

MRI Pre-Scan Method for Imaging Metallic Devices

IP Status: Pending US Patent; **Application #:** 16/364,382

Measures RF induced currents on metallic leads

A new pre-scan method can measure radio-frequency (RF) induced currents flowing on metallic leads during an MRI excitation. The method first acquires low-power images around a metallic lead (including those used for Deep Brain Stimulation, or DBS) using conventional Gradient Echo Sequence (GRE) accelerated by parallel acquisition (i.e., GRAPPA). Then it analyzes the images and quantifies the magnitude and phase of the RF induced current. To do so, it uses the relative location of the B1+ null with respect to the lead position in axial images. Finally, it models/matches the null location at the vicinity of the lead. The calculated induced current is patient and lead location specific. The measurement can be used to predict safe excitation scenarios, reduce heating around the lead and may also significantly improve image quality.

Accurate and more time efficient

For patients with implanted devices, MRI scans can induce radio-frequency (RF) currents on implanted metallic leads which may critically increase the temperature at the lead tip and impact image quality. Current methods to address these issues include MR-compatible lead designs and MR excitation methods that minimize risk of heating. When combined with a variety of MR sequences, the method can improve the image quality and patient safety in clinical scenarios. The new method is not model based but is achieved *in vivo* for each particular patient and lead location. In addition, it can be used to calculate worst-case scenarios for lead heating, and replace the need to take temperature measurements.

Phase of Development

- Simulations and *in vitro* (cadaver) testing.

Benefits

- Patient and lead specific
- Predicts safe MR excitation scenarios
- Reduces heating around the lead
- May significantly improve image quality

Features

- Pre-scan method
- Measures RF induced currents flowing on metallic leads
- Quantifies magnitude and phase of the RF induced current
- Can be used with Deep Brain Stimulation (DBS) implants

Applications

Technology ID

20180223

Category

Engineering & Physical Sciences/Instrumentation, Sensors & Controls
Engineering & Physical Sciences/MRI & Spectroscopy
Life Sciences/Diagnostics & Imaging
Life Sciences/MRI & Spectroscopy
Software & IT/Algorithms

[View online](#)



- Deep Brain Stimulation (DBS)
- Metallic brain implants
- Replace lead temperature progression measurement studies
- Testing MR compatibility of implant leads
- Predicting safe excitation scenarios

"Researchers

Yigitcan Eryaman, PhD

Research Associate, Radiology

[External Link](#) (www.cmrr.umn.edu)

Gregor Adriany, PhD

Associate Professor, Radiology

[External Link](#) (www.radiology.umn.edu)

Noam Harel, PhD

Professor, Radiology

[External Link](#) (www.med.umn.edu)

Gregory F. Molnar, PhD

Associate Professor, Neurology

[External Link](#) (nmrc.umn.edu)

Publications

[A simple geometric analysis method for measuring and mitigating RF induced currents on](#)

[Deep Brain Stimulation leads by multichannel transmission/reception](#)

NeuroImage, 2019 Jan 1;184:658-668

Interested in Licensing?

The University relies on industry partners to further develop and ultimately commercialize this technology. The license is for the sale, manufacture or use of products claimed by the patents. Please contact us to share your business needs and licensing and technical interests in this technology.