

# news

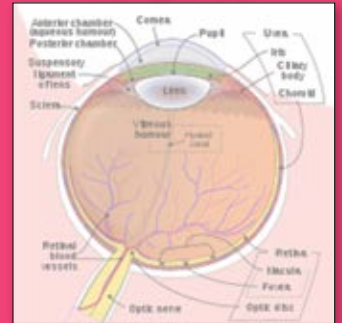
THE NEWSLETTER OF  
THE BRITISH ASSOCIATION OF MR RADIOGRAPHERS

## SPOTLIGHT ON MR Phantom Safety



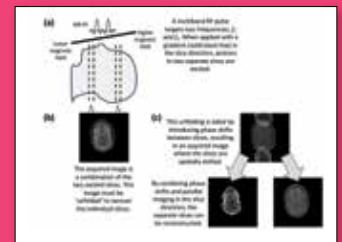
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<p><b>1</b></p> <p>The decision to have an MRI scan is made with your doctor.</p>	<p><b>2</b></p> <p><b>Important:</b> Tell your doctor and the MRI staff that you have a heart device.</p>	<p><b>3</b></p> <p>Give your device details or name of your pacing clinic so they can liaise with the MRI centre.</p>
<p><b>4</b></p> <p>The team will check if your device has been tested by the manufacturer to undergo MRI.</p>	<p><b>5</b></p> <p>If your device has not been tested for MRI, your doctor will explain the benefits, risks and alternatives.</p>	<p><b>6</b></p> <p>Ask one of our team if you have any concerns.</p>
<p><b>On the day of your scan</b></p>		
<p><b>7</b></p> <p>Remind staff that you have a device, and bring along your device identification card.</p>	<p><b>8</b></p> <p>Your device will be checked and reprogrammed so it's ready for your scan.</p>	<p><b>9</b></p> <p>During the scan we will monitor your heart rhythm.</p>
<p><b>10</b></p> <p>We will talk to you to check you are okay. Squeeze a buzzer if you are worried.</p>	<p><b>11</b></p> <p>After the scan we'll check your device and set it back to normal.</p>	

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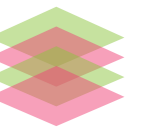
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# welcome



## from your **BAMRR PRESIDENT**

**W**elcome to the Spring edition of the BAMRR Newsletter. Whilst the challenges we have all faced during the past few years are still ever present, things are starting to feel more 'normal'. The BAMRR team are really excited that we are finally, after postponing many times, able to go ahead with our Further course in May, face to face in London. We have some fantastic

speakers lined up, all which have patiently altered the dates committed as we had to push back due to Covid-19 restrictions. A big thank you to all of those speakers, some BAMRR members. We really hope for a great turn out.

The 2022 Joint Annual Meeting ISMRM-ESMRMB in-person scientific meeting and exhibition with a virtual meeting component will be held 7th - 12th May 2022. The preliminary programme I have seen looks great and we hope to see some of you drop by our booth in the exhibition hall to say hello.

We have decided to host our Annual BAMRR conference virtually as we did for 2021. Delegate feedback suggested the ease of access, cost implications and Covid-19 concerns made this more appealing and hence our decision to host virtually again for 2022, particularly whilst restrictions still remain somewhat uncertain – save the date Saturday 1st October 2022

I hope you enjoy the content we have put together for you in this edition. Please do get in touch if you have any requests for future content and where possible we would try to include. If any readers have anything they would like us to include such as case studies or literature articles then again please do get in touch for us to consider. As always a huge thank you to our newsletter editor Matthew Benbow who works tirelessly behind the scenes to produce this fantastic resource for us all

*Zoe Lingham*  
BAMRR President  
[linghamzoe@gmail.com](mailto:linghamzoe@gmail.com)



## from you **EDITOR**

### Welcome to the Spring 2022 BAMRR News.

I hope you just might just be reading this because you have found 10 minutes to take a break from scanning and have grabbed the latest edition of BAMRR news. Everyone is just so busy at the moment – short staffed, yet also having to play covid-catch-up. I am determined that just because demands on us are high, that we don't let CPD and education take a back seat. We at BAMRR will do our best to keep running our courses, conferences and sourcing interesting articles for BAMRR News. To that end I would like to thank all those who have found time to write a contribution for this edition. I am pleased that we have managed to gather a varied range of topics that I hope will help to keep you inspired in your work.

We would like to be able to send a copy of BAMRR News to all our members, and a batch to those who are part of a group

membership. Therefore if you know any members who did not receive a copy and are wondering why, it will be most likely because we do not have their current postal address. Please nudge them to contact our membership secretary to rectify this and they too will have a much more enjoyable tea break just like yourself.

Now, get back to work!

(Oh, after you have read the rest of the magazine of course)

*Matthew Benbow*  
BAMRR Editor



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## WELCOME from our sponsor **GUERBET**

Guerbet wishes you a warm welcome to the Spring edition of BAMRR News.

Guerbet are delighted to continue sponsoring the BAMRR community and hearing all about your continued hard work and commitment to your dedicated professions. At Guerbet UK we are getting into the swing of in-person events and congresses for 2022 and delighted to be seeing you all again. We are also excited to be sponsoring your BAMRR Further MRI course in May and looking forward to seeing you there.

We'd also like to remind you of our Guerbet TV and Medical Imaging Institute webinars. They are CPD accredited and run once a month on a range of topics from AI/ Informatics to Chest and Lung intervention. To find out more please contact your local Guerbet representative or email [uk.events@guerbet.com](mailto:uk.events@guerbet.com).

If you would also like any support with educational programmes or events please do get in touch with [uk.events@guerbet.com](mailto:uk.events@guerbet.com).

