Meniscal measurements of T1rho and T2 at MR imaging in healthy subjects and patients with osteoarthritis.

Abstract:
To prospectively evaluate differences in T1(rho) (T1 relaxation time in the rotating frame) and T2 values in the meniscus at magnetic resonance (MR) imaging in both patients with varying degrees of osteoarthritis (OA) and healthy control subjects. The study was institutional review board approved and HIPAA compliant. Written informed consent was obtained from all subjects. T1(rho) and T2 measurements were performed at 3.0-T MR imaging in 60 subjects deemed to be healthy (n = 23; mean age, 34.1 years +/- 10.0 [standard deviation]; age range, 23-59 years), having mild OA (n = 27; mean age, 52.5 years +/- 10.9; age range, 32-69 years), or having severe OA (n = 10; mean age, 61.6 years +/- 11.6; age range, 50-86 years). Semiautomatic segmentation was performed to generate T1(rho) and T2 maps of the menisci. Clinical findings were assessed by using Western Ontario and McMaster Osteoarthritis (WOMAC) questionnaires. Differences in T1(rho) and T2 values between the three subject groups were calculated by using two-tailed t tests (with P < .05 indicating significance), and receiver operating characteristic analyses were performed. Correlations of meniscal T1(rho) and T2 values with age, cartilage-derived T1(rho) and T2 parameters, and WOMAC scores were calculated. Significant differences between the three subject groups...
were found: Mean T1(rho) values were 14.7 msec +/- 5.5, 16.1 msec +/- 6.6, and 19.3 msec +/- 7.6 for the healthy, mild OA, and severe OA groups, respectively. Mean T2 values were 11.4 msec +/- 3.9, 13.5 msec +/- 4.7, and 16.6 msec +/- 8.2 for the healthy, mild OA, and severe OA groups, respectively. Correlations of meniscal T1(rho) and T2 values with subject age (R(2) = 0.18, for correlation with T2 only), cartilage-derived parameters (R(2) = 0.14-0.29), and WOMAC scores (R(2) = 0.11-0.45) were significant. Meniscal T1(rho) and T2 values correlate with clinical findings of OA and can be used to differentiate healthy subjects from patients with mild or severe OA.