

Policy: 1.5T and 3T Magnetic Resonance Imaging for Quality Assurance and Technical Development

Objectives

Formalize MR acquisition testing and quality control using recruited volunteers for subsequent use in routine clinical MRI settings.

Introduction and Background

Magnetic resonance imaging (MRI) has evolved into a lasting cornerstone of the Department of Radiology and Imaging Sciences at Emory University. Due to its versatility and complexity, there is continuous activity on optimizing new acquisition techniques, while simultaneously addressing existing quality assurance issues during day-to-day operations. In a standard clinical setting, both existing and new pulse sequences are sensitive to a variety of image artifacts, and must be monitored and diagnosed routinely. Therefore, MR protocols and sequences require periodic quality assurance and optimization by MR scientists in order to maintain the highest diagnostic performance. Often, simple image quality issues can be resolved through known system parameter adjustments without test scans, whereas other pulse sequence adjustments may require imaging with a dedicated MRI “phantom”, which is an inanimate object (such as a fluid-filled plastic cylinder) with specific MR-sensitive properties.

However, not all development and quality assurance issues can be addressed using MR phantoms. Often, they do not contain the multitude of biological and physiological properties needed to simulate human imaging scenarios that account for tissue, flow, diffusion, and geometric differences. For a more robust analysis of these effects, therefore, carefully conducted MR sequence optimization processes should include imaging analysis on normal volunteers. These dedicated MR imaging sessions with volunteers will allow the precise implementation of data-driven results, which will be documented for each tested pulse sequence. In order to advance MR technology and provide high-level quality control services to radiologists and clinicians, formal acquisition testing and trouble-shooting is necessary using human volunteers.

Scope

Through specific quality improvement requests from radiologists, clinicians, and imaging scientists, we will recruit healthy volunteers, as necessary, for MRI sequence optimization at 1.5T or 3T, and create a knowledge database of results for current clinical implementation and future reference.

The following restrictions will apply to all MRI volunteer sessions:

1. Limit of 1 hour total exam time
2. Sessions will not interfere with normal MR schedule
3. Only specific MRI specialists indicated on this policy will conduct volunteer scanning
4. No gadolinium contrast administered
5. Data will not be used for research purposes
6. Volunteer selection will adhere to exclusion criteria (see below)
7. Volunteer will change into MR-safe clothing

8. Pre-screening will be conducted using MR patient screening forms
9. ***Limit individual volunteer participation to once a month***

Participant Recruitment & Selection

Volunteers will be selected through advertisements to generate a pool of potential volunteers to be called when needed. A person within the department will be identified to maintain volunteer contact information and coordinate the scheduling via email.

Exclusion Criteria

- Subjects <18 years old
- Inability to provide verbal and/or written consent
- Claustrophobia
- Pregnancy
- Other MR contraindications, as outlined by the MR screening form
- ***Employees and student volunteers must not be under direct supervision of the recruiting individual***

Data Handling and Adverse Event Reporting

No PHI will be obtained or recorded at the time of imaging. All MR volunteer sessions will be conducted using anonymous identifiers for name and date-of-birth. All imaging data will be exported and archived offline on password-protected workstations, where other data analysis tasks will be performed. All written documentation, such as screening forms, from the sessions will also be kept secure (i.e., locked file cabinet). Anonymous images and analysis results may be shared with the collaborative radiologists or imaging scientists via secured network transfer or portable hardware devices. In the event of an unexpected finding on the images, the volunteer would be contacted by that radiologist, appropriate recommendations for follow-up made, and this communication documented in the volunteer's file within 24 hours of the scanning session. All documentation will be maintained for a minimum of two years.

Funding

At this time, no funds have been allocated to compensate the volunteers.

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