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# BAMRR Policy Board Members, Autumn 2022

The co-ordination of the Associations activities is overseen and undertaken by an elected Policy Board. The board currently consists of the following who are members of BAMRR and working in different regions of the UK.

The Policy Board is composed of:



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## NPL Quantitative MRI Initiative

Dear BAMRR Member,

The National Physical Laboratory (NPL) is involved in iMet-MRI, a collaboration between multiple European National Measurement Institutes and Hospitals/Trusts. Matt Hall from NPL says “the project plans to develop new standards and best-practice guidance for quantitative MRI. Traditionally, clinical MRI involved the acquisition of so-called “weighted images”, which provide contrast combining a number of different factors. These images are unquestionably useful, but differences between scanners of different makes, models, and age change the contrast, making long-term comparability challenging. Quantitative MRI provides measures of physical and chemical quantities in well-defined units, which reveal contrast on physically meaningful effects, potentially allowing images to reveal pathological effects and progression in far greater detail than conventional MR images. Since measurement values exist independently of the scan process, there is the possibility to calibrate and benchmark individual scanners to independently verified quantities allowing greater comparability between time points and facilities. Critically, however, the project is embedded in clinical realities and seeks to support clinical MRI and its use in the clinic as well as in multi-site applications such as clinical trials. As such there is a need for clinical expertise in guiding its goals and priorities.”

NPL are therefore seeking to establish a small (4-5) people Clinical Community Stakeholder Network group that I have agreed to chair: I would therefore be delighted to hear from Radiographers who would like to join the group and help guide the project and ensure maximum clinical impact of the work.

The commitment is expected to be around 3-4 meetings a year, probably held virtually.

If you have (some) quantitative MRI experience and (lots of) interest to join this group, please email me your details together with a brief statement of your relevant experience and why you would like to join.

Many thanks

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# SPOTLIGHT ON MR Phantom safety

**Cath Mills** BAMRR Safety Co-ordinator

## What are MRI phantoms?

MRI phantoms are scientific devices that are used to do quality assurance tests on MRI systems. QA tests are mandatory for all UK clinical scanners to ensure optimal image quality is achieved for patient care and accurate diagnosis. These devices have been specifically designed to be imaged in the MRI field to evaluate, analyse, and tune the performance of the scanner (1).

## Who uses them and why?

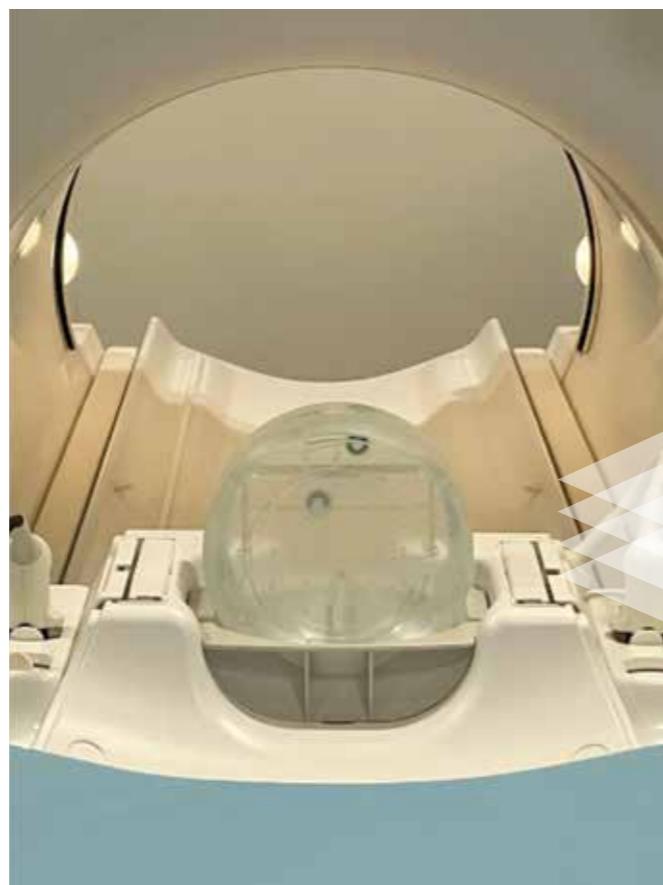
Radiographers carry out QA scans with phantoms usually on a daily or weekly basis. The frequency of routine QA will depend on manufacturer recommendation and local service setup. More comprehensive QA scans are carried out by engineers during routine scheduled scanner services throughout the year. Radiographers, physicists and engineers may also use phantoms to help setup new protocols on the scanner, or to perform test scans to check coils when a fault is suspected.

## What do they contain?

Phantom fluids content differ between scanner manufacturers, and for different static magnetic field strengths. As well as water, phantoms may contain other toxic substances. Examples of these include nickel sulphate, sodium chloride, sulfuric acid, ammonium chloride, and marcol oil.

## What are they used for?

Each MRI phantom is customised to be used with a specific scanner system and to measure outputs for that system. The tests that are performed evaluate accuracy and precision of measurement in MRI studies. The phantom tests for image quality include tolerances for: Image uniformity, Geometric accuracy, Slice thickness, Spatial resolution, Ghosting, Low contrast detectability, Slice position, and SNR (2).



## Why are they important?

Phantoms offer an alternative solution to testing image quality without using human subjects. This ensures that the scanner and methods for scanning are operating in a standardised way (2). The complexity of the variables that MRI measures means that the phantoms used must provide standards for the calibration of these measurements in a repeatable and traceable way. This allows the MR Operators to know that the scanner is working at optimum standards, and ultimately that the patient's receive the best possible care (3).

