

Evaluation of Normal Ankle Cartilage by Magnetic Resonance Imaging (MRI) T1ρ Mapping

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Introduction/Purpose: With the recent remarkable progresses in image diagnosis using magnetic resonance imaging (MRI), it could be possible to evaluate articular cartilage in detail. T1ρ mapping by MRI has recently drawn attention as a noninvasive cartilage evaluation method. While its validity has been proven, there are no reports describing T1ρ mapping for the ankle; therefore, in this present study, T1ρ values of the articular cartilage surfaces of the talar dome were measured in healthy individuals.

Methods: The study sample comprised 10 ankles from 10 healthy volunteers (4 male and 6 female), with a mean age of 32.2 years. Images taken using a 3.0 T MRI device, manufactured by Philips, were processed using the PRIDE software (Philips, Inc.) and analyzed using Image J, a specialized analysis software. Evaluations were performed using slices in the coronal plane from the trochlear ridge of the talus and slices 10 mm anterior and posterior of the ridge. Each slice was divided into three equal parts including the medial, central, and lateral areas of cartilage on the articular surface of the trochlea tali, to totally yield 9 regions of interests where T1ρ values (ms) were measured. Furthermore, values were measured thrice for each region in each volunteer, and the mean was calculated.

Results: T1ρ values for the medial, central, and lateral regions were 31.0 ± 6.4 ms, 31.2 ± 7.2 ms, and 32.2 ± 6.9 ms, respectively for the anterior talus; 24.2 ± 4.2 ms, 21.7 ± 5.6 ms, and 25.1 ± 5.5 ms, respectively for the trochlear ridge of the talus; and 33.8 ± 4.8 ms, 31.9 ± 4.5 ms, and 35.1 ± 4.8 ms, respectively for the posterior talus. T1ρ values were significantly lower in the anterior and posterior areas of the talar dome than in the trochlear ridge of the talus ($p < 0.05$).

Conclusion: Proteoglycan content of articular cartilage in the talar dome was determined to be low in the anterior and posterior areas, that reveals load application might be concentrate on these areas.

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