

# 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

#### **Authors**

Vasily Yarnykh

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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