The thickness of the medial tibial cartilage compartment was measured using a fully automatic framework based on supervised learning and a statistical shape model. The method results in a thickness map - including denuded regions that are measured with zero thickness. Aiming for global thinning, we calculated the mean thickness. Aiming for focal thinning with no specific anatomical location we calculated the 10% quantile of the thickness map (denoted thickness Q10). For baseline measurements, the thickness was normalized by the width of the medial tibial plateau.
We tested the thickness quantifications for the ability to separate the group of healthy knees (defined by KL 0) from OA knees (KL $>$ 0) both at baseline and using the relative longitudinal change. The tests were performed using an un-paired t-test.
Results: At baseline, both mean thickness and thickness Q10 were able to separate the groups of healthy and OA knees. For mean thickness, healthy knees were significantly ($p = 0.05$) thicker than OA knees, with averages of 2.24 mm and 2.19 mm, respectively. For thickness Q10, the thin part of healthy knees were significantly ($p = 0.0005$) thicker than OA, with averages of 1.72 mm and 1.61 mm, respectively (see Fig. 1).

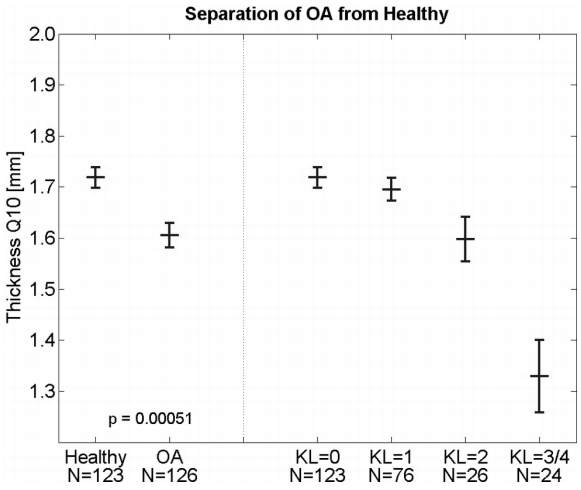

Fig. 1. Thickness Q10 at baseline for levels of OA defined by KL. Knees with KL 3 and KL 4 are pooled since there was only a single KL 4.

Both measures could also separate the groups of healthy and OA knees when using the relative longitudinal changes. For mean thickness, the average thinning was 2.3% for healthy and 5.9% for OA knees. For Q10, this was 0.0% and 5.4%. Here, the two p values were 0.005 and 0.009.
Conclusions: For both thickness measures, the longitudinal cartilage thinning was significantly worse for knees with OA at baseline. This suggests that both thickness quantifications are suitable for use in longitudinal clinical trials.
The thickness Q10 measure was designed to pick up focal thinning caused by lesions. The results show that the Q10 measure is much better able to separate healthy from OA compared to mean thickness at baseline. Also, the results suggest that the opposite is the case for the longitudinal change.
We therefore propose that for diagnostic purposes, the Q10 measure is well suited for quantifying a life-time of lesions caused by minor knee injuries - whereas for a clinical trial, with a relative short study period where few extra focal lesions occur, mean thickness quantification may be equally appropriate.

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CORRELATION OF KNEE PAIN, FUNCTION, AND HEALTH-RELATED QUALITY OF LIFE MEASURES WITH RADIOGRAPHIC FINDINGS AND PHYSICAL PARAMETERS IN KNEE OSTEOARTHRITIS