## The MHRA identifies MR Phantoms as a hazard in MRI(4)



## Hazards in MRI

MHRA Safety Guidelines for Magnetic Resonance Imaging Equipment in Clinical Use, Feb 2021

Static magnetic field

Cryogenics

Radio frequency electromagnetic fields



Time varying magnetic field gradients

Phantom fluids

Acoustic noise

## What are the risks associated with phantom fluids?

As mentioned above some phantoms may contain water-based solutions, such as nickel sulphate, and some contain oil-based solutions. These types of solutions can cause irritation if they come into contact with the skin or eyes, they can be toxic if ingested, and if they are exposed to extreme high temperatures or strong air currents, for example in a fire or emergency situation, they can form toxic aerosol droplets that could potentially be inhaled.

Some of the toxic substances used in phantom fluids could have carcinogenic properties so it is important to be aware of and understand the risks. Information is available in the scanner manufacturer user manual about the type of phantom fluids used, the risks associated with them, any first aid requirements if people are exposed to phantom content, and how to safely deal with a spillage.

## Suggested recommendations for phantom safety

- Always refer to the scanner manufacturer operating manual for specific phantom safety information
- Include phantom safety in staff training and education. Staff who work in MRI should be aware of the risks associated with phantom fluids, how to deal with phantom spills, know what to do if people are exposed to them, and be aware of any extra risks in a fire/emergency situation
- A phantom spillage clean up procedure should be in place
- The location of spill kits (should they be required) should be known to all staff
- A leaking or damaged phantom disposal procedure as per manufacturer recommendations and local COSHH should be available
- Always report a leaking or damaged phantom to the Senior Radiographer in charge/Imaging manager, the scanner manufacturer, and document it on the local incident reporting system.
- Have a Risk assessment in place. The British Institute of Radiology have a useful risk assessment template on their website 'Injury to persons exposed to spillage from chemicals within MRI phantoms' [https://www.bir.org.uk/media/351909/ra\\_14\\_phantom\\_spillage.pdf](https://www.bir.org.uk/media/351909/ra_14_phantom_spillage.pdf)

## What is in a spill kit?

Necessary content of spill kits will vary considerably between scanner types and manufacturers, some scanners may have phantoms that do not contain toxic fluid and will therefore not require a special spill kit to clean up leaking fluid. Always check whether a spill kit is required and what the contents should be. For the majority of scanners in the UK the content of the spill kit is made locally and stored in a suitable place in the MRI department. It should contain everything 'ready to go' in case of a spillage. Usually it will contain PPE, absorbent material (some examples include cloths, sand, silica gel, sawdust, absorbent granules), some type of sealed container to put a damaged phantom and debris in after spillage has been mopped up, and the contact number of who to call to arrange safe collection.

## Current MHRA Guidance about phantom safety

The MHRA details phantom fluid safety in section 2.8 'other hazards', stating that 'whilst handling sealed/closed phantoms is not hazardous, contact with the liquid after a leak or smashed phantom should be controlled due to the toxicological nature of some phantom fluid components, such as nickel. Sites should prepare procedures for dealing with phantom fluid spills, clean-up and disposal as per COSHH' (4).

### References

1. What are imaging phantoms, NIST physics website <https://www.nist.gov/topics/physics/what-are-imaging-phantoms>
2. Quality assurance of clinical MRI scanners using ACR MRI phantom: preliminary results (Chen et al, 2004) <https://pubmed.ncbi.nlm.nih.gov/15692871/>
3. Quantitative magnetic resonance imaging phantoms: A review and the need for a system phantom (Keenan et al, 2017) <https://onlinelibrary.wiley.com/doi/10.1002/mrm.26982>
4. MHRA Safety Guidelines for Magnetic Resonance Imaging Equipment in Clinical Use (Feb, 2021)

## Safety Update Launch of MRI e-learning for health resource



MRI Safety  
Multiprofessional elearning tailored to your MR safety needs



This programme is in partnership with...














**Courses released 1 Nov 2021**

### Introduction and safety framework overview

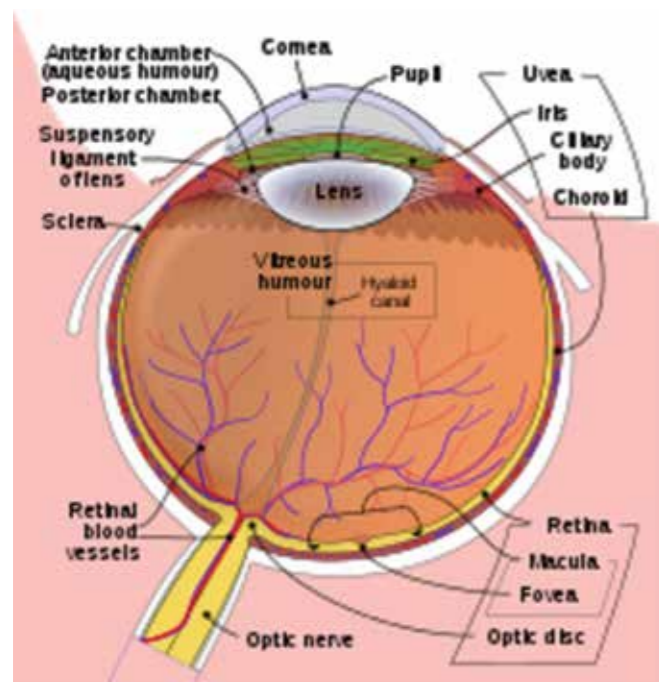
1. Static magnetic field session
2. RF and gradients
3. Screening
4. Emergencies
5. Gadolinium contrast agents

The first batch of MRI Safety e-learning sessions successfully went live on 1st November 2021. BAMRR are part of the multidisciplinary working party who have been developing an e-learning programme on the topic of MRI Safety. The working party is made up of over 20 people who work in the field of MRI in the UK and have a specific interest in MR safety (see picture above for professional organisations involved).

