Technology Opportunity, Ref. No. UB-24/181

ORACLE: Quantify non-invasively five relevant biomarkers from MRI!

ORACLE is an analytical post-processing framework which uses phase-cycled bSSFP data for robust, quantitative biomarker quantification. The framework quantifies T1 and T2 relaxation times, proton density, proton-density-fractions, and off-resonance Δf simultaneously.

Keywords Quantitative MRI, parametric mapping, biomarker quantification

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Reference Plähn, N. M. J et al. Analytical T1, T2, proton density, and magnetic field inhomogeneity quantification in the brain using phase-cycled bSSFP. ISMRM & ISMRT Annual Meeting & Exhibition 2024

Background Current MRI methods rely on separate scans to quantify T1 and T2 relaxation times, proton-density and Δf. This increases scan-time and hinders co-registration between different biomarker maps, which impedes a direct comparison between different maps.

Invention ORACLE enables the instantaneous generation of high-resolution biomarker maps describing the key MRI parameters T1, T2, proton density, proton-density fraction, and susceptibility (off-resonance effects), providing a comprehensive insight into tissue properties.

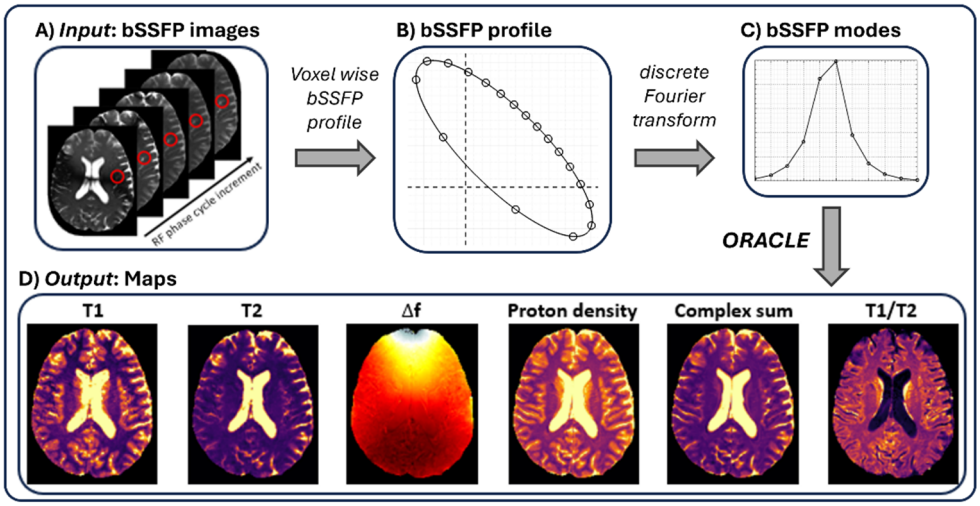

Figure 1
Pipeline of multi-parameter quantification using ORACLE. A) bSSFP images acquired with different RF phase cycle increments are used as an input. B) A voxel-wise bSSFP profile is generated. C) A discrete Fourier transformation generates bSSFP modes. D) Repeat A-C) and apply ORACLE to obtain quantitative maps (e.g. quantitative maps in the brain at 3T).

Application The ORACLE framework will advance MRI diagnostic imaging, because it offers an integrated suite of tools designed for tissue characterization with great promise to improve the detection and analysis of tumor, lesions, MS, microbleeds, NAFLD, demyelination and cancer based on a single scan. Hence, those diseases and pathologies can be studied from different perspectives and localization of abnormalities are directly comparable between all biomarker maps.

Patent Status Priority Patent Application filed

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