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Purpose: To evaluate the relationship of health-related quality of life measures in subjects with knee osteoarthritis (OA) with subjects' physical characteristics and radiographic features of their knee OA.
Methods: The Mayo Clinic Exercise-OA cohort consists of 306 community-based volunteers enrolled in a randomized controlled trial to determine the effects of exercise on knee OA. At baseline: pain, function and general physical and mental health were assessed with the Knee injury and Osteoarthritis Outcome Score (KOOS), the SF-36 health status questionnaire, and visual analog scale (VAS). Standard Buckland-Wright semiflexed weight-bearing AP and lateral x-rays of both knees were taken and each compartment was graded by Kellgren/Lawrence (K/L) score.
Results: Worsening K/L grade of knee OA, involvement of the patellofemoral joint and increasing BMI were all significantly associated with progressively lower KOOS scores and SF-36 physical function scores, but not with decreased SF-36 mental health scores. Increasing radiographic grade also significantly correlated with higher VAS pain scores. Among these, mean SF-36 physical function scores were 7% lower in overweight subjects (BMI 25-29.9) and 15% lower in obese subjects (BMI $\geq$ 30) as compared to those with normal BMI ($<$ 25). Mean KOOS knee-symptom scores were 8% poorer in subjects with patellofemoral involvement vs. without, and mean VAS pain scores were 25% worse in higher grade radiographic OA (K/L 3 and 4) than in lower grades (K/L 1 and 2). Mental health scores were essentially unchanged across all radiographic grades, compartments involved, and BMI categories.
Conclusions: Based on patient reported health-related quality of life measures, we found radiographic severity of knee OA, patellofemoral involvement and greater BMI to have a significant impact on knee pain and symptoms, as well as overall physical function. Furthermore, it appears that worse OA features correspond to more physical distress but not necessarily poorer mental or emotional well-being.

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CROSS-SECTIONAL AND LONGITUDINAL CLINICO-RADIOLOGICAL CORRELATIONS IN HAND OA

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Purpose: Hand osteoarthritis (H0A) has a very unpredictable evolution with respect to both symptoms and structural changes. No clear correlation between symptoms and radiographic severity has been established. We miss studies on this topic. Furthermore, many patients at end radiographic stages of HOA are painless, indicating a high discordance between symptoms and structural severity of the disease.
Objective: To study the cross-sectional and longitudinal prospective relationship between symptom and radiographic severity in HOA.
Methods: Two readers scored separately 105 pairs of radio-

graphs (baseline, year 1), selected from patients enrolled in a randomised controlled trial, using Kallman and Kellgren-Lawrence (KL) scoring systems. Patients characteristics were described and baseline and year 1 level of symptoms assessed using a VAS for pain rating and the Functional Index for Hand OA (FIHOA). *Statistics:* The Pearson correlation coefficient was calculated for cross-sectional correlations, between pain and FIHOA scores and radiographic severity assessed using Kallman and KL radiographic scoring methods. For longitudinal correlations, the Pearson correlation coefficient was also used for comparisons between baseline radiographic severity and the clinical evolution, and between baseline levels of pain and dysfunction and radiographic progression over 1 year.

Results: Patients were aged 61 ± 6 years, 93% women, 83% right-handed. The most painful joint at enrollment was the TMC (43%), the PIP (23%) and DIP (31%). Pain rated 56 ± 16 mm and FIHOA score 12 ± 4.6 on average. *Cross-sectional correlations:* There was a correlation between the FIHOA score and radiographic severity assessed by both Kallman (R= 0.34; p= 0.0004)) or KL (R= 0.35; p= 0.0002) scorings. There was also a correlation between pain on a VAS and Kallman scoring (R ranged from 0.19 to 0.21 according to the reader; p= 0.05 and 0.03 respectively), but not with KL scores. Baseline values of pain and FIHOA scores were correlated (R = 0.3; P = 0.0012). *Longitudinal correlations:* No significant correlations were found between baseline radiographic severity and the subsequent course of symptoms, indicating that pain and function were 2 independent variables from baseline radiographic severity. Similarly, no correlation was observed between baseline levels of symptoms (either pain or function) and subsequent radiographic progression over one year.

Conclusions: In this sample the level of HOA symptoms was cross-sectionally correlated to radiographic severity at baseline. But we found no correlation between baseline clinical status and radiographic progression or between baseline radiographic severity and the clinical course of symptoms indicating that radiographic progression and clinical evolution might be independent variables in HOA.

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NATURAL HISTORY OF RADIOGRAPHIC KNEE OSTEOARTHRITIS OVER 3-10 YEARS AFTER PREVIOUS MENISCAL SURGERY

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Purpose: The incidence and progression of knee OA over longer time periods is not well documented. We evaluated change in radiographic knee status over 3-10 years in patients who had been treated by meniscectomy some 25 years earlier.

