AbstractID: 1677 Title: Optimization of Spin Lattice Relaxation Mapping Based on Two Points Inversion Recovery

In MRI, spin lattice relaxation time T1 can be measured relatively fast using two-point sampling methods. However, previous approaches of two-point sampling were based on either saturation prepared acquisitions or a combination of saturation and inversion-recovery (IR) prepared acquisitions, which reduces signal dynamic range by a factor of two. The objective of this study was therefore to develop a two-point approach for T1 measurement solely based on IR acquisitions, thus providing the full signal dynamic range. This was accomplished by acquiring three image sets, one set (S1) without IR and two other sets (SIR1 and SIR2) with different IR times TI1 and TI2. By subtracting individually SIR1 and SIR2 from S1, estimations of T1 utilize the full signal dynamic range. Moreover, image acquisition only required a few seconds with echo-planar imaging, compared to several minutes with conventional multipoint methods. Optimal TI1 and TI2 values for measuring T1 were predicted using standard error propagation theory. To demonstrate the utility of the proposed method for T1 measurements of brain tissue, a normal volunteer (39 years old, female) was studied using a 1.5T MRI system. Estimated T1 values of gray matter (GM, T1=1013ms) and white matter (WM, T1=644ms) using this method were similar to previously published results from conventional multipoint IR acquisitions (GM T1=950ms; WM T1=600ms). In conclusion, the proposed method requires only few seconds, yet yields reasonable T1 values, and therefore should be useful in obtaining T1 values of brain tissue in clinical studies.

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