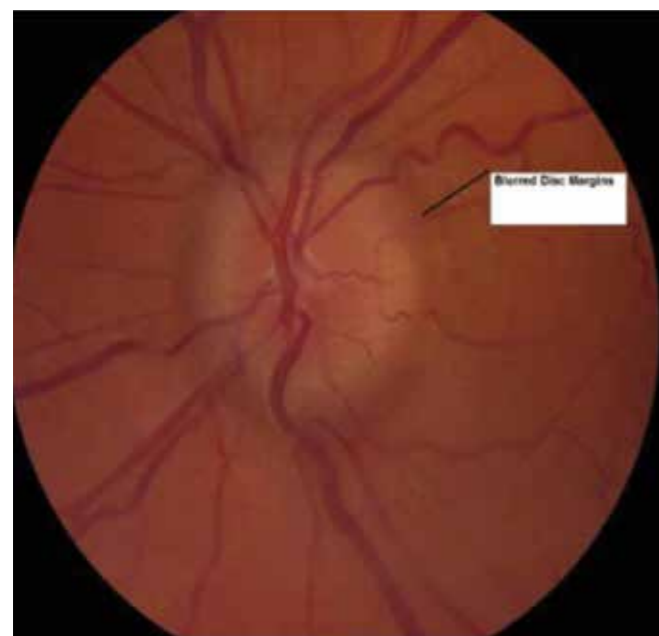
The e-learning is structured into five courses, each linked to a different MR safety role. The courses can be accessed via the e-learning for health MRI home page <https://www.e-lfh.org.uk/programmes/mri-safety/> where users are guided to appropriate content for the MR safety roles relevant to them. Additional sessions are being developed by the working party and will be released at a future date. Access is available for anyone in the nhs, anyone with an nhs.net or ac.uk account.

# Papilloedema, IIH and MRI

**Helen Estall** Consultant Radiographer, University Hospitals Leicester



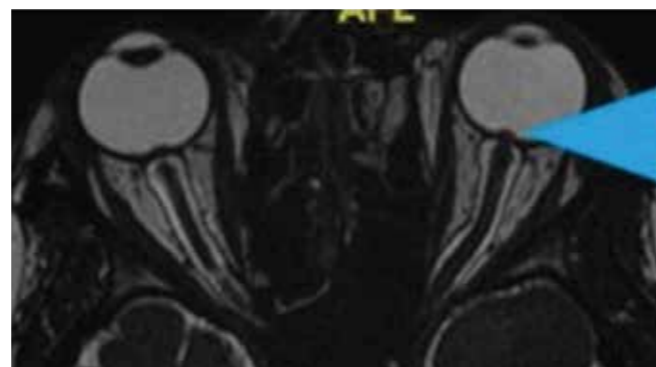
◆ Figure 1 – anatomy of the globe



◆ Figure 2 – funduscopy demonstrating optic disc blurring

Image from <http://www.antimicrobe.org/h04c/files/history/Papilledema.asp>

Optic disc swelling can also occasionally be seen on MRI, but often only on specific orbital imaging rather than a routine T2 axial of the brain (figure 3):



◆ Figure 3 – CISS axial demonstrating bilateral optic disc protrusions in a patient with bilateral papilloedema

### Raised Intracranial Pressure and Idiopathic Intracranial Hypertension

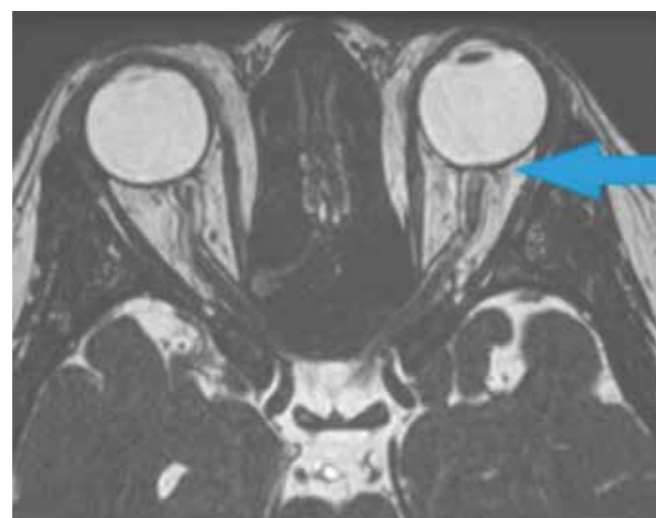
Imaging is extremely important and must be carried out for all patients with papilloedema to exclude causes for increased intracranial hypertension (ICP) such as a mass or bleed. Raised ICP is a pathological increase in the pressure in the brain and can have many causes such as haemorrhage, dural sinus thrombosis and Idiopathic Intracranial Hypertension (IIH). IIH is a diagnosis of exclusion and is where the cause of the raised pressure, such as a mass or haemorrhage has not been identified.

### MRI

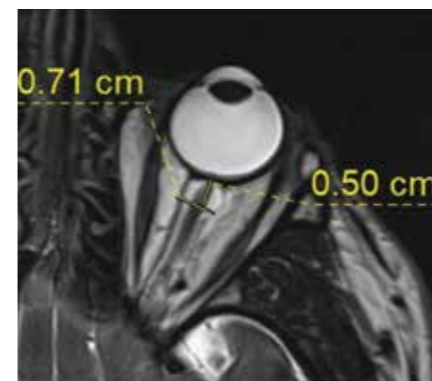
There are several imaging features on MRI that although not specific for IIH alone, can aid the diagnosis of IIH. Patients with IIH usually describe headaches, visual problems, pulsatile tinnitus and photopsia, papilloedema is not always present. CT or MRI is essential to exclude any other causes of increased intracranial pressure.

