

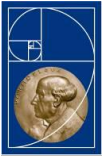
PARACELSUS
MEDIZINISCHE PRIVATUNIVERSITÄT

NanoDiaRA 

Knee Cartilage Thickness Change within 5 Years after an ACL Tear: With and without Reconstructive Surgery

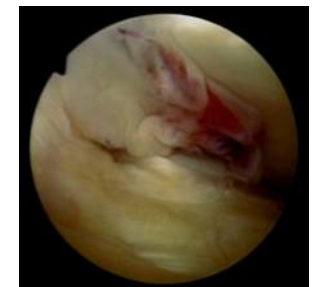
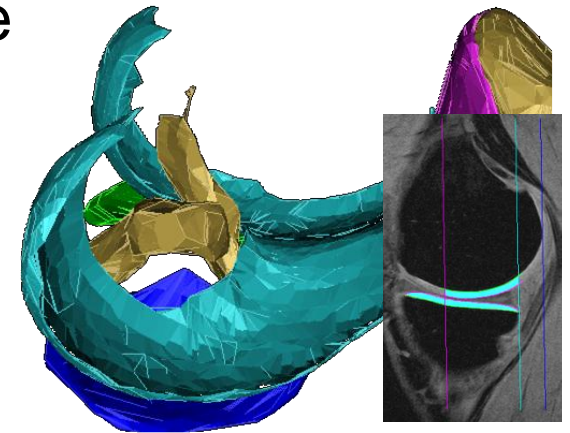
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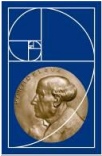
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Background

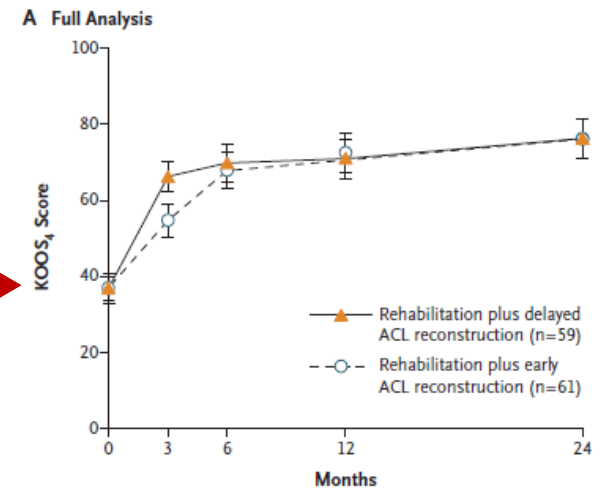
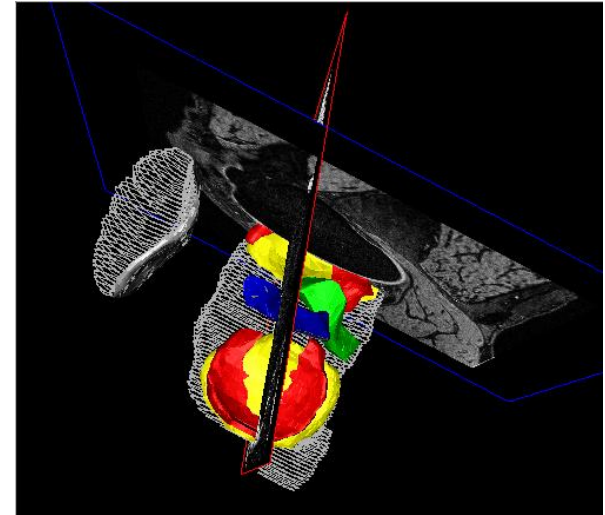
- An ACL tear (ACLT) is a serious and common knee injury.
- It mainly affects young active adults
- In the long term, the risk of OA incidence is increased:
 - » *due to the acute trauma*
 - » *due to chronic unfavorable biomechanical conditions*
- Little is known about the structural changes in cartilage following ACL injury

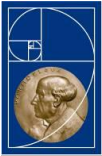




The KANON Study

- 121 young 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. *BMJ* 2013).

