



## Day 4

### Contemporary practice and evidence in changes in safety in MRI

Imaging plays a central role in modern healthcare (1). There is increasing Radiology activity which is driven by new and emerging technologies, the changing needs of an ageing population and a drive towards seven day working. Since the introduction of MRI as a diagnostic technique the number of people exposed to Electromagnetic Fields has dramatically increased. A study in an acute London hospital showed that over a six-year period (2010-2016) MRI demand increased by 72% (3). With the increased use of clinical MRI and advances in areas such as equipment and implant technology there is an obvious need to ensure that safety is reviewed, and guidelines are updated. The American College of Radiography acknowledged in 2013 the need to continually review both the potential risks in the MR environment and reported adverse effects, so that guidance can be adjusted accordingly as the MR industry changes (2).

As part of MRI Safety week we have chosen some of the areas where review and research have led to changes in safety which have impacted on contemporary practice in MRI.

## Pacemakers/MRI in pregnancy/Heart valves/Cochlear implants

Scanning patients with pacemakers, scanning female patients during the first trimester of pregnancy, and patients with artificial heart valves and cochlear implants were all previously an absolute contraindication for MRI.

Current guidance:

MHRALink

[https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/476931/MRI\\_guidance\\_2015\\_-\\_4-02d1.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/476931/MRI_guidance_2015_-_4-02d1.pdf)

Cochlear implants section 4.11.1.5

Pacemakers section 4.11.1.1

Heart valves section 4.11.2.2

*SoR safety publication 'Safety in Magnetic Resonance Imaging'* <https://www.sor.org/learning/document-library/safety-magnetic-resonance-imaging-2>

MRI Safety.com Sherlock link : pregnancy in MRI

[http://www.mrisafety.com/SafetyInformation\\_view.php?editid1=195](http://www.mrisafety.com/SafetyInformation_view.php?editid1=195)

Article : *Magnetic Resonance Imaging is a safe technique in patients with prosthetic heart valves and coronary stents*

<https://www.sciencedirect.com/science/article/pii/S110996661730475X>

This website has extensive information and links on scanning cardiac implants and Non-MRI Conditional pacemakers. It also has SOPs and other interesting links

[mrimypacemaker.com](http://mrimypacemaker.com)

## 'Off label'

'Off label' scanning is a term that has only been recently used in the MRI community. This process is followed when it has not been possible to check implant or device safety for one or more reasons, but where MRI has been indicated as clinically valuable for the patient.

MHRA guidance - section 4.11.4 'Scanning patients with implants where MRI may be contraindicated'

The BIR published information on this during MR Safety Week last year - [https://www.bir.org.uk/media/376632/day\\_5\\_scanning\\_without\\_manufacturer\\_s\\_approval\\_final\\_rdocx.pdf](https://www.bir.org.uk/media/376632/day_5_scanning_without_manufacturer_s_approval_final_rdocx.pdf)

BIR Risk assessment form -

[https://www.bir.org.uk/media/291846/ra\\_12\\_implants.pdf](https://www.bir.org.uk/media/291846/ra_12_implants.pdf)

Link to article about BJR 'Off-label MRI examination of an MR Conditional pacemaker

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6180873/>

## Post-operative scans in MRI

Historically a patient had to wait 6 weeks post-surgery after metallic implant insertion before an MRI could be performed, but some scans can now be undertaken immediately.

MHRA section 4.11.2 'Examples of non-active implantable medical products'

Up to date advice from Shellock (contains additional references)

[http://www.mrisafety.com/SafetyInformation\\_view.php?editid1=194](http://www.mrisafety.com/SafetyInformation_view.php?editid1=194)

Article link: Safety of Orthopaedic Implants in Magnetic Resonance Imaging: An Experimental Verification, 2006

<https://onlinelibrary.wiley.com/doi/pdf/10.1002/jor.20213>

## Contrast

Contrast safety reviews have been carried out after concerns that Gadolinium retention may occur in two areas of the brain after contrast injection for MRI scan was performed. Changes were made in the UK to the types of contrast agents used for MRI. Research is ongoing in this area but for the latest advice visit the European Medicines Agency website.

<https://www.ema.europa.eu/en/medicines/human/referrals/gadolinium-containing-contrast-agents>

The Society of Radiographers and BAMRR recommend that MRI departments in the UK refer to the MHRA guidelines for up to date safety guidance.

### References

1. The Radiography Workforce Current Challenges and Changing Needs, CoR  
[https://www.sor.org/sites/default/files/document-versions/appg\\_a4.pdf](https://www.sor.org/sites/default/files/document-versions/appg_a4.pdf)
2. ACR Guidance Document on MR Safe Practices: 2013  
<https://onlinelibrary.wiley.com/doi/pdf/10.1002/jmri.24011>
3. Biological Effects and Safety in Magnetic Resonance Imaging: A Review  
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2705217/>