In the absence of a cause for ICP such as a mass or haemorrhage, imaging features that support the diagnosis of IIH include the following:

Papilloedema – see figure 3 above

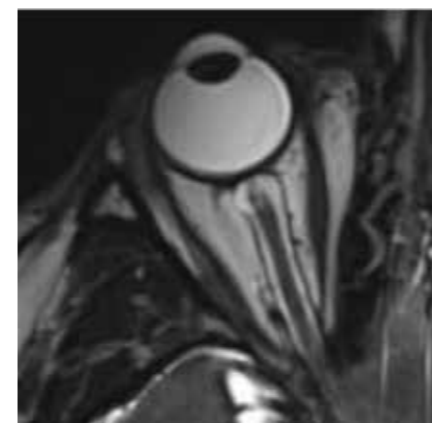


◆ Figure 4 – CISS axial demonstrating flattening of the posterior sclera of the globe bilaterally

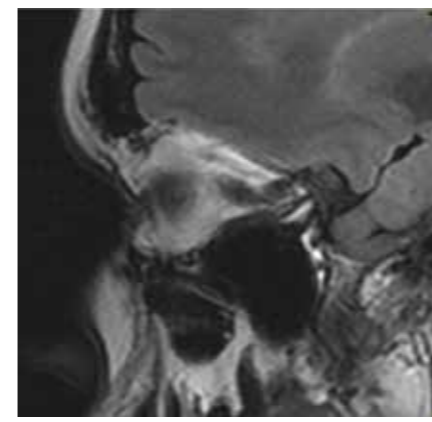


◆ Figure 5 – CISS axial demonstrating increased optic nerve sheath (ONS) diameter:

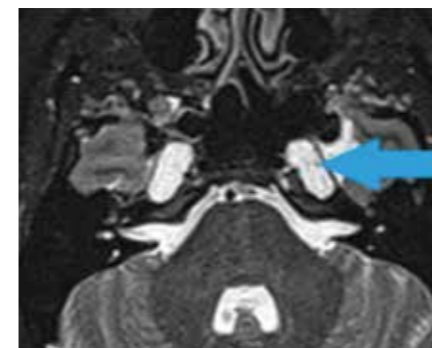
The ONS is measured at 5mm posterior to the globe, if the diameter is larger than 6mm this can indicate increased intracranial pressure.



◆ Figure 6 – CISS axial demonstrating prominence of the ONS to the orbital apex



◆ Figure 7 – FLAIR sagittal demonstrating vertical tortuosity of the optic nerves



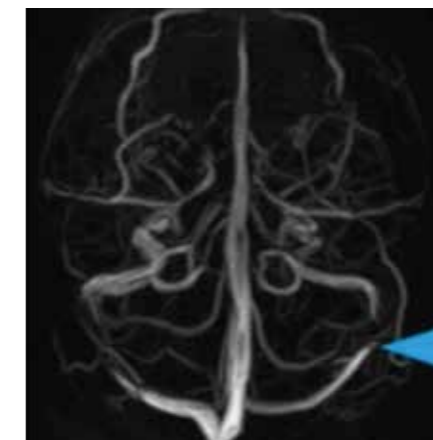
◆ Figure 8 – CISS axial demonstrating enlarged Meckel's caves

The Meckel's caves usually measure in the range of 6-8mm in diameter:



◆ Figure 9 – T1 coronal demonstrating a partially empty sella

An empty or partially empty sella is a very common finding in patients without IIH, however, in the correct clinical context it can aid diagnosis. The pituitary height varies depending on the patient's age and hormone levels in women with a normal range of between 6 and 12mm.



◆ Figure 10 – MRV demonstrating bilateral narrowing of the distal transverse sinuses

The MRI features described above can be seen in many patients that do not have IIH; however, it is important that the correct sequences are completed for those patients with papilloedema and a working diagnosis of IIH. Bilateral stenosis of the transverse sinuses is one of the more important findings in IIH and inclusion of a MR venogram (MRV) is advised.

For more information on a pathway for patients attending ED with papilloedema: <https://dx.doi.org/10.26044/iecr2020/C-03084>

## SAVE THE DATE

### CONFERENCE

Saturday  
1st October 2022

Registration will be open soon: [bamrr.org](http://bamrr.org)



## New BAMRR Board member

**K**ath has over 20 years multiplatform MRI experience. She has worked for numerous private MRI providers during this time and is currently working at the Rutherford Cancer Centre South Wales. Kath has a specific interest in Clinical Governance and training.



◆ Kath Norfield



# Acquiring Multiple Slices Simultaneously

## Motivation

Conventional MR scans excite and receive signal from each slice consecutively. The sequential nature of slice acquisition impacts overall scan times; for example, repetition times (TR) may be increased to ensure there is enough time to 'fit in' a sufficient number of slices. With techniques such as simultaneous multi-slice (SMS), Multi-band SENSE (MB), and HyperBand (HB), multiple slices can be acquired at the same time, allowing scan times to be reduced.

## How it works

### Excitation

As with conventional slice selection, these techniques rely on the application of a radiofrequency (RF) pulse at the same time as a magnetic field gradient along the slice direction: the gradient ensures that protons at different positions along the slice direction resonate at different frequencies, and the RF pulse 'targets' a specific narrow range of these frequencies to excite the desired slice. The key difference with the SMS/MB/HB techniques is the design of the RF pulses. Here, we have to target not just a single narrow range of frequencies, but multiple different frequency ranges, which correspond to the multiple slices (Figure 1a). These multi-band RF pulses are more challenging to implement than conventional slice selective RF pulses, and their design must be optimised to account for the number of excited slices, specific absorption rate (SAR), and pulse duration.

