AGE- AND SEX-DEPENDENCE OF FEMOROTIBIAL CARTILAGE CHANGE AFTER ACL TEAR – 5 YEAR FOLLOW-UP IN THE KANON STUDY

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Anterior cruciate ligament (ACL) tear is a serious injury affecting predominantly physically active young people. It is characterized by joint instability, decreased physical activity, unsatisfactory knee function, poor knee-related quality of life, and an increased risk of incident knee OA [1]. An ACL tear is associated with acute trauma and chronically altered joint mechanics. An increase in medial femorotibial cartilage thickness (ThC) was described within 1-2 years after the tear [2,3]. However, whether this represents an early pathological event (caused by trauma), whether it persists later (potentially due to chronic alterations), and whether this is dependent on age or sex is unclear.

OBJECTIVES

To study cartilage thickness change (with MRI):

- during intermediate follow-up after ACL tear (2 to 5 year follow-up [Y2→Y5]
- compared with early follow-up after ACL tear (baseline and 2 years [BL→Y2].
- and to explore the association of thickness change with sex and age

METHODS

- The KANON- trial is a randomized control trial, comparing rehabilitation plus early ACL reconstruction (ACLR) with rehabilitation plus the option of delayed ACLR (n=121) [4].
- 107/121 (88%) of the original KANON-sample, with young active adults suffering from an acute ACL tear in a previously uninjured knee, had MRI data at all 3 time points (Fig. 1): 81 (76%) men, 26 (24%) women; median age 25.6y (range 18-36y).
- Sagittal 1.5T MRIs (3D/WATSc) were acquired within 5 weeks of the tear (BL), and at Y2 and at Y5 follow-up (Fig. 1)
- Cartilage thickness (ThC) in the medial (MFTC) and lateral (LFTC) femorotibial compartment was computed after segmentation of femoral and tibial cartilage (blinding to acquisition order and treatment group).
- Unpaired t-tests and regression analysis (Pearson) used to explore the relationship of the cartilage changes with age and sex.

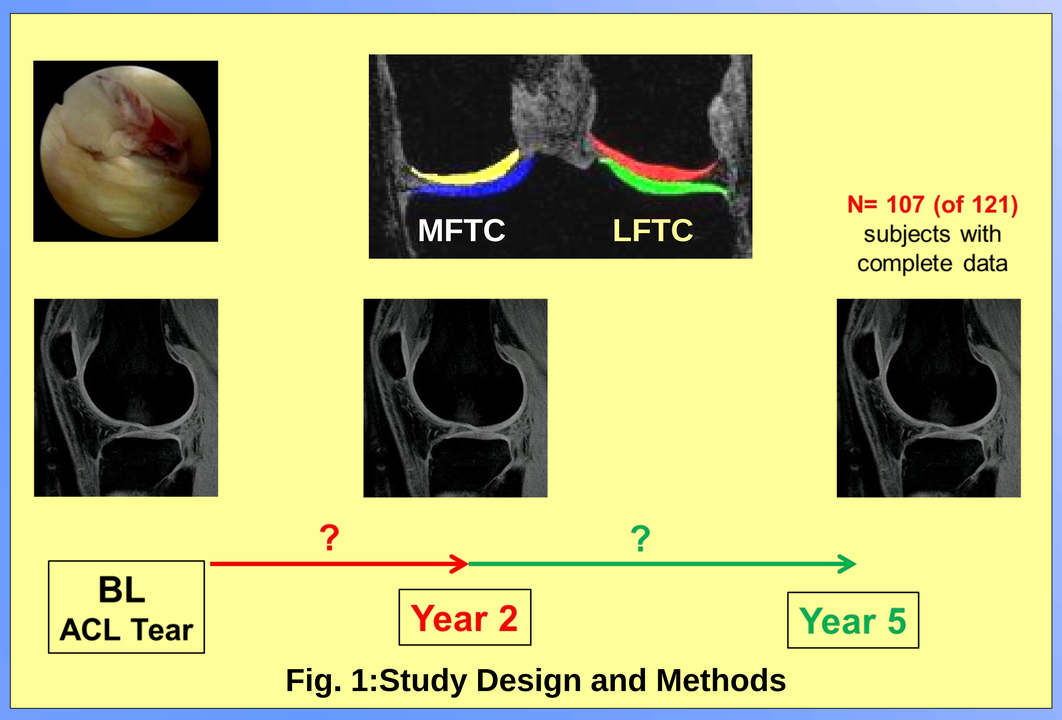
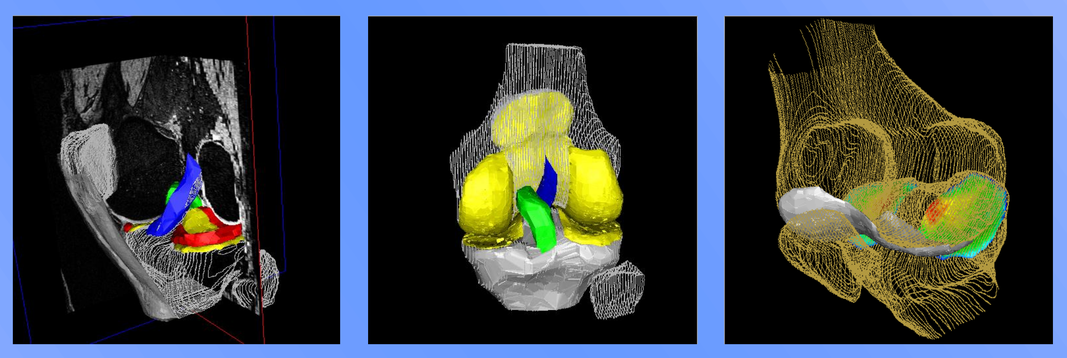


