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Time Efficient Arterial Spin Labeling Imaging with Segmented Multiband-acquisition (20150097, Dr. Greg Metzger)

Technology No. 20150097

IP Status: Issued US Patent; **Application #:** 14/994,251

High-Resolution, Whole Brain Perfusion Imaging

Multi-band echo planar imaging (MB-EPI), a new approach to increase data acquisition efficiency and/or temporal resolution, can potentially overcome critical limitations of standard acquisition strategies for obtaining high-resolution, whole brain perfusion imaging using arterial spin labeling. While multiband may also introduce certain confounding effects, recent studies reveal that the amplified noise (given by the geometry factor, or g-factor) and the leakage contamination (assessed by the total leakage factor) have minimal impact on cerebral blood flow estimation. The studies demonstrated that compared to SB-EPI, MB-EPI improves high-resolution, whole brain pCASL perfusion imaging in terms of improved spatial and temporal signal-to-noise ratio efficiency. Furthermore, it increases compliance with commonly used single blood compartment models, resulting in improved cerebral blood flow estimates.

Overcomes Traditional MB-EPI Limitations , Improves SNR Efficiencies

This MB-EPI arterial spin labeling imaging acquisition strategy overcomes limitations of traditional MB-EPI for pCASL and further improves SNR efficiencies of MB-EPI arterial spin labeling imaging. Compared to single MB-EPI acquisition for whole brain imaging, this approach can provide extra benefits for arterial spin labeling imaging by:

1. further boosting spatial and temporal perfusion SNR efficiencies,
2. reducing imaging time, and/or
3. eliminating (or further minimizing) leakage contamination levels, therefore increasing temporal SNR efficiency.

The most significant difference is that segmented MB readouts will be applied for arterial spin labeling imaging for the inferior, middle and superior brain regions, instead of a single MB

readout.

BENEFITS AND FEATURES:

- Minimal impact on cerebral blood flow estimation
- Improved spatial and temporal signal-to-noise ratio efficiency
- Increases data acquisition efficiency and/or temporal resolution
- High-resolution whole brain pCASL perfusion imaging
- Improved cerebral blood flow estimates
- MB readouts applied for arterial spin labeling imaging for inferior, middle and superior brain regions

APPLICATIONS:

- Brain imaging
- High-resolution whole brain pCASL perfusion imaging
- spin labeling imaging methods (e.g., FAIR and VS-ASL)
- Neuroscience research
- Clinical applications

Phase of Development - Prototype developed

Researchers

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Publications

Theoretical and experimental evaluation of multi-band EPI for high-resolution whole brain pCASL Imaging
NeuroImage, Volume 106, 1 February 2015, Pages 170-181

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