

# MRI

IN PRACTICE  
THE COURSE

Dr Catherine Westbrook  
Dr John Talbot



## MRI in Practice

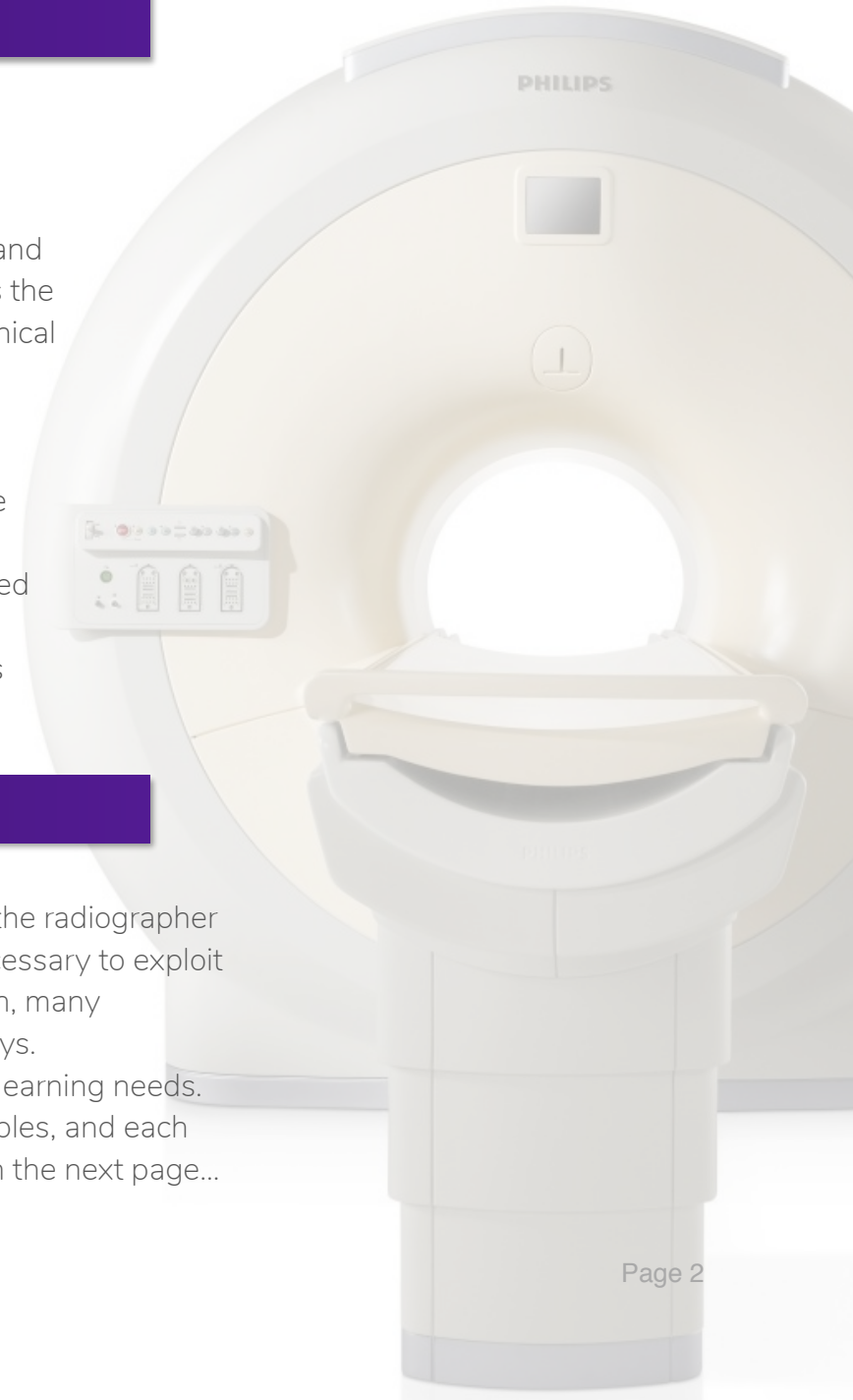
### Welcome to MRI in Practice - The Course

“MRI in Practice” the book, was first published in 1993. Now in its fourth edition, it is considered an essential text for many MRI courses including the registry exam in the US and for post graduate MRI programmes in the UK. The amazing success of this book, which is the World’s best-seller in its genre, mainly lies in its clarity and logicity. It clearly provides clinical MRI practitioners relevant information at the right level.

