Tendinopathy of the patellar ligament, known as jumper’s knee, is usually associated with high symptomatic disease burden. Magnetic resonance imaging (MRI) is important to narrow down differential diagnosis of anterior knee pain. However, due to the comparably difficult assessment of the patellar tendon integrity on standard MR sequences by mere visual interpretation, quantitative analysis with novel MR techniques, eg, ultrashort echo time (UTE) relaxometry, may better reflect tendon integrity with information beyond visually perceivable morphologic changes. In addition, relaxometry may help to assess the therapeutic effect of interventions on pathologic tendons and for the development of prognostic imaging biomarkers for, eg, return to play time.

In the article “Tissue-Specific T2* Biomarkers in Patellar Tendinopathy by Subregional Quantification Using 3D Ultrashort Echo Time” published in the Journal of Magnetic Resonance Imaging,1 Breda et al present a novel approach for quantification of patellar tendinopathy (PT) with regard to spatial variations of T2* values. Based on a biexponential fitting model of UTE relaxometry, specific tissue compartments in PT could be identified and quantified, reflecting known differences of free-water distribution between highly organized intact collagen and degenerated disorganized tendon tissue.

The findings are in concordance with a number of publications that have recently focused on the utilization of ultrashort time-to-echo sequences (UTE) in musculoskeletal tasks in general,2–4 and more specifically in quantification of tendinopathies.

Previous studies by Kijowski et al,5 and a very recent publication by Krämer et al,6 demonstrated that utilization of UTE sequences enables PT quantification, when used with bicomponent T2* analysis. Tissue-specific quantification can in general be performed with T1 and T2*, but is inherently challenging due to extremely short transverse relaxation times of tendons and ligaments.

In this study, the authors performed a novel approach, significantly expanding the current body of literature, as very small axial regions/volumes of interest were assessed separately to account for spatial differences in T2*. Using an in-plane-resolution of 0.6 × 0.6 mm and a through-plane thickness of 1.5 mm in order to obtain sufficient signal, the authors were able to provide subregional analysis for 10 consecutive slices of the patellar tendon starting beneath the inferior patellar pole.

The study features a homogeneous, comparably large cohort of young athletes with clinically and sonography-confirmed PT. Furthermore, acquisition of relaxation data, image postprocessing, and data analysis was performed by a single-protocol, scanner and examiner design, accounting for a high degree of experimental setup standardization.

While the current examination protocol (60 minutes!) and postprocessing steps are not yet applicable for clinical settings, the authors showed promising results for future investigations. Almost regardless of the fitting method used (biexponential, monoexponential, and fractional order), the study proved to differentiate between tissue compartments with similar water pools, and to improve T2* quantification in PT patients by subregional analysis. The authors suggest having solved the issue of spatial T2* variation and therefore enabling a better understanding of UTE-specific biomarkers. This might be of importance in future longitudinal investigations, as radiologic biomarkers could serve as surrogates for the subregion-specific content of glycosaminoglycans, which is known to correlate with higher clinical disease burden.7 Future studies might focus on this aspect as well as on protocol adoption for daily clinical routine.

Disclosure
The authors have no conflicts of interest.

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Level of Evidence: 5

Technical Efficacy Stage: 2