Fig. 1:Study Design and Methods



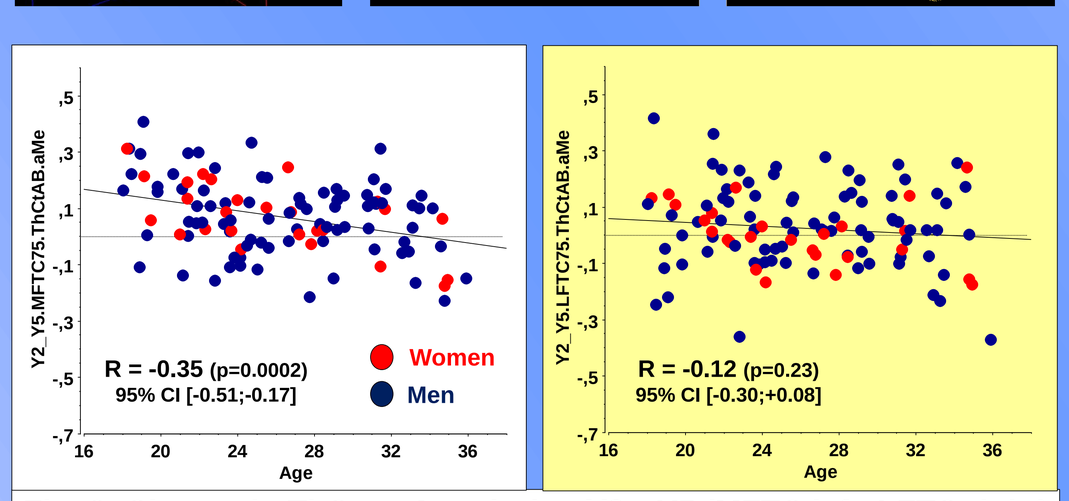


Fig. 2: Change in ThC vs. Age during Y2→Y5 (MFTC left, LFTC right)