With this philosophy in mind MRI in Practice is now the basis for one of the World's most popular [MRI Courses](#). Presented by authors Cathy Westbrook and John Talbot, the course has been delivered in over 20 countries across 5 continents, and teaches hundreds of delegates each year. In addition to these impressive figures, the course has a well deserved reputation for having an informal approach that allows delegates to enjoy the learning experience - and take advantage of the networking opportunities that are fostered by this model.

## A Fresh Approach to Learning MRI

MRI as a modality is still expanding and evolving rapidly, and poses many challenges for the radiographer and radiologist. An in-depth understanding of the technology and clinical practice are necessary to exploit the full potential of the MR system. To take advantage of this exciting new career direction, many practitioners are advancing their knowledge of MRI using a variety of educational pathways. Here at MRI in Practice, we appreciate that everyone is different, and have very different learning needs. For this reason we have given the course a gentle learning curve, starting with first principles, and each day building on the concepts covered on the day before. Take a look at our programme on the next page...



## The Course Programme (length, content and timing may vary by country/organiser)

Timings may vary	Day 01	Day 02	Day 03	Day 04
09:00 - 10:00	ARRIVE for 10:00	Spin Echo Pulse Sequences Talbot	Flying Through k-Space Westbrook	Flow and MRA Talbot
	Basic Principles Westbrook  Image Contrast Westbrook	Break		
11:00 - 13:00		Image Optimisation Westbrook	Flying Through k-Space Westbrook	Gradient Echo Pulse Sequences Westbrook
Lunch				Image Artefacts from the Group Talbot & Group
14:00 - 15:30	Equipment Talbot	Image Production Talbot	Revision Session Talbot	
Break				DEPART at 2:30
16:00 - 17:00	Safety Talbot	Image Artefacts Talbot	Principles of Gradient Echo Westbrook	

The full UK course (shown above) is may be attended in two blocks of two days each. Individual days or combinations of days are not offered. Non-UK versions of the course are run as one single course and may vary in length and structure to allow for the requirements of the local organiser/sponsor/cultural norms. In the USA the course is a three-day course (having longer days) a sample programme can be found at the end of the brochure. The lecture content is the same and is outlined on the following pages.

## Course content

Reflecting the pace of evolution in the field of MRI itself, our course is constantly being updated to take advantage of the latest multimedia and presentation technology.

Our hardware set-up features high-power Mac computers, screening HD computer-generated imagery projected through crisp, bright and whisper-quiet DVI data projectors, giving the ultimate engaging graphic experience.

Of course it is the content that is the most important thing - and when it comes to quality you don't have to take our word for it, MRI in Practice is the World's best selling MRI textbook, and has a consistent 5-star customer rating on Amazon.com. Used as the key text across America by technologists studying for the registry exam, our book now in its 4th major edition, has become the go-to reference text in the field of MRI.

MRI in Practice | The Course delivers the same trusted content in a slick lecture format that is designed to engage and inform in equal measure.

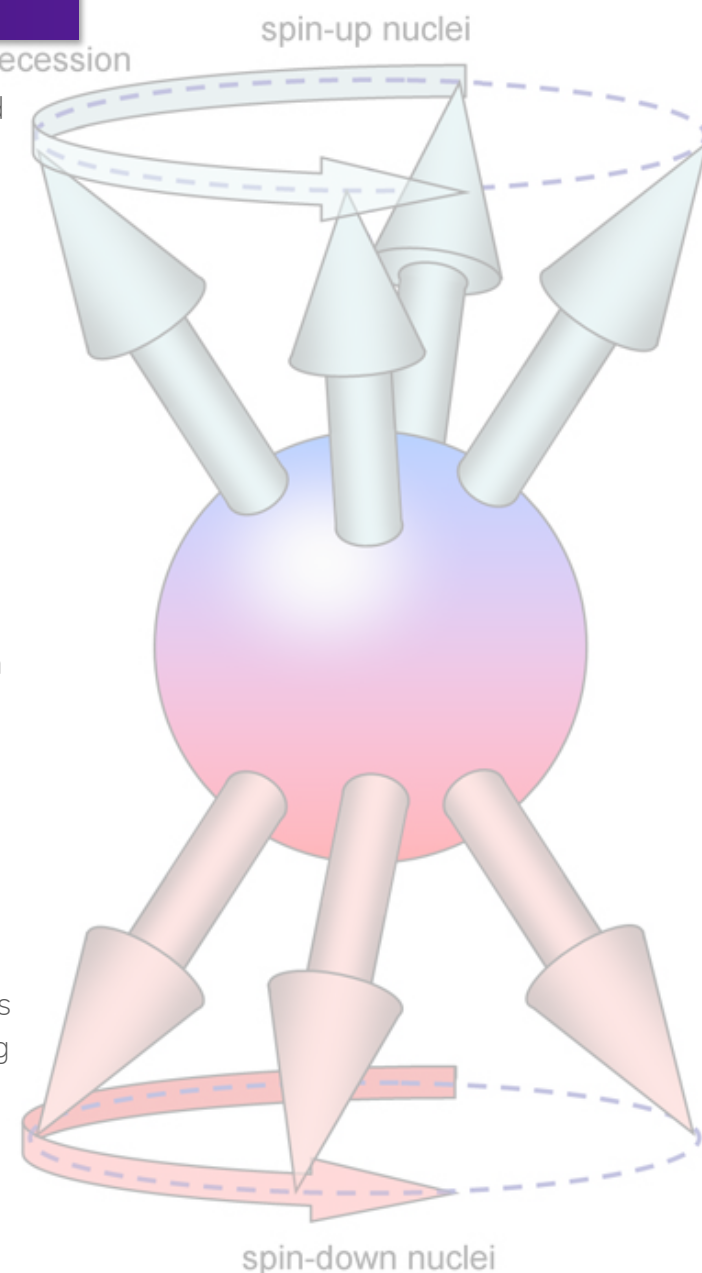
Lectures and quiz sessions are interspersed with revision and discussion so that delegates can put the physics of MRI into a practical context. Every underpinning principle we discuss can be directly applied to how you work at the scanner console.