Methods: We assessed 218 subjects with no associated cruciate ligament tear or radiographic knee OA at time of index meniscectomy. 1st assessment was 16 - 21 y post-surgery, 2nd assessment at 19 - 32 y (mean age att 2nd assessment 59 ± 11 y, women 20%, BMI 27 ± 4). Follow up rate (1st to 2nd assessment) was 73%. Standardized weight-bearing semi-flexed tibiofemoral x-rays from both assessments were graded according to the OARSI atlas. Two investigators, blinded to clinical data, each read all x-rays paired, with knowledge of sequence. Interobserver kappa for detection of healthy, incident, stationary, progressive, and end stage OA cases was 0.65. We defined *incident OA* as new radiographic OA at 2nd assessment, *progressive OA* as an increase in joint space narrowing (JSN) by ≥1 grades in a compartment with previous OA, *end stage OA* as JSN grade 3 at 1st assessment. We excluded subjects with knee arthroplasty (TKR, n = 8) since we were unable to assess radiographic change. We defined radiographic OA as the presence of any of the following in a knee compartment: JSN grade ≥2, sum of the two osteophyte grades ≥2, or grade 1 JSN *AND* a grade 1 osteophyte.

Results: Of 114 knees with *no* radiographic OA at 1st assessment, incident OA was present in 39% at 2nd assessment, resulting in 68% overall prevalence of OA 19-32 y after meniscectomy (72% incl subjects with TKR for OA). Of subjects who already had knee OA at 1st assessment, 69% exhibited radiographic progression (Figure 1).

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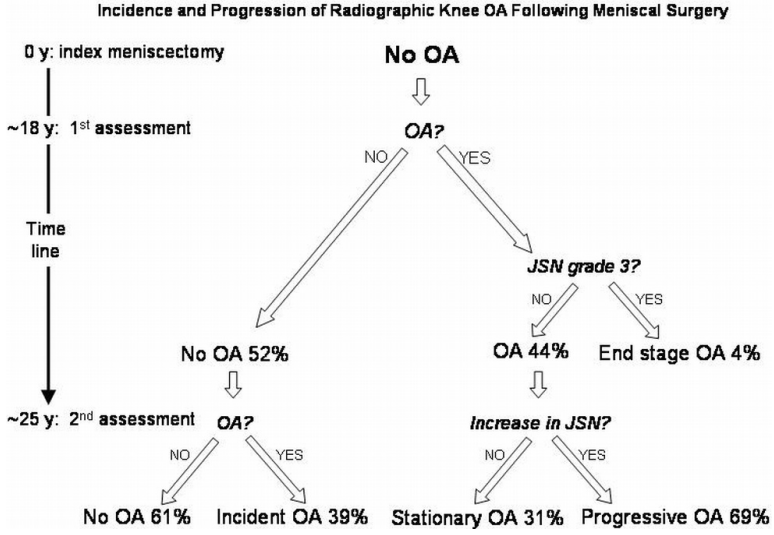

Fig. 1

P329 – Subject characteristics

Subject characteristics at 2nd assessment	No OA at 1st assessment			OA (not endstage) at 1st assessment		
	No OA (n=70)	Incident OA (n=44)	P	Stationary OA (n=29)	Progressive OA (n=66)	P
Age, mean ± SD y	58.2 ± 11.2	57.5 ± 9.8	0.57	57.9 ± 9.6	61.7 ± 10.4	0.10
Sex, no. (%) women	9 (13)	16 (36)	0.005	5 (17)	10 (15)	0.77
BMI, mean ± SD (kg/m2)	26.7 ± 3.2	27.2 ± 4.1	0.39	26.2 ± 4.0	28.1 ± 4.7	0.036
Time between assessments, mean ± SD y	6.2 ± 2.8	7.6 ± 2.8	0.016	5.4 ± 2.4	8.1 ± 2.6	0.0001
Time since meniscectomy, mean ± SD y	23.4 ± 4.5	25.8 ± 4.8	0.013	22.0 ± 3.9	26.6 ± 4.7	<0.0001