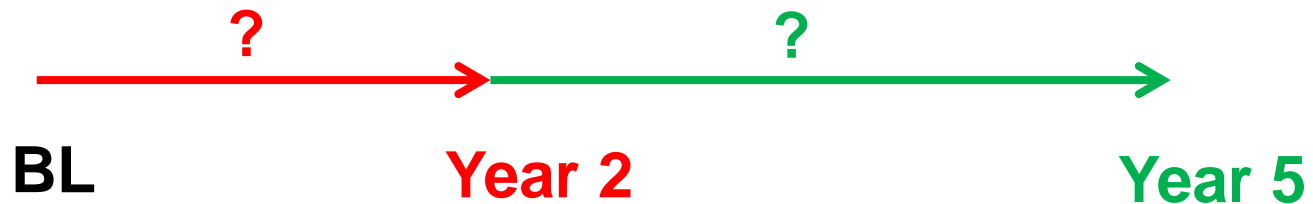
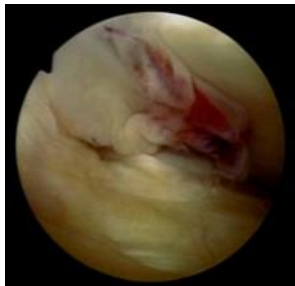
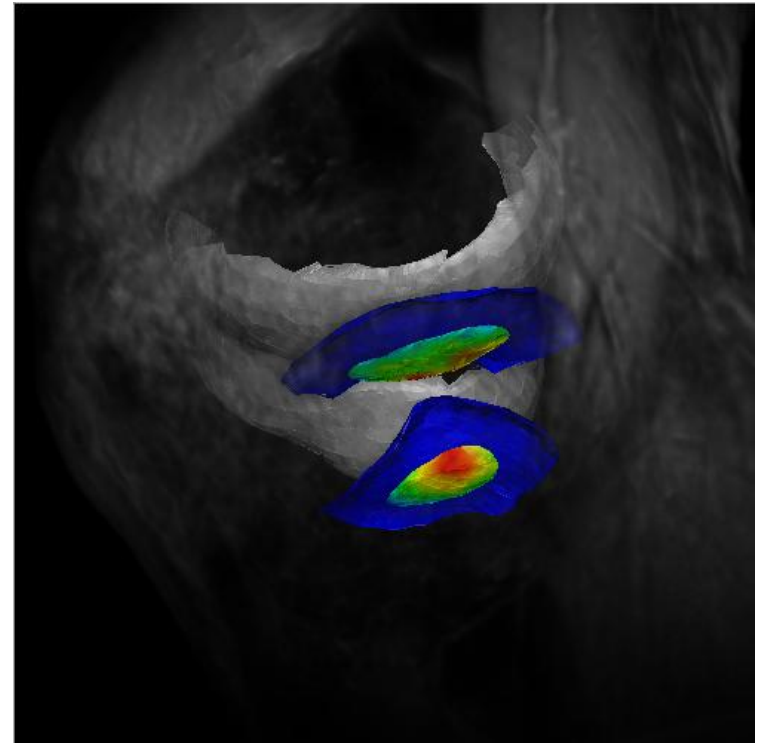


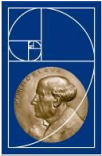


Objective

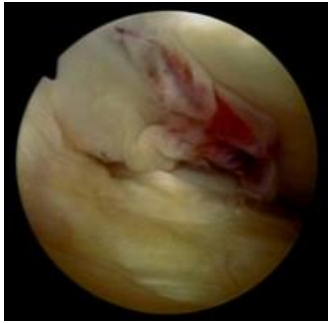
To determine rate of change in (subregional) cartilage thickness after ACL injury:

- in the early phase (BL → 2 y follow up)
- in an intermediate phase (2 → 5 y follow up)
- stratified by treatment group





Study Design



- ✓ 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= 107 (of 121)
subjects with
complete data

