Introduction: Femoropatellar joint (PFJ) osteoarthritis (OA) is a prevalent disease in young and elderly populations and is recognized as a potent source of knee symptoms. Although anterior cruciate ligament (ACL) injury represents a well-established risk factor for incident femorotibial OA, the risk of incident femoropatellar OA after ACL injury has been less investigated. Yet, recent studies using MRI and quantitative image analysis reported the femoral trochlea to be the only cartilage plate in the knee to undergo cartilage thinning within the first two years after an ACL tear (1,2). However, it is unknown whether these changes continue (and if yes, at which magnitude) during later and longer follow-up. The purpose of the present work was to study the rate of change in cartilage thickness in the FPJ during the period of 2 to 5 years after ACL injury.

Methods: 121 young active adults (mean age 26.1 years) with an acute ACL tear in a previously uninjured knee were included in a randomized control trial (3). The study compared rehabilitation plus early ACL reconstruction (n=62), with rehabilitation plus the option of having a delayed ACL reconstruction if needed (n=59). A previously validated (4) MR sequence (3D/WATSc sequence) with 3.0 mm slice thickness (1.5 mm slice spacing) and 0.29 mm in-plane resolution (TR=20ms, TE =7.8ms, FA = 25°) was acquired using a 1.5T Philips Gyroscan Intera magnet and a CP knee coil. Baseline images were acquired within 5 weeks of ACL tear. The mean cartilage thickness was assessed by manual segmentation of the cartilage interfaces in the patella and the femoral trochlea with blinding to time points. In the current analysis, MRI results were blinded for treatment group, and we aimed to explore cartilage changes between 2 and 5 year follow up, independent of treatment. In this exploratory study, a 2-tailed t-test was used to determine whether FPJ changes between 2 year and 5 year follow up after ACL injury and between ACL injury and 2 year follow up were significantly different from zero.

Results: 107 of 121 participants completed the 2 and 5 year follow up. The mean cartilage thickness loss between the ACL injury and 2-year follow up was -2.0% ($p<0.001$) in the femoral trochlea, and was not significant in the patella (Table 1). However, no significant reduction in cartilage thickness was detected during the interval 2 to 5-years after ACL injury in either the femoral trochlear or the patella (Table 1)).

Table 1: Change in cartilage thickness in the femoral trochlea and in the patella and between ACL injury and 5 year follow-up

		Mean Change µm	Mean Change %	Standardized response mean	95% CI-Intervall Lower - Upper		t-Test 2-tailed
	Trochlea	-45	-2.0	-0.39	-67	-22.8	**0.0001**
ACL injury → Year 2	Patella	-9	-0.3	-0.10	-26	8.5	0.313
	Trochlea	-1	0.0	-0.01	-16	13.5	0.888
Year 2 →Year 5	Patella	-4	-0.1	-0.04	-22	14.6	0.686

Discussion and Conclusions: The long-term follow results of our current study show that cartilage loss in the femoral trochlea appears to be a temporary event that occurs within a time window of 1-2 years after ACL injury (1,2), but does not seem to continue during later observational intervals. This is in contrast to findings in the medial femoro-tibial compartment, for which we observed cartilage thickening between the ACL injury and 2 year follow up, and also between 2 year and 5 year follow up (same conference). Cartilage loss in the femoral trochlea after ACL injury hence likely is related to the initial trauma but not to a chronic alteration in the biomechanical conditions.

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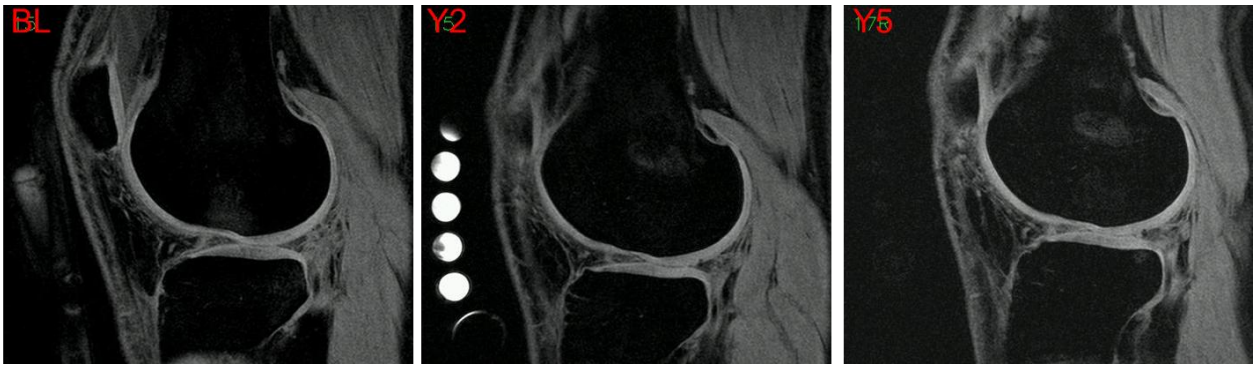

Figure 1: MR images of the femoropatellar joint at baseline (BL), 2 years (Y2) and 5 years (Y5) after ACL injury

TITLE:

QUANTITATIVE CHANGE IN CARTILAGE THICKNESS IN THE FEMOROPATELLATAR JOINT AFTER ACUTE ANTERIOR CRUCIATE LIGAMENT TEAR – LONG TERM FOLLOW-UP

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