All sessions are delivered by MRI in Practice authors and fully qualified professional educators Dr Cathy Westbrook & Dr John Talbot. The lectures are presented in an informal atmosphere where audience participation is actively encouraged.

Due to the intensive nature of the course, delegates are often provided with the ultimate set of written course notes - a signed, complimentary copy of MRI in Practice\*.

The book contains all of the important information about the topics within the course, as well as some supplementary reading. This means that delegates do not have to spend hours scribbling frantic notes, but can instead turn their full attention to the lectures, and can relax in the knowledge that their book will provide valuable reference material for the future.

The following pages give some typical course content.



\* selected venues only, please check with the course organiser before applying.



## Day 1 AM

### Introduction to the course (Westbrook Talbot)

Welcome and introduction to the course and the topics.

### Basic Principles (Westbrook) 1 hour

Aim: to investigate the fundamental principles of MRI including:

- Nuclear structure
- MR active nuclei
- Alignment
- Precession and resonance
- Signal generation

### Image Contrast Mechanisms (Westbrook) 1 hour

Aim: to evaluate the various mechanisms responsible for image contrast in MRI including:

- Molecular make-up of fat and water
- T1 recovery
- T2 decay
- Diffusion Weighting
- Image weighting characteristics
- Introduction to pulse sequences

## Day 1 PM

### Instrumentation (Talbot) 1 hour

Aim: to investigate types of equipment used in MRI and their safe use including:

- Magnets: principles of, construction, homogeneity.
- Shielding
- Shimming
- Gradients
- Radio Frequency: shielding, transmit/receive coils

This lecture includes high definition computer generated imagery of the magnet components, allowing you to see how they all work together like never before.

### Safety (Talbot) 1.5 hours

Aim: to review all MRI safety issues including:

- Static-field dangers - projectiles
- Gradient-field dangers – nerve stimulation
- Secondary (RF) field dangers - heating & antenna effect
- Cryogenics – quenches and anoxia
- Contraindications for MRI

with real-life examples of safety incidents from around the world.

## Day 2 AM

### Principles of Spin Echo (Talbot) 1.5 hours

Aim: to investigate the basic mechanisms of spin echo imaging including:

- T2\* effects
- RF rephasing
- Single and dual echo spin echo
- Fast (Turbo) Spin Echo, advantages and trade-offs
- Driven Equilibrium
- Inversion recovery

### Image Optimisation (Westbrook) 2 hours

Aim: to facilitate the understanding of the factors that affect image quality; their mechanisms and trade-offs including:

- Signal to noise ratio (SNR)
- Contrast to noise ratio (CNR)
- Spatial resolution
- Scan time
- Decision making strategies