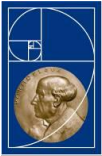


BL
ACL Tear

Year 2

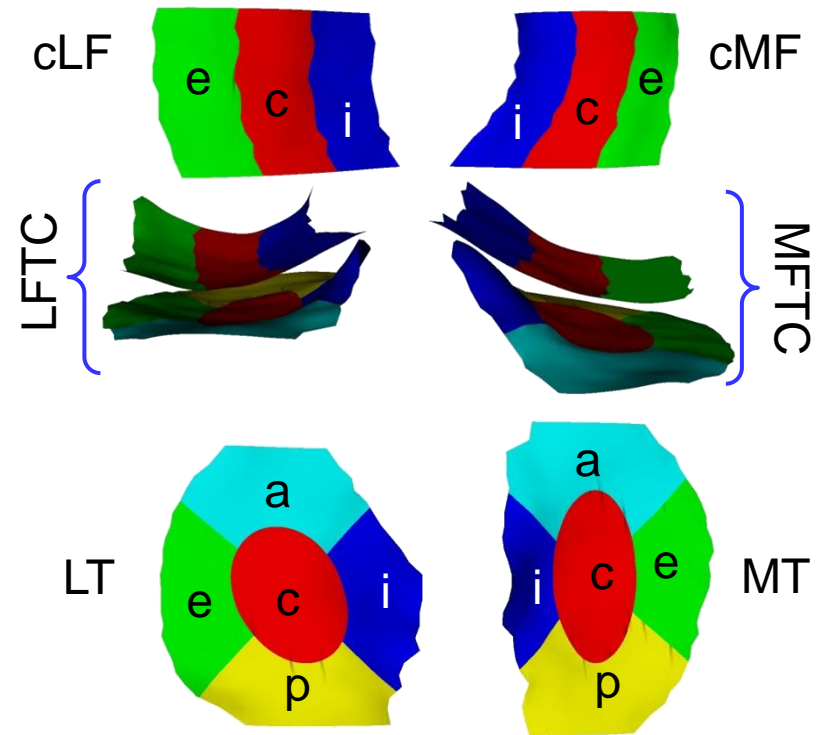
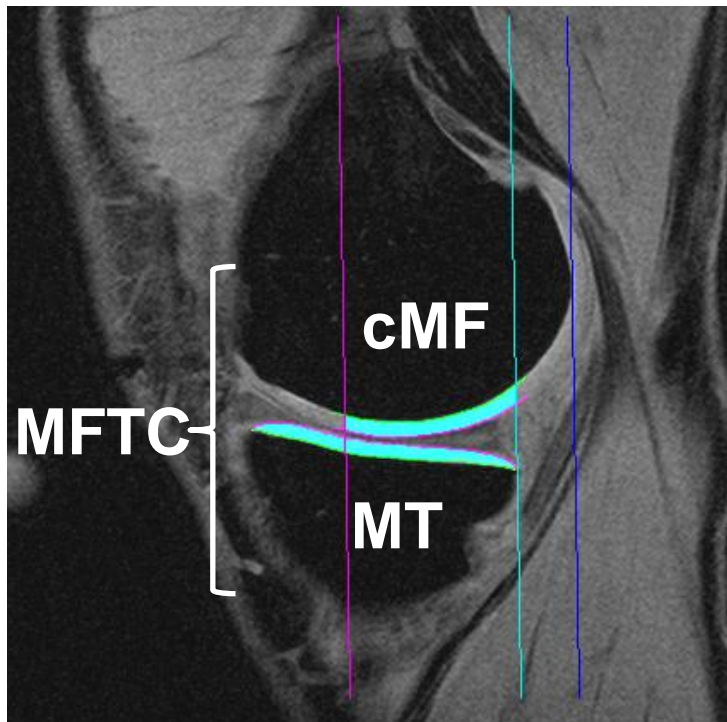
Year 5





Methods

- 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)





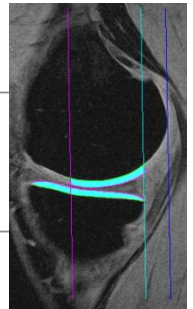
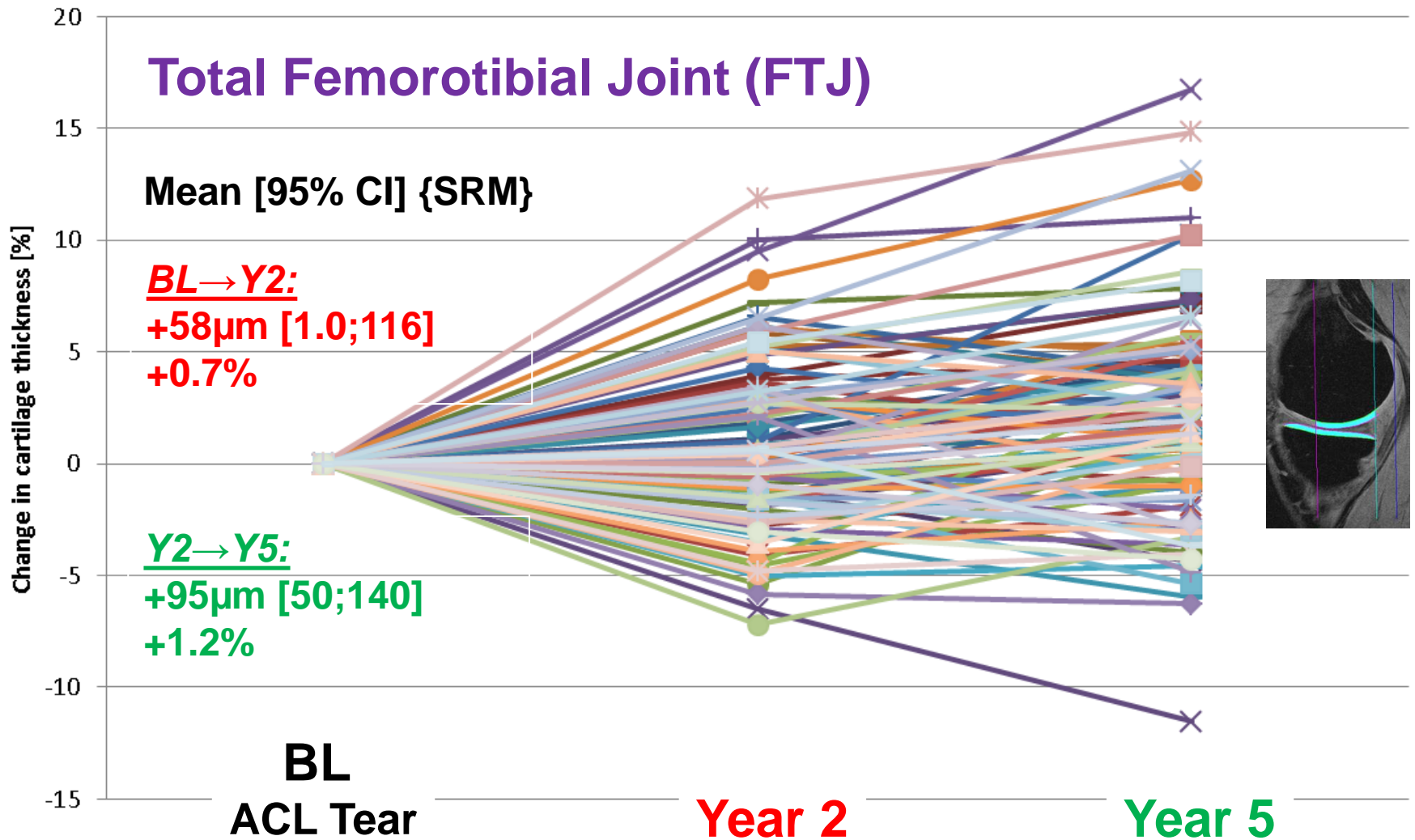
Descriptive Results

