

Fast Macromolecular Proton Fraction Mapping for Quantitative Brain Assessment

A novel method for rapid and accurate mapping of macromolecular proton fraction (MPF) from magnetic resonance images (MRIs), enhancing diagnostic and disease monitoring capabilities for neurological conditions.

What is the Problem?

Accurate and efficient brain imaging is crucial for diagnosing and monitoring neurological conditions such as multiple sclerosis. Macromolecular proton fraction (MPF) is a key measure in magnetic resonance imaging (MRI) that determines cross-relaxation between water and macromolecules in tissues. MPF can be used to quantify the level of myelination in neural tissues and can also help to assess fibrosis in non-neural tissues. Traditional methods for mapping MPF are time-consuming and often require multiple measurements, which can be impractical in clinical settings. There is a need for a faster, more reliable method to obtain these clinical and pre-clinical imaging metrics.

What is the Solution?

This technology introduces a method for fast quantitative mapping of MPF using a single off-resonance magnetization transfer measurement. The MPF maps are reconstructed through an algorithm comprising iterative solution of the matrix pulsed magnetization transfer equation and enabling high accuracy and reliability across a variety of clinical and pre-clinical MRI platforms. By utilizing a single source image with off-resonance saturation, this method reduces the total acquisition time to approximately 3 minutes for whole-brain coverage and clinically reasonable spatial resolution (1.5 mm).

What is the Competitive Advantage?

Efficiency: Reduces imaging time to about 3 minutes, making it feasible for routine clinical use.

Accuracy: Provides strong agreement with conventional multiparameter methods, with no significant bias.

Precision: Enables acquisition of highly reproducible MPF maps using various types of MRI equipment with less than 2% relative errors.

Simplicity: Substantially simplifies the imaging procedure and enables straightforward implementation for any clinical MRI machine.

Technology ID

BDP 7508

Category

Device/Imaging
Selection of Available
Technologies

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Validation: Provides close agreement between MPF maps and myelin histology in the normal brain and various disease models, as evidenced by multiple animal studies.

Patent Information:

[US10617343B2](#)

References

1. Yarnykh V. L.(2012) , <https://pmc.ncbi.nlm.nih.gov/articles/PMC3311766/>,
<https://onlinelibrary.wiley.com/journal/15222594>, 68, 166-178