### Reconstruction

When multiple slices are excited simultaneously, the acquired image is the sum of the separate slices (Figure 1b), and this acquired image must be 'unfolded' to reconstruct the separate slices. This unfolding is typically achieved using two complementary approaches: phase shifts and parallel imaging. By either varying the phase of the excitation pulses or carefully controlling magnetic field gradients, a phase shift can be introduced between the multiple slices, yielding an acquired image where slices are spatially shifted with respect to each other by a certain fraction of the field-of-view (Figure 1c); this aids the unfolding as the separate slices are no longer directly superimposed on each other. By exploiting the variation in coil sensitivities along the slice direction, parallel imaging can also be used in reconstructing the separate slices. This differs from the conventional use of parallel imaging, where in-plane spatial encoding is aided

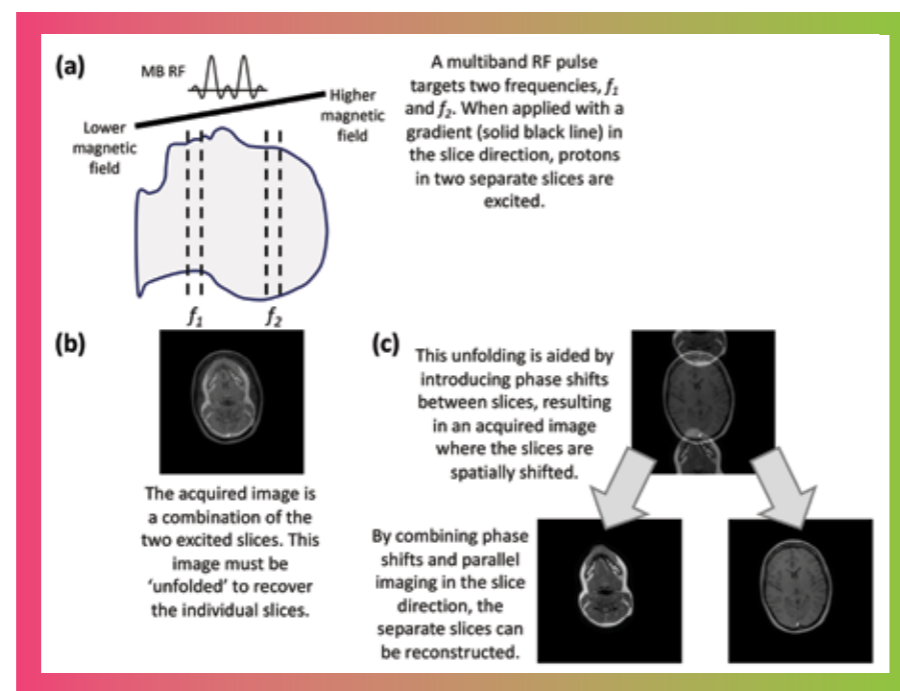
by exploiting coil sensitivity variations along the phase-encode direction.

While conventional parallel imaging reduces the signal-to-noise ratio (SNR) as fewer phase-encode steps are acquired, SMS/MB/HB techniques have the benefit of not impacting SNR. However, there is the potential for artefacts if signals from separate slices are not completely separated.

### Applications

Initial applications of SMS/MB/HB techniques focussed on accelerating echo-planar imaging (EPI)-based acquisitions such as fMRI and diffusion imaging. With two to four slices typically acquired simultaneously, TR can be reduced, resulting in shorter EPI scan times. This time saving can either be used to directly reduce scan time, or can be used to increase coverage, increase temporal resolution (for fMRI), or acquire more b-values and/or gradient directions (for diffusion imaging), without having prohibitively long scans. By incorporating multi-slice acquisitions with turbo spin-echo (TSE) sequences, scans for a wide range of anatomies and pathologies can be accelerated.

With on-going research looking to further develop these techniques, it is anticipated that SMS/MB/HB will be used in accelerating sequences for an increasing range of applications.



### References

- Barth et al., Simultaneous Multislice (SMS) Imaging Techniques. *Magn Reson Med* 75:63-81, 2016.
- McNabb et al., Inter-slice leakage and intra-slice aliasing in simultaneous multi-slice echo-planar images. *Brain Struct Funct* 225:1153-1158, 2020.

# Making MRI available for patients with cardiac devices: background to patient and clinician educational resources

**Dr Anish Bhuva, NIHR Clinical Lecturer, Institute of Health Informatics, University College London and Barts Heart Centre a.bhuva@ucl.ac.uk**

Magnetic resonance imaging (MRI) is used to diagnose a wide range of illnesses. Like everyone, many people with cardiac devices (pacemakers, defibrillators or implantable cardiac monitors) may benefit from an MRI scan at some point. Technology has changed in the last decade so MRI is technically possible when it is needed, yet patients still face difficulty with access to MRI. This leads to delays in the diagnosis and treatment of many conditions that rely on MRI such as cancer, stroke and brain surgery. The "MRI my Pacemaker" campaign was set up to ensure that patients with cardiac devices have the same access to MRI as everyone else.

The campaign has worked with the support of the British Heart Foundation and British Society of Heart Failure to develop educational videos and leaflets. Because referrers are far less likely to refer a patient with a cardiac device for MRI than other patients, we have developed an educational video for clinicians to raise awareness. The campaign is also regularly contacted by patients looking for MRI services (both in the UK and abroad). As patients are their own best advocate, we have developed resources to provide support to patients at the time of an implant or if an MRI is being considered.