Total Femorotibial Joint (FTJ)

Mean [95% CI] {SRM}

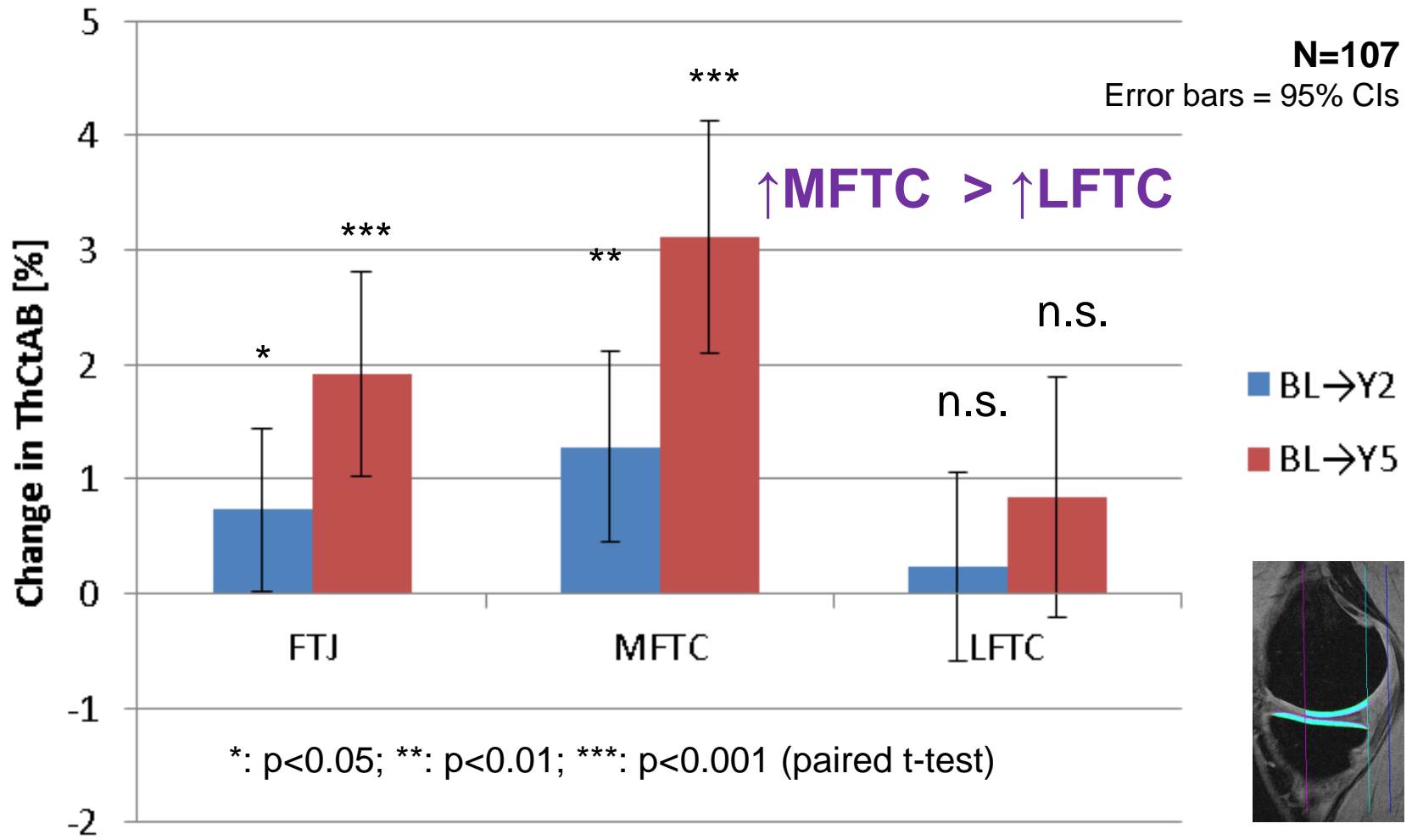
BL→Y2:
+58 μ m [1.0;116]
+0.7%

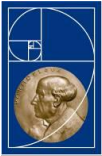
Y2→Y5:
