



Scope for the provision of MR Physics support

MR plays an important and expanding role in diagnostic healthcare. Clinical Scientists with their unique combination of scientific expertise and awareness of clinical requirements can provide the MR physics support that is crucial to the development of new and existing MR techniques in an effective, safe and time-efficient manner. This document summarises the various services that can be provided by the MR Physics group at Guy's & St Thomas' NHS Foundation Trust as part of a service level agreement to external sites.

MR safety

We are able to provide a role of MR Safety Advisor, as recommended by the MHRA, covering advice on the appointment and training requirements of Responsible Persons and Authorised Persons. If required, we can provide appropriate MR safety training to different staff groups.

We can support the production and development of MR Local Rules to ensure and maintain safe working practices.

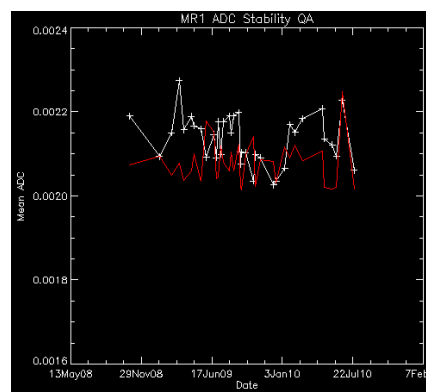
Many implanted medical devices continue to lack clear instructions about the safety of patients undergoing an MRI scan. We are able to provide *ad hoc* safety advice for such cases and aim to provide an email response within 1 working day.

We have extensive experience in performing MR safety audits and can carry out risk assessments as required. We can assess occupational exposure to acoustic noise and electromagnetic radiation.

MR quality assurance

We can help to set up routine QA protocols for local staff to perform, providing early identification of hardware failures, e.g. faulty coil elements, and a reproducibility assessment of quantitative MR measurements, e.g. apparent diffusion coefficient (ADC), T1 and T2 values, and MR spectroscopy. We are able to analyse repeat QA data and provide periodic reports on the reproducibility of these parameters to fully inform any clinical service utilising such quantitative MR measurements.

We can also provide an annual QA visit to repeat key acceptance testing measurements to meet the requirements of the NHS Breast Screening Programme for MRI screening of high-risk women or as part of a general assessment. We can additionally perform an audit of QA documentation.

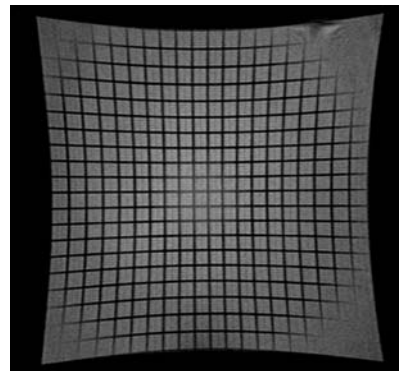


RF cage checks

We are able to offer measurements of RF attenuation for MRI scanning rooms, typically with the magnet on field, avoiding the significant costs and system downtime associated with ramping down the magnet.

Geometrical distortion measurements

We can make a detailed assessment of the system-based distortions of an MR scanner to assist with the use of MRI for surgical, radiotherapy treatment and biopsy planning purposes.

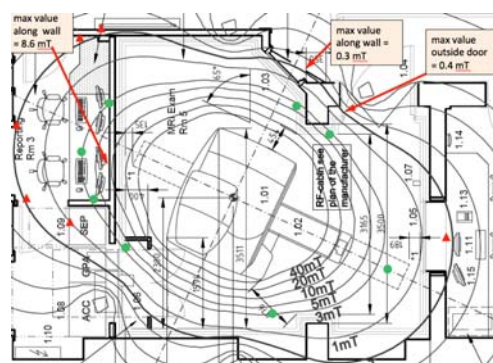


MR system purchasing & site planning

We can offer advice and support to sites on the procurement of MRI systems and system upgrades. As an independent group with experience of all the major MRI systems and an understanding of technical details, we can work with staff to help identify and prioritise spending options to ensure sound purchasing decisions that best meet local needs. We can advise on site planning from the outset, focusing on MR safety and MRI vendor requirements.

MR acceptance testing

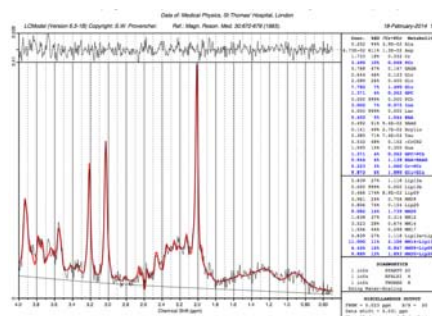
We offer acceptance testing of all MRI systems on site using appropriate test phantoms and analysis software, including MR safety assessment incorporating environmental field strength mapping and a safety audit incorporated into a final report.



MR protocols and advanced techniques

We can provide physics support to review existing clinical protocols, using our knowledge and understanding of the latest developments and evidence base to highlight areas that have potential for improvement, in terms of quality and/or time efficiency. We can create or recommend modified sequences to allow local sites to perform comparisons with existing protocols as part of a systematic programme of protocol development and optimisation.

Finally, we offer support for sites wishing to set up new MR services incorporating advanced MR techniques, such as MR-guided breast biopsies, cardiac MRI, MR spectroscopy, and functional MRI.



Teaching

The MR Physics group has a wealth of teaching experience, contributing to several graduate and postgraduate courses as well as BAMRR and BIR study days and other national and international meetings, covering the basic concepts of MR to advanced cutting-edge techniques and clinical applications. Teaching sessions can be provided covering general or specific aspects of MR physics as required.

The Team

The MR Physics group at Guy's & St Thomas' has been established since 1986. During this time we have built up experience on GE, Philips and Siemens MRI systems. We have made a significant contribution to several national and European guidelines relevant to clinical MRI, including

- MHRA Safety Guidelines for Magnetic Resonance Imaging Equipment in Clinical Use
- Institute of Physics & Engineering in Medicine (IPEM) Policy Statement on Scientific safety advice to Magnetic Resonance Imaging Units that undertake human Imaging
- Update to IPEM report 80 on Quality Assurance in MRI
- NHS Breast Screening Programme MRI Quality Assurance guidance to fulfill the requirements of report 68, Technical Guidelines for Magnetic Resonance Imaging for the Surveillance of Women at Higher Risk of Developing Breast Cancer
- Hand J, Bosmans H, Caruana C, Keevil S, Norris DG, Padovani, R and Speck O (2013) The European Federation of Organisations for Medical Physics Policy Statement No 14: The role of the Medical Physicist in the management of safety within the magnetic resonance imaging environment: EFOMP recommendations. *Physica Medica* 29 122-125.

As such, we have a comprehensive understanding of the various safety and quality issues associated with clinical MR. Using this, we are well placed to advise MR units who wish to establish and maintain local practices that meet the current range of published guidelines and recommendations.