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Autor(en) des Beitrags: Joseph, G B, GB; McCulloch, C E, CE; Nevitt, M C, MC; Heilmeier, U, U; Nardo, L, L; Lynch, J A, JA; Liu, F, F; Baum, T, T; Link, T M, TM


Abstract: 1) To establish a gender- and BMI-specific reference database of cartilage T2 values, and 2) to assess the associations between cartilage T2 values and gender, age, and BMI in knees without radiographic osteoarthritis or MRI-based (WORMS 0/1) evidence of cartilage degeneration. 481 subjects aged 45-65 years with Kellgren-Lawrence Scores 0/1 in the study knee were selected. Baseline morphologic cartilage 3T MRI readings (WORMS scoring) and T2 measurements (resolution = 0.313 mm × 0.446 mm) were performed in the medial and lateral femurs, medial and lateral tibias, and patella compartments. To create a reference database, a logarithmic transformation was applied to the data to obtain the 5th-95th percentile values for T2. Significant differences in mean cartilage T2 values were observed between joint compartments. Although females had slightly higher T2 values than males in a majority of compartments, the differences were only significant in the medial femur (P < 0.0001). A weak positive association was seen between age and T2 in all compartments, most pronounced in the patella (3.27% increase in median T2/10 years, P = 0.009). Significant associations between BMI and T2 were observed, most pronounced in the lateral tibia (5.33% increase in
median T2/5 kg/m(2) increase in BMI, P< 0.0001), and medial tibia (4.81% increase in median T2
/5 kg/m(2) increase in BMI, P< 0.0001). This study established the first reference database of T2
values in a large sample of morphologically normal cartilage plates in knees without radiographic
knee osteoarthritis (OA). While cartilage T2 values were weakly associated with age and gender, they
had the highest correlations with BMI.