+95 μ m [50;140]
+1.2%





Descriptive Results

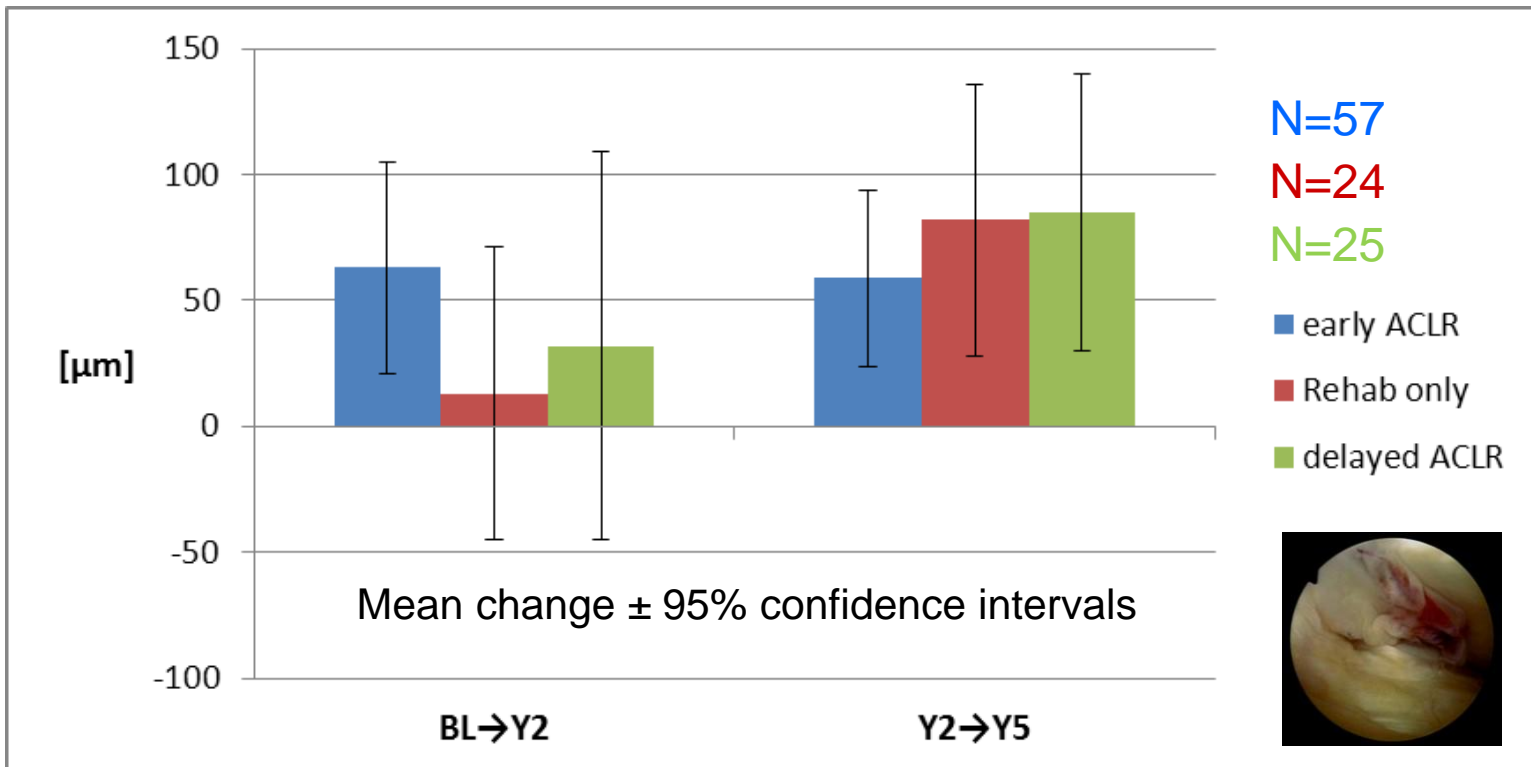


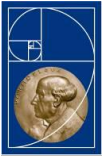


Stratification / Treatment Group (MFTC)

