PROLONGED SUBREGIONAL FEMORO-TIBIAL CARTILAGE INCREASE AFTER ACL TEAR – 5-YEAR FOLLOW-UP

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An ACL tear is a serious and common knee injury.

It mainly affects young active adults.

In the long term, the risk of OA development is increased:

- due to the acute trauma
- due to chronic unfavorable biomechanical conditions

Little is known about the structural changes in cartilage following ACL injury.
To determine the rate of change in (subregional) cartilage thickness after ACL injury:

- in the early phase (BL → 2 y follow up)
- in an intermediate phase (2 → 5 y follow up)
121 young, active adults: ACL tear after trauma to uninjured knee

Primary analysis: comparison of clinical outcomes (KOOS) between patients randomized to:

- Early ACL reconstruction and structured rehabilitation or
- Structured rehabilitation with optional delayed ACL reconstruction

No significant differences after 2 years (Frobell et al. N Engl. J. Med. 2010)
or after 5 years (Frobell et al. Br Med J 2013).
Demographics

- 24% female participants
- Age: 26 ± 5 years
- BMI: 24.2 ± 3.0 kg/m²

Sagittal FLASH (1.5T)

1.5mm x 0.29mm x 0.29mm

N= 106 (of 121) subjects with complete data

BL
ACL Tear

Year 2

Year 5
Pair-wise segmentation of articular cartilages (blinding to tpt):
  » **Tibia:** Medial & lateral (MT/LT) each 5 subregions
  » **Femur:** central 75% of medial & lateral condyle (cMF/cLF) each 3 subregions
  » → Medial and lateral compartment (MFTC/LFTC) each 8 subregions

Computation of cartilage thickness (ThCtAB)


Total Femorotibial Joint (FTJ)

Mean [95% CI] {SRM}

**BL**→**Y2:**
+58µm [1.0;116]
+0.7% {+0.20}

**Y2**→**Y5:**
+95µm [50;140]
+1.2% {+0.41}

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Cartilage Increase after ACL Tear – Results II

Change in ThCtrAB [%]

-1 -0.5 0 0.5 1 1.5 2 2.5 3 3.5 4 4.5 5

FTJ  MFTC  LFTC

↑MFTC > ↑LFTC

*: p<0.05; **: p<0.01; ***: p<0.001 (paired t-test)

N=107
Error bars = 95% CIs

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**3550 / Cartilage Increase after ACL Tear – Results III**

**BL→Y2 (% change):**
- 6 subregions ↑ (p<0.05)
- 8 subregions =
- 2 subregions ↓ (p<0.05)

**Y2→Y5 (% change):**
- 8 subregions ↑ (p<0.05)
- 8 subregions =
- 0 subregions. ↓

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Increase in cartilage thickness after ACL tear not only in the early, but also in an intermediate period (Y2 → Y5)
- Medial increase > lateral increase
- ecMF↑ and pLT↓ may be first signs of pathological change
- Impact of age and treatment?
- MFTC cartilage increase
- No significant difference between treatment groups
  (ACLR = Surgical ACL Repair)
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