Quantitative mapping of T2 using partial spoiling

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Fast quantitative MRI has become an important tool for biochemical characterization of tissue beyond conventional T1, T2, and T2*-weighted imaging. As a result, steady-state free precession (SSFP) techniques have attracted increased interest, and several methods have been developed for rapid quantification of relaxation times using steady-state free precession. In this work, a new and fast approach for T2 mapping is introduced based on partial RF spoiling of nonbalanced steady-state free precession. The new T2 mapping technique is evaluated and optimized from simulations, and in vivo results are presented for human brain at 1.5 T and for human articular cartilage at 3.0 T. The range of T2 for gray and white matter was from 60 msec (for the corpus callosum) to 100 msec (for cortical gray matter). For cartilage, spatial variation in T2 was observed between deep (34 msec) and superficial (48 msec) layers, as well as between tibial (33 msec), femoral, (54 msec) and patellar (43 msec) cartilage. Excellent correspondence between T2 values derived from partially spoiled SSFP scans and the ones found with a reference multicontrast spin-echo technique is observed, corroborating the accuracy of the new method for proper T2 mapping. Finally, the feasibility of a fast high-resolution quantitative partially spoiled SSFP T2 scan is demonstrated at 7.0 T for human patellar cartilage.
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