Medial femorotibial compartment (MFTC)

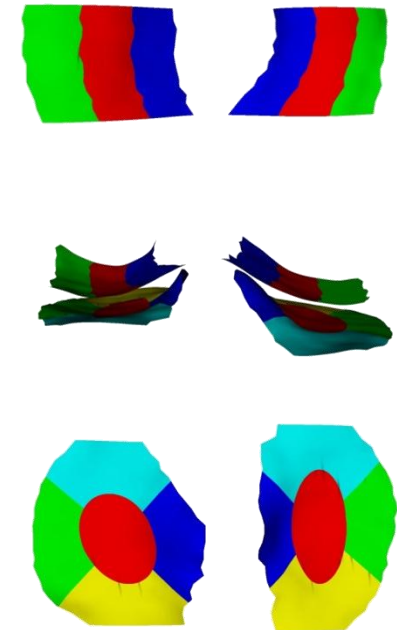
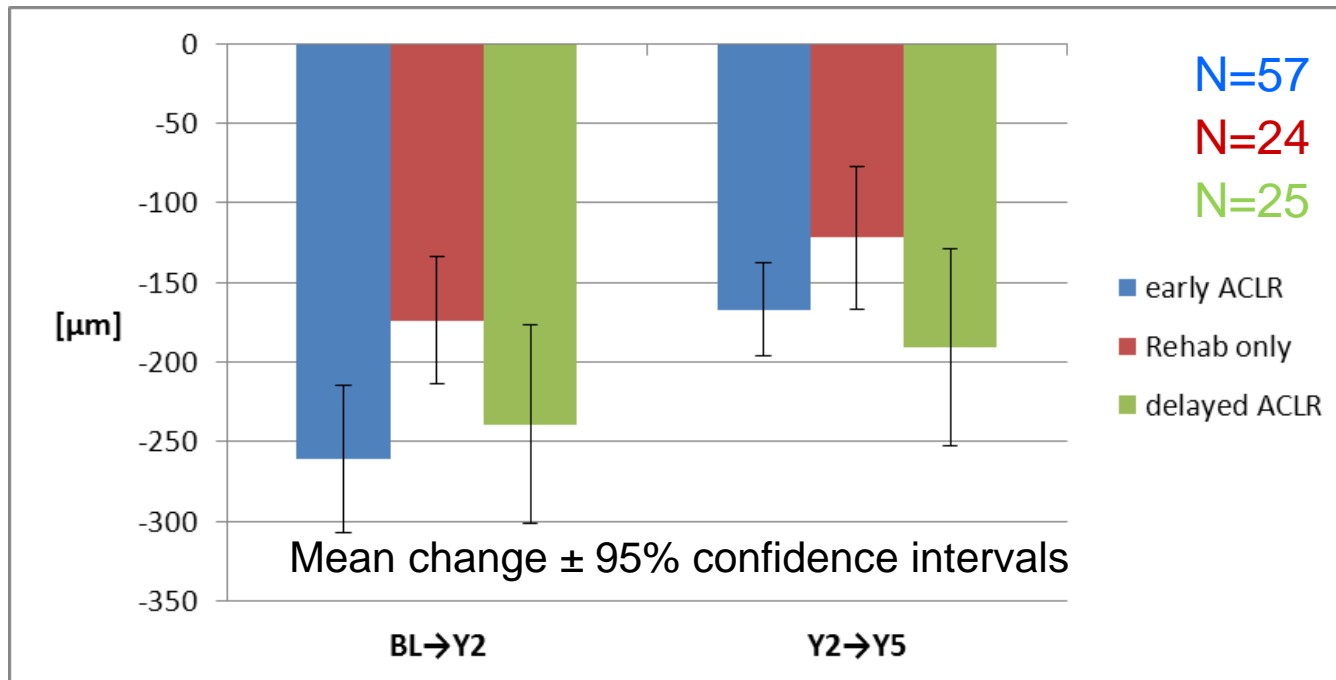
- crude test $p \geq 0.18$ t-test
- adjusted $p \geq 0.16$ ANCOVA adj. for age, sex & BMI

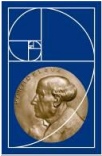




Stratification / Treatment Group (OV1)