## Day 2 PM

### Image Production (Talbot) 1.5 hours

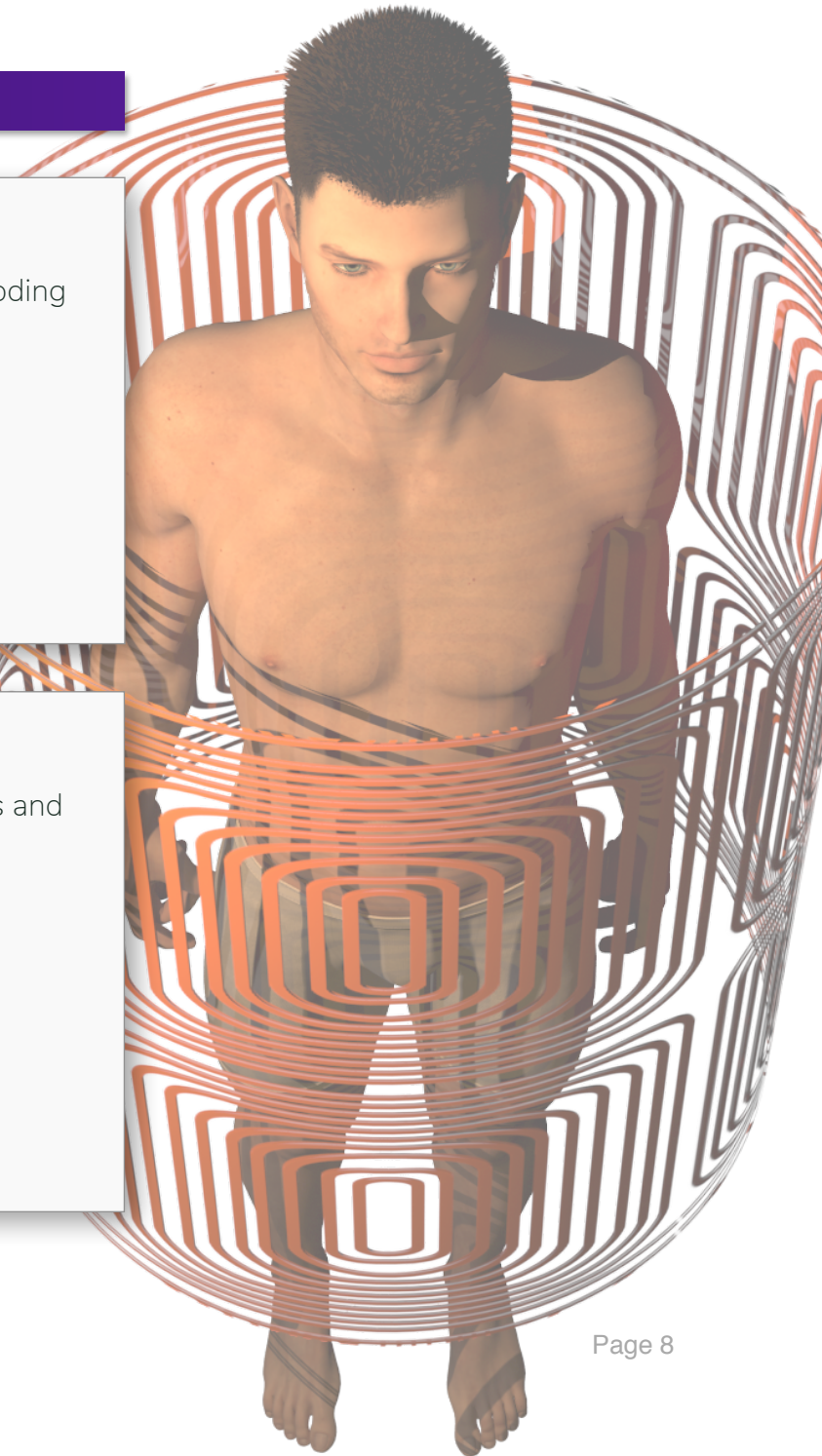
Aim: to facilitate the understanding of gradient functions for the purpose of spatial encoding including:

- An introduction to data sampling
- Slice selection
- Frequency encoding
- Phase encoding
- Fourier Transformation

### Basic Artefacts - Identification and Compensation (Talbot) 1.5 hours

Aim: to facilitate the understanding of the appearances and cause of common artefacts and their remedies. May include:

- Aliasing
- Nyquist ghost
- Tissue-dependent out-of-phase signal loss
- Magnetic susceptibility artefact
- Entry slice phenomenon
- Phase mismapping





## Day 3 AM

### **K space and data acquisition (Westbrook) 4 hours**

Aim: to explore in-depth the principles that underpin data acquisition in MRI including:

- K space functions and characteristics
- Data sampling techniques
- K space traversal
- K space filling in basic and advanced sequencing
- K space filling modifications including parallel imaging

## Day 3 PM

### Revision Quiz 1.5 hours

Aim: to consolidate the basic knowledge gained through self-marked timed evaluation:

- Basic Principles
- Contrast Mechanisms
- Instrumentation
- Basic Pulse sequences
- Image Optimisation

### Gradient echo sequences (Westbrook) 1 hour

Aim: to provide an introduction to gradient echo sequences

- Principles of Gradient Echo Pulse Sequences
- Weighting in Gradient Echo Pulse Sequences

## Day 4 AM

### Flow and Flow-Dependent Vascular Imaging (Talbot) 1.5 hours

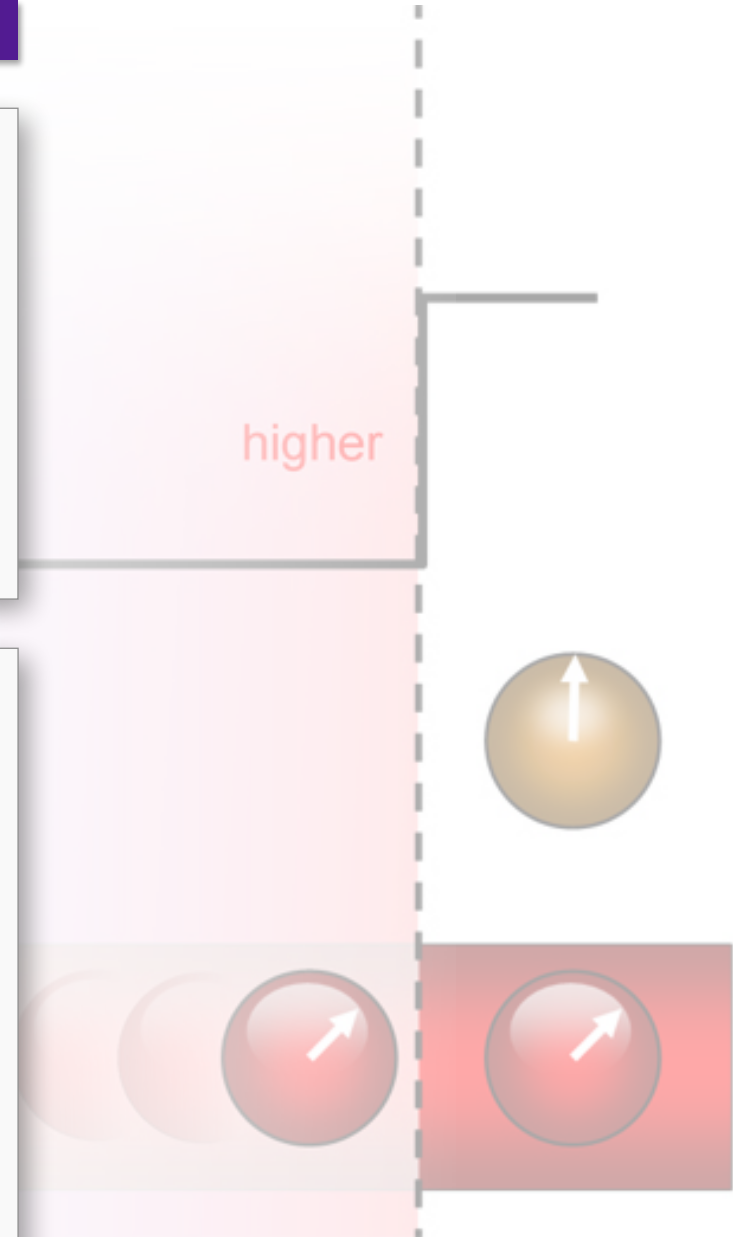
Aim: to provide an overview and basic understanding of the scope of Magnetic Resonance Angiography including:

- Time of flight, entry slice phenomenon, and flow anomalies
- Post processing and the maximum intensity projection algorithm
- Inflow, Phase Contrast, Black-Blood, BOLD and Fresh Blood Imaging,
- Mechanism of flow-dependent MRA sequences
- Advantages & disadvantages in clinical use

### Gradient echo sequences (Westbrook) 2 hours

Aim: to investigate the advanced mechanisms of gradient echo imaging and their clinical uses including:

- The steady state (advanced concepts)
- Coherent gradient echo
- Balanced Gradient Echo
- Incoherent gradient echo
- Steady state free precession
- Fast gradient echo
- Echo planar imaging
- Diffusion Weighting



