

Cartilage Longevity – Predicting Progression by MRI and Biochemistry



Summary

- Fully automatic computer-based MRI markers of quantity and quality combined with a urine marker of collagen type II breakdown.
- Evaluated on 159 subjects (288 knees at baseline, 245 at follow-up after 21 months)
- The aggregate longevity marker provides superior identification of OA progressors.

Background and Methods

During OA, cartilage loss is preceded structural degradation. The alterations in cartilage composition – changes in hydration and proteoglycan distribution and degradation of cartilage type II – are reflected both systemically in urine/serum and in MRI signal intensities. We evaluated the aggregate marker denoted cartilage longevity combining measurements of collagen type II fragments in the serum (uCTX-II) with MRI markers of cartilage volume, area, thickness, curvature, smoothness, and homogeneity. The subjects aged 56 ± 16 years with BMI 26 ± 4 . At baseline the count of knees with KL scores 0-4 were 145, 88, 30, 24, 1. Of the healthy knees, 101 remained healthy and 25 were early progressors at follow-up. In the aggregate marker, MRI scores for left and right knees were averaged into a single subject measurement.

Results

The diagnostic ability of the longevity marker was evaluated as ROC area 0.87 (Figure 1); superior to all other markers ($p < 0.05$). The prognostic ability to separate progressors from non-progressors was also superior for the longevity marker with OR at 20 for the highest quartile (Figure 2, OR given with 95% confidence intervals).

Conclusions

Both diagnostically and prognostically, the aggregate longevity marker was superior to all individual markers. By identifying the group with high risk of progression, study population selection can be designed to ensure progression in the control group and to facilitate a positive study outcome.

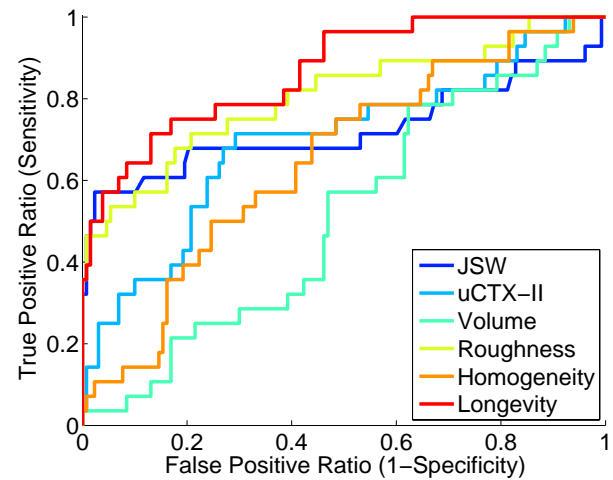


Figure 1

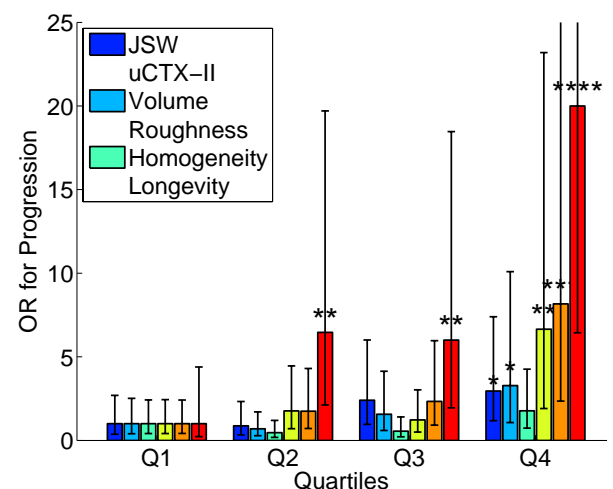


Figure 2

Key Publications

Automatic morphometric cartilage quantification in the medial tibial plateau from MRI for osteoarthritis grading.
Dam EB, Folkesson J, Pettersen PC, Christiansen C.
Osteoarthritis & Cartilage. 2007, 15(7): 808-18.

Cartilage Longevity: A Prognostic OA Biomarker Combining Biochemical and MRI-Based Cartilage Markers (Oral)
OARSI, Fort Lauderdale, 2007
Dam, Loog, Christiansen, Karsdal

Prognostic Osteoarthritis Biomarkers
US Patent 2008