

### Effects of Running on Femoral Articular Cartilage Thickness for Anterior Cruciate Ligament Reconstruction Patients and Non-ACLR Control Subjects

AUBREE L. REMMEL, HYUNWOOK LEE†, MINSUB OH†, SEUNGUH HAN†, STEVEN P. ALLEN‡, GARRITT L. PAGE§, DUSTIN A. BRUENING†, ROBERT D. HYLDAHL†, J. TY HOPKINS†, & MATTHEW K. SEELEY, FACSM†

†Department of Exercise Sciences, Brigham Young University Provo, UT, USA;  
‡Department of Electric and Computer Engineering, Brigham Young University, Provo, UT, USA; §Department of Statistics, Brigham Young University, Provo, UT, USA

---

*Category: Undergraduate*

*Advisor / Mentor: Seeley, Matthew K. (matt\_seeley@byu.edu)*

#### ABSTRACT

Anterior cruciate ligament reconstruction (ACLR) patients are more likely to develop posttraumatic knee osteoarthritis than non-ACLR counterparts. The effect of running on femoral articular cartilage thickness is unclear. **PURPOSE:** The purpose of this study was to compare how 30 minutes of running influences femoral articular cartilage thickness for ACLR patients and non-ACLR control subjects. We hypothesized that running would deform the femoral articular cartilage more for the ACLR patients than for the control subjects. **METHODS:** We recruited 20 individuals with primary unilateral ACLR and 20 matched non-ACLR controls. ACLR patients and control subjects were matched based upon age, gender, BMI, and weekly running mileage. The present procedures were approved by the appropriate institutional board and all subjects provided informed consent before data collection. We used ultrasound imaging to measure femoral articular cartilage thickness before and after 30 minutes of running. The ultrasound images were manually analyzed using ImageJ software by the same investigator. Total femoral articular cartilage cross-sectional area of each image was segmented into three regions: medial, lateral, and intercondylar. Deformation due to the run was compared between the ACLR patients and control subjects for each region using independent t tests ( $P < 0.05$ , adjusted for multiple comparisons). **RESULTS:** The 30-minute run resulted in more deformation for the ACLR patients ( $0.03 \pm 0.01$  cm) than the matched controls ( $0.01 \pm 0.01$  cm) for the medial region ( $p < 0.01$ ) of the femoral articular cartilage. Identically, the 30-minute run resulted in more deformation for the ACLR patients ( $0.03 \pm 0.01$  cm) than the matched controls ( $0.01 \pm 0.01$  cm;  $p < 0.01$ ) for an average of the entire articular cartilage area (medial, lateral, and intercondylar). No significant differences existed between groups for the lateral or intercondylar regions. **CONCLUSION:** Thirty minutes of running deformed medial and overall femoral articular cartilage more for ACLR patients than non-ACLR control subjects.