The topic is complex— the MRI process requires imaging and heart specialists and of course patients to work together. Seven professional societies and three patient charities have therefore developed the content. The resources are intended for half a million people in the UK who have a cardiac device, and all clinicians referring to and performing MRI. Because patients with cardiac devices attend at least annually for a device check, the leaflet will be distributed to patients in cardiac physiology clinics at routine attendances, at the time of implantation, and through patient charities. Print and photocopy leaflet versions have been designed.

We are grateful to the following patient groups and charities for their input:

**Arrhythmia Alliance, Cardiomyopathy UK and Barts Charity.**

The National UK Device-MRI Working Group and the following national professional societies have all contributed to the content or supported the work:

- British Association of MRI Radiographers
- British Cardiovascular Society
- British Heart Rhythm Society
- British Institute of Radiology
- British Society of Cardiovascular Magnetic Resonance
- British Society for Heart Failure
- Institute of Physics and Engineering in Medicine
- The Royal College of Radiologists
- The Society of Radiographers

We are grateful to the British Heart Foundation for funding the resources

### Online videos can be found here:

#### Patient educational video

- <https://www.youtube.com/watch?v=u6upeTKqPrg>
- [https://www.youtube.com/watch?v=odaL\\_c85BiY](https://www.youtube.com/watch?v=odaL_c85BiY) (with subtitles)
- Spanish, Urdu, Hindi translations will also follow shortly.

#### Referrer educational video

- <https://www.youtube.com/watch?v=aOk8RMomkSU>
- <https://www.youtube.com/watch?v=ISPgGS90IQw> (with subtitles)

For further details, go to [MRImypacemaker.com](http://MRImypacemaker.com), or contact us at [contact@mrmypacemaker.com](mailto:contact@mrmypacemaker.com).

# MRI\* and your pacemaker

An easy guide for patients with pacemakers, defibrillators or implantable cardiac monitors

## What is an MRI machine?

Magnetic Resonance Imaging (MRI) machines are used to diagnose a wide range of illnesses. They do this by using the power of magnets to create images which allow us to examine your body in detail. Find out more by searching [www.nhs.uk/conditions/mri-scan/](http://www.nhs.uk/conditions/mri-scan/)

Like everyone, most people with cardiac devices (pacemakers, defibrillators or implantable cardiac monitors) may benefit from an MRI scan at some point so it's important to know how you can access them safely.

## Can I have an MRI with my cardiac device?

Yes! Most people can have an MRI scan nowadays. MRI scans are safe and painless. If you have a device\* it will likely need to be temporarily programmed to a 'safe' mode during the scan.

Your clinician will not necessarily know you have a device.

**You must tell your clinician booking the scan AND the MRI department organising the appointment if you have a device.**

This includes if you have an implanted heart monitor, even though the MRI process is usually simpler.

The MRI unit makes special preparations and needs extra people to help. If you don't tell them beforehand your scan will probably be delayed. Your device will need to be checked and programmed before and after your scan. This is similar to your routine pacing check.

\* We say 'device' to mean pacemakers, defibrillators or implantable cardiac monitors

## Does it matter what kind of device I have?

Yes. Both **MR Conditional** and **MR Unlabelled** devices can be scanned, but the referral process and the device adjustments depend on which kind you have. If you have an implanted heart monitor, you should also let the MRI team know.

## What are the risks of having an MRI scan?

**MR Conditional devices:** safe

**MR Unlabelled devices:** low risk of complications, occurring in less than 1 in 2000 patients. Risks include:

- Damage to your device
- Abnormal heart rhythms
- Unexpected shocks from your device

## How can I check if my device is MR Conditional?

1. Check your device identification card – some cards will state if your device is MR-Conditional (see example below)
2. Contact the cardiology team that looks after your device
3. Call the manufacturer directly

Your lead and generator combination will always be carefully checked before the scan to confirm the type of device you have.


### Hospital Heart Centre, UK

DEVICE DATE	01/01/10
MFG	St Jude Medical
TYPE	PM1272
S/N	1234567

MRI CONDITIONAL SYSTEM? Yes

## Getting a scan – step by step

### Before your scan

**1** 

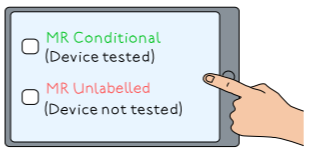
The decision to have an MRI scan is made with your doctor.

**2** 


**Important:** Tell your doctor and the MRI staff that you have a heart device.

**3** 


Give your device details or name of your pacing clinic so they can liaise with the MRI centre.

**4** 

The team will check if your device has been tested by the manufacturer to undergo MRI.

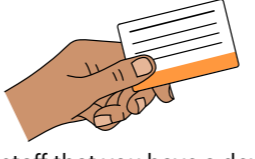
**5** 

If your device has not been tested for MRI, your doctor will explain the benefits, risks and alternatives.


**6** 

Ask one of our team if you have any concerns.

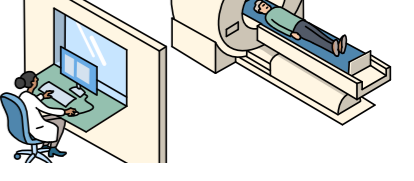
### On the day of your scan

**7** 

Remind staff that you have a device, and bring along your device identification card.

**8** 


Your device will be checked and reprogrammed so it's ready for your scan.

**9** 

During the scan we will monitor your heart rhythm.

**10** 

We will talk to you to check you are okay. Squeeze a buzzer if you are worried.

**11** 

After the scan we'll check your device and set it back to normal.

