The predictive value of dGEMRIC regarding future knee OA: Long-term assessment after traumatic chondral injury and ACL injury

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Abstract

Background
The monitoring of articular cartilage quality in humans is important to understand the mechanisms of healthy, injured, healing and degenerative processes in vivo. MRI can directly document morphologic changes and radiography can indirectly document cartilage loss, but neither method can quantify cartilage quality. Contrast-enhanced MRI (dGEMRIC) can measure the quality of cartilage by measuring the fixed charge density of the cartilage matrix which corresponds to the concentration of glucosaminoglycans.

Objective and Methods
The objectives (and methods) were to: (a) Establish the reproducibility of the dGEMRIC technique. (b) Study the mid- (dGEMRIC) and long-term (radiography and PROMS) effects on cartilage damage after two types of significant joint trauma; chondral injury on the medial femoral condyle and ACL-injury. (c) Study the predictive value of dGEMRIC regarding long term cartilage degeneration (OA).

Results
#1 We have shown a good inter- and intra-observer reproducibility of the dGEMRIC index of the femoral cartilage.
#2 The dGEMRIC index is lower (decreased cartilage quality) 2 years after ACL injury vs. non-injured knees. Concomitant meniscus injury and overweight were associated with worse cartilage status 2 years after the ACL injury.
#3 A traumatic cartilage injury was associated with a high prevalence of OA after 17 years. A low dGEMRIC index in the repair tissue two years postoperatively indicated fibrocartilage of low quality. A negative correlation between the dGEMRIC index and future OA suggested that the quality of the surrounding cartilage influences the outcome after cartilage repair surgery.
#4 *preliminary* A low dGEMRIC value 2 years after an ACL injury correlates with clinical and radiographic OA in long-term (13 years) follow-up.

Importance
Qualitative non-invasive assessment of cartilage quality is feasible and sensitive. In addition, the cartilage quality assessed with dGEMRIC has a predictive value for future knee OA.
List of papers


#3 Tjornstrand J, Neuman P, Svensson J, Lundin B, Dahlberg LE, Tiderius CJ. Outcome after a surgically treated chondral injury on the medial femoral condyle. Early evaluation with dGEMRIC and 17 year radiographic and clinical follow-up. Acta Orthopedica, Accepted for publication 2018-04-03