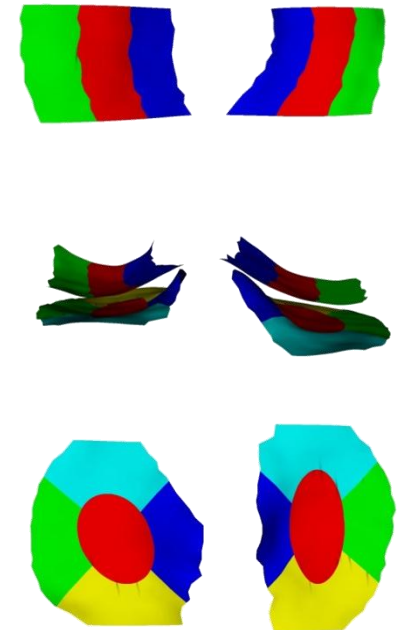
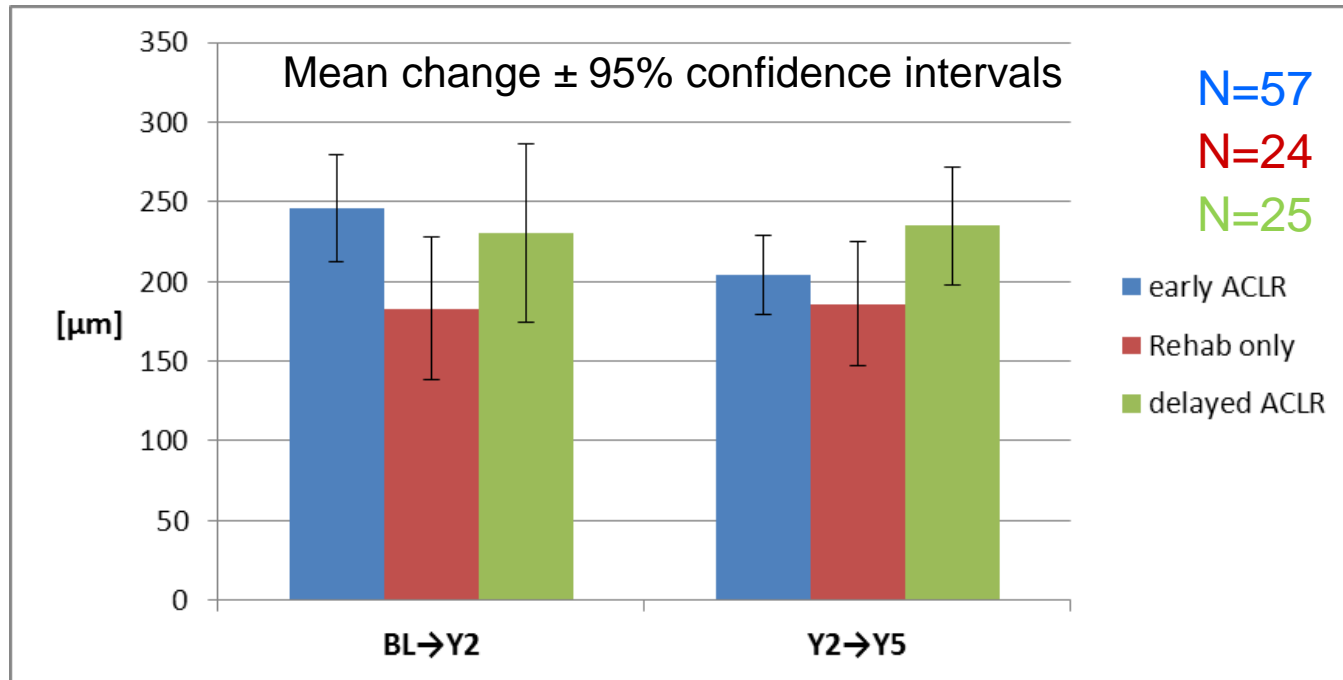
- OV1: Early ACLR >> rehab only / BL → Y2 (crude/adj.p=0.02/0.02)
- OV1: Early ACLR (>) rehab only / Y2 → Y5 (crude/adj.p≥ 0.09/0.14)
- OV 1: Delayed ACLR (>) rehab both periods (crude/adj. p>=0.08/0.09)





Stratification / Treatment Group (OV16)

