia (MT), lateral tibia (LT), medial femoral condyle (cMF) and lateral femoral condyle (cLF) using proprietary software (Chondrometrics GmbH, Germany).

Results: The mean (SD) values for each cartilage morphometry parameter (not adjusted for BMI) in each of the 4 knee compartments studied for each of the 4 KLG groups are presented in Table 1.

Conclusions: 3.0 Tesla MR imaging provides quantitative measurements of cartilage morphology. Comparisons of cartilage morphometric parameters between KLG groups, adjusted for BMI using mixed effects models, showed that across compartments OA and non-OA subjects exhibit similar AC ($p > 0.05$), and observed VC differences are related to ThC.Me differences.

P280 – Table 1. Observed means (SDs) of cartilage morphometry parameters

		cLF	LT	cMF	MT
ThC.Me	KLG 0	1.67 (0.23)	2.01 (0.25)	1.73 (0.23)	1.62 (0.18)
(mm)	KLG 1	1.86 (0.26)	2.02 (0.31)	1.74 (0.23)	1.64 (0.13)
	KLG 2	1.87(0.24)	1.98 (0.31)	1.82 (0.28)	1.76 (0.16)
	KLG 3	1.79 (0.32)	1.87 (0.28)	1.54 (0.25)	1.59 (0.21)
VC	KLG 0	1011.4 (180.4)	1940.7 (362.4)	990.1 (172.4)	1786.7 (318.3)
(mm3)	KLG 1	1158.1 (249.0)	2074.5 (537.0)	1011.4 (170.9)	1885.2 (275.6)
	KLG 2	1156.3 (181.1)	2000.6 (363.8)	1090.2 (199.7)	2046.5 (291.4)
	KLG 3	1115.0 (241.9)	1849.2 (350.9)	920.6 (201.7)	1829.6 (329.8)
(AC+cAB)/2	KLG 0	613.8 (67.7)	984.0 (105.0)	577.0 (67.9)	1108.9 (108.7)
(mm2)	KLG 1	628.4 (74.7)	1033.7 (140.7)	587.6 (56.7)	1162.9 (111.8)
	KLG 2	625.0 (68.5)	1022.9 (116.8)	605.1 (68.7)	1181.4 (106.6)
	KLG 3	626.8 (71.5)	1004.6 (105.6)	592.4 (83)	1160.5 (112.6)
tAB	KLG 0	576 (65)	930 (101)	528 (66)	1081 (106)
(mm2)	KLG 1	588 (70)	979 (130)	539 (54)	1133 (109)
	KLG 2	583 (69)	974 (108)	553 (66)	1151 (102)
	KLG 3	587 (68)	954 (108)	555 (76)	1128 (110)