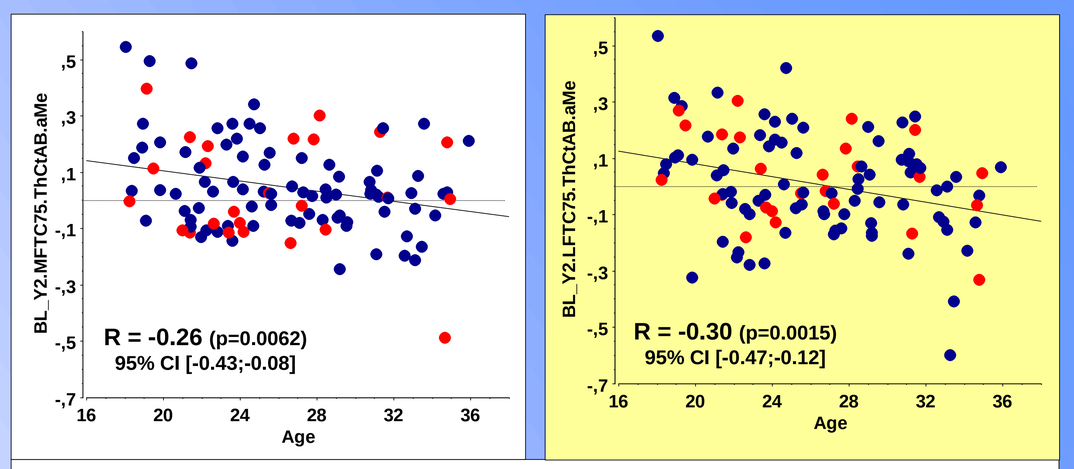


Fig. 3: Change in ThC vs. Age during BL→Y2 (MFTC left, LFTC right)

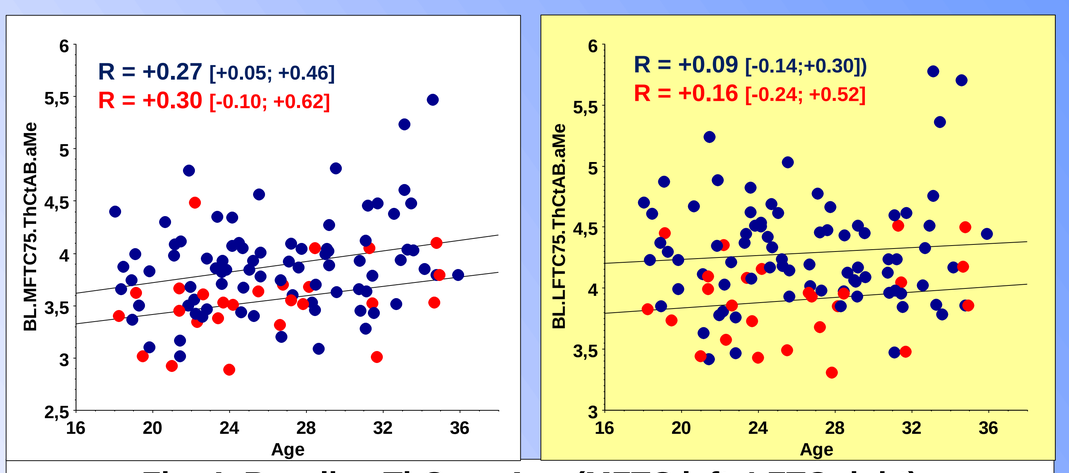


Fig. 4: Baseline ThC vs. Age (MFTC left, LFTC right)

RESULTS

- +1.3% MFTC cartilage thickness increase (ThC↑) during early (BL→Y2) follow-up (FU): (mean±SD [95% CI] =+49±165µm [17, 80]).
- Persistent MFTC ThC↑ (+1.8%) during intermediate (Y2→Y5) FU: +70±130µm [45, 95]).
- No significant difference in Y2→Y5 MFTC ThC↑ (p=0.94) between men (69±134µm; [40, 99]) and women (71±120µm; [23, 120]).
- Significantly (p=0.017) greater MFTC ThC↑ in those younger than group median age (25.6y) (99±137µm [62, 137]) than in those older than 25.6y (40±117µm [7, 72]) for Y2→Y5 (Fig. 2).
- Significant correlation of MFTC ThC↑ with age
  - ✓ R= -0.35 [-0.51,-0.17] for Y2→Y5 (Fig. 2)
  - ✓ R= -0.26 [-0.43,-0.07] for BL→Y2 (Fig. 3)
- No significant LFTC ThC↑ (Fig. 2,3)
- Significant correlation of LFTC ThC↑ with age for BL→Y2, but not for Y2→Y5 (Figs. 2, 3).
- Positive correlation of baseline MFTC ThC with age in men (+0.27 [0.05; 0.46]) and women (+0.30 [-0.10; 0.62]), and less so for LFTC ThC (Fig. 4); annual MFTC ThC↑ from the regression equations = +25µm/y in men and +22µm/y in women (relative to age 18).

➢ CONCLUSIONS

- Age associated with increase in MFTC ThC.
  - ✓ 12% of the Y2→Y5 variability explained.
  - ✓ 19% of the BL→Y5 variability explained.
- (Baseline) cross sectional findings indicate that an increase in MFTC ThC with age may be a physiological event in early adulthood.
- Longitudinal studies in healthy young active adults needed to confirm whether MFTC ThC↑ is a pathological event after ACL tear.

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