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Black-Blood T1 Myocardial Mapping to Remove Partial Voluming Effects

IP Status: Issued US Patent; **Application #:** 15/695,259

Improved Quantitative Myocardial Tissue Characterization

A magnetic resonance imaging (MRI) sequence, which allows for complete blood suppression during quantitative imaging, can improve the robustness of quantitative myocardial tissue characterization. The technique, which can be used in commercially available MRI scanners with no additional hardware, improves diagnostic capabilities by suppressing blood signals from quantitative maps. The technique helps reduce partial voluming effects at the myocardium-blood interface and enables robust quantification of myocardial tissue characteristics—independent of myocardial thickness or slice orientation. The sequence may be used for quantitative assessment of the endocardial myocardium, a typical scar area in left ventricular hypertrophy. Eliminating partial voluming further reduces false positives in patients with reduced myocardial wall thickness or young healthy subjects, who commonly have thin myocardial walls.

Blood Signal Supression

Quantitative myocardial tissue characterization is a newer yet crucial technology in cardiac MRI. It provides quantitative insights in myocardial tissue composition in numerous cardiac diseases. The technique provides greater diagnostic and prognostic capabilities, with greater repeatability, and has shown clinical value in diagnosing numerous cardiomyopathies. However, the high signal from blood pools adjacent to the myocardium corrupts these measurements due to partial voluming effects, and this corruption requires careful expert evaluation of the maps to read the results. In addition, partial-voluming effects restricts the tool's applicability to the mid-myocardium and reduces its applicability to subjects with thin myocardia. This newly-developed black-blood quantitative imaging sequence, when applied to myocardial T_1 mapping, completely suppresses the blood signal and therefore improves quantitative characterization of the heart. Furthermore, the results show improved inter- and intra-observer reproducibility for data analysis.

BENEFITS AND FEATURES:

- Improves robustness of myocardial tissue characterization
- Reduces false positives
- Used with commercially available MRI scanners
- No additional MRI hardware necessary: upgrade distributed with regular vendor software or sequence update routines
- Advantageous in subjects with myocardial thinning and/or mid-myocardium

APPLICATIONS:

Technology ID
20160395

Category
Engineering & Physical Sciences/MRI & Spectroscopy
Life Sciences/Biomarkers
Life Sciences/Diagnostics & Imaging
Life Sciences/Human Health
Life Sciences/MRI & Spectroscopy
Agriculture & Veterinary/Veterinary Medicine

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- Myocardial tissue characterization
- Conventional MRI scanners
- Diseases such as aortic valve disease and hyperintensive heart disease nonischemic cardiomyopathies (hypertrophic, dilated and restrictive) and diabetes cardiac amyloidosis myocardial infarction

Phase of Development - Pilot scale demonstration. Have published results on eight healthy volunteers.

Researchers

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Publications

Black-blood native T1 mapping: Blood signal suppression for reduced partial voluming in the myocardium
Magnetic Resonance in Medicine, 16 September 2016