

Publication

One-minute whole-brain magnetization transfer ratio imaging with intrinsic B1-correction

JournalArticle (Originalarbeit in einer wissenschaftlichen Zeitschrift)**ID** 4665168**Author(s)** Afshari, Roya; Santini, Francesco; Heule, Rahel; Meyer, Craig H.; Pfeuffer, Josef; Bieri, Oliver**Author(s) at UniBasel** [Afshari, Roya](#) ; [Bieri, Oliver](#) ; [Santini, Francesco](#) ;**Year** 2020**Title** One-minute whole-brain magnetization transfer ratio imaging with intrinsic B1-correction**Journal** Magnetic Resonance in Medicine**Volume** 85**Number** 5**Pages / Article-Number** 2686-2695

Purpose : Magnetization transfer ratio (MTR) histograms are widely used for the assessment of diffuse pathological changes in the brain. For broad clinical application, MTR scans should not only be fast but confounding factors should be minimized for high reproducibility. To this end, a one-minute whole brain spiral MTR method with intrinsic B₁-field correction is introduced. **Methods :** A spiral multi-slice spoiled gradient echo sequence with adaptable magnetization transfer (MT) saturation pulses (angle b) is proposed. After a low-resolution single-shot spiral readout and a dummy preparation period, high-resolution images are acquired using an interleaved spiral readout. For whole brain MTR imaging, fifty interleaved slices with three different MT contrasts (b = 0°, 350°, 550°) together with an intrinsic B₁-field map are recorded in 58.5s on a clinical 3T system. From the three contrasts, two sets of MTR images are derived and used for subsequent B₁ correction, assuming a linear dependency on b. For validation, a binary spin bath model is used. **Results :** For the proposed B₁-correction scheme, numerical simulations indicate for brain tissue a decrease of about a factor of ten for the B₁-related bias on MTR. As a result, upon B₁-correction, MTR differences in gray and white matter become markedly accentuated and the reproducibility of MTR histograms from scan-rescan experiments is improved. Furthermore, B₁-corrected MTR histograms show a lower variability for age-matched normal appearing brain tissue. **Conclusion :** From its speed and offering intrinsic B₁-correction, the proposed method shows excellent prospects for clinical studies that explore MT-effects based on MTR histogram analysis.

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