## Why have I previously been told I can't have a scan?

People with **MR Unlabelled** devices couldn't have MRI scans until recently. We now know that with careful planning the risks are lower than previously thought. These scans usually take place at specialised MRI centres. They need an important reason for being done, with no alternative test available.

## What if my hospital cannot scan patients with cardiac devices?

For more information, referral centres or support visit [mrimypacemaker.com](http://mrimypacemaker.com)

## We have a team to support you if you have a problem



[hearhythmalliance.org](http://hearhythmalliance.org)  
[info@hearhythmalliance.org](mailto:info@hearhythmalliance.org)



[cardiomyopathy.org](http://cardiomyopathy.org)  
[contact@cardiomyopathy.org](mailto:contact@cardiomyopathy.org)

This has been produced with the support of Arrhythmia Alliance, British Association of MRI Radiographers, British Cardiovascular Society, British Heart Rhythm Society, British Institute of Radiology, British Society for Heart Failure, British Society of Cardiovascular Magnetic Resonance, Cardiomyopathy UK, Institute of Physics and Engineering in Medicine, Royal College of Radiologists, The Society of Radiographers



# Developing a Standard Operating Procedure

The following information is designed as a learning resource which may assist MRI units to formulate their standard operating procedures

Barbara Nugent of MRI Safety Matters®

Subsequent newsletters will provide suggestions for writing standard operating procedures (SOPs) for dealing with various emergencies. What to consider when dealing with a fire situation will be detailed in the summer issue. This spring edition describes why SOPs are required and provides some guidance for writing an SOP.

## What is an SOP?

An SOP is a resource which contains clear directions to enable the employees of an organisation (an MRI unit, in this case), to know how to consistently perform both routine and not so routine work practices or processes. The SOP contains a comprehensive explanation of how the process can be achieved safely, effectively, and efficiently and as envisaged. The SOP will define the expected best practices, activities and all the quality standards that need to be met for the process to be completed. SOPs therefore inform employees of what is required and standardises the process to be followed to complete the task. Having SOPs "makes both decisions and processes more automatic for your team at all times" \*.

\* Quote from a blog by David Oragui published: November 20 2019, How to Write Effective Standard Operating Procedures (SOP) (helpjuice.com)

Seek appropriate quality standards that are to be met by the process

Before writing SOPs, always read the appropriate sections related to dealing with emergencies in the MRI unit from the Safety Guidelines for Magnetic Resonance Imaging Equipment in Clinical Use: [MHRA publishing.service.gov.uk](https://www.mhra.gov.uk/publishing-service) and always refer to the latest version of the guidance. Reference the relevant sections of the recommendations in the SOP.

## Relevant guidance from the MHRA

MHRA safety guidelines support the need for local SOPs to be developed, training to be implemented and emergency drills to be run to try to deal with any emergency in the MRI unit:

MHRA 4.17.1 Training: Introduction

**It is recommended that the MR RESPONSIBLE PERSON ensures that adequate written safety procedures, emergency procedures and operating instructions are issued to all concerned...**

The setting up of a local MRI Safety Committee to develop and agree the SOPs for all potential emergencies in the unit is also recommended by the MHRA:

An appropriate way to ensure that the necessary responsibilities are established and carried out may be to set up a MR safety committee under the leadership of the MR RESPONSIBLE PERSON.

## MHRA 5.6 Emergency procedures

### 5.6.1 General

Emergency(sic) procedures should be reviewed and audited at regular periods. Procedures should be well known and understood by all MR AUTHORISED PERSONNEL and practised from time to time.

To comply with the guidance to **practise from time to time**, develop and run drills/simulations based on the unit's SOP on how to deal with emergencies. Undertaking drills consequently requires that drill SOPs be created too.

The following MHRA guidance, for example, further supports best practice when dealing with a fire and can be used to help to develop the SOP:

### 5.6.3 Fire

It is strongly recommended that sites invite the local fire service, via the hospital fire officer, to visit the MR unit in order to familiarise themselves with the local situation.

Ensure that the SOP details who is responsible for liaising with the local fire crews and local hospital fire officers to develop a strategy for training fire teams on how to mitigate the risks of attending a fire in the MRI unit (this will be further explored in the next edition).

### 5.6.4 Superconducting magnet quench:

It is recognised that in a fire situation there may be a need to quench the magnet, therefore, an SOP describing how to deal with a quench and the associated drill SOP should also be developed. Often the creation of one SOP leads to an obvious need for others to be developed such as an SOP for safely receiving and testing the unit's MR Conditional fire extinguishers.

## A typical format of an SOP:

- Define the objective: State the aim of the SOP and ensure that any appropriate published guidance or references are included to support the aims as above
- Define the procedure
- Define all the processes to be followed
- Define who has responsibility for ensuring the SOP is read by staff and signed off
- Define who has responsibility for training staff about the SOP, maintaining training records and reviewing staff training
- Define the methods that staff will use to comply with the policy
- Define review dates and responsibility for review

MRI safety Matters® is bringing back Dr Emanuel Kanal's 2nd European MR Safety Officer and MR Medical Director (MRSO/MRMD) course to London in May along with the American Board of MR Safety (ABMRS) UK-modified MRSO/MRMD/MRSE exams, designed for radiographers, radiologists and medical physicists/clinical scientists, respectively. The 2nd MRI Safety Update Day with Dr Frank Shellock, Professor Martin Graves and other esteemed speakers returns to Edinburgh in September. For more information, please email [mrisafetymatters@btinternet.com](mailto:mrisafetymatters@btinternet.com)

To comment on this article or get involved in MRI safety projects please contact Barbara at MRI safety Matters®.



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