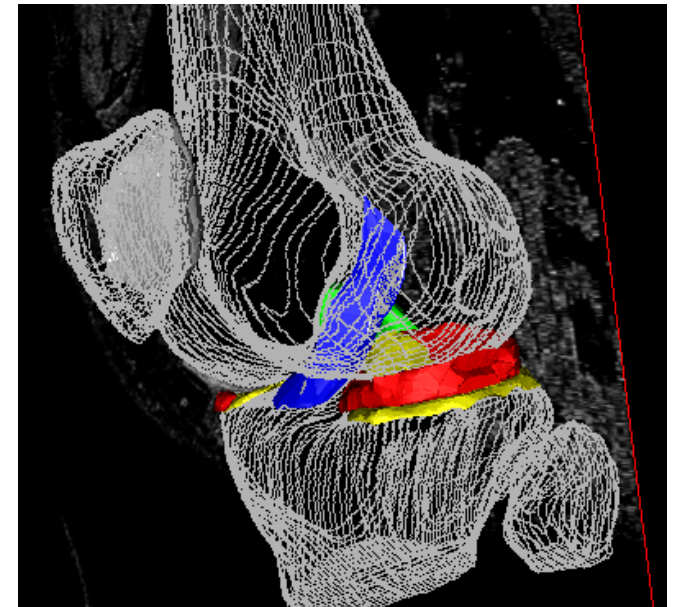
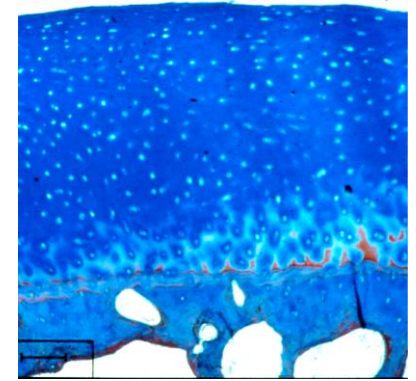
- OV16: Early ACLR >> rehab only / BL → Y2 (crude/adj.p=0.04/0.03)
- OV16: Early ACLR = rehab only / Y2 → Y5
- OV 16: Delayed ACLR > rehab both periods (crude/adj. p>=0.07/0.04)





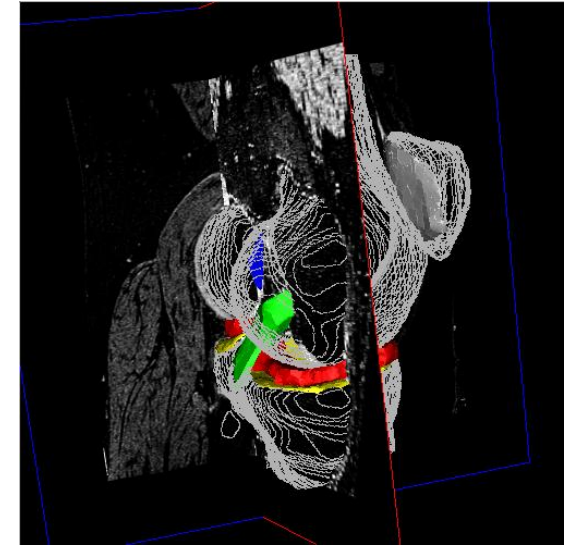
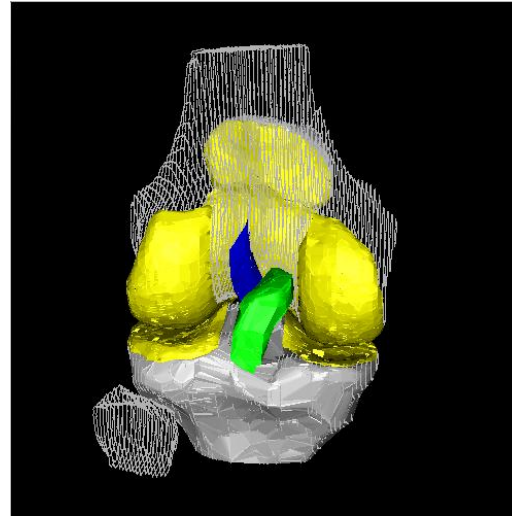
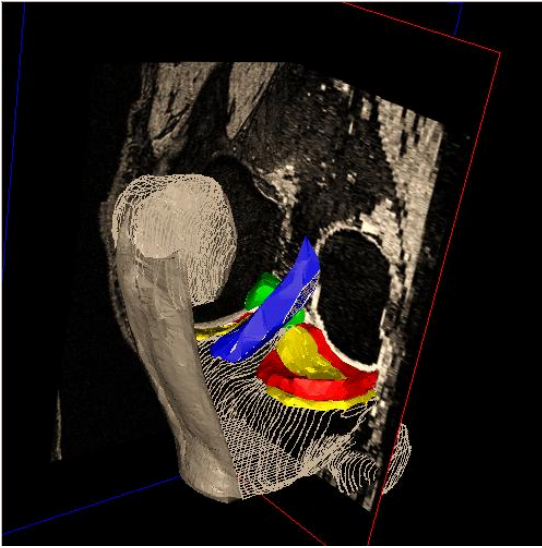
Conclusions & Discussion

- Increase in (MFTC) cartilage thickness observed over early (BL→Y2) and intermediate (Y2→Y5) follow-up
- Reasons for the (MFTC) cartilage thickness may be:
 - Cartilage swelling (early degenerative change)
 - Cartilage hypertrophy (tissue adaptation)
 - Normal growth ? Healthy (young) reference group required!
- Greater magnitude of subregional cartilage loss in knees with early ACLR than in knees Rehab only (BL→Y2)
- Trend less clear @ Y2→Y5
- ACLR surgery may induce acute subregional cartilage thickness loss
- Based on the current data, no clinical or structural benefit of ACLR vs. Rehab only @Y2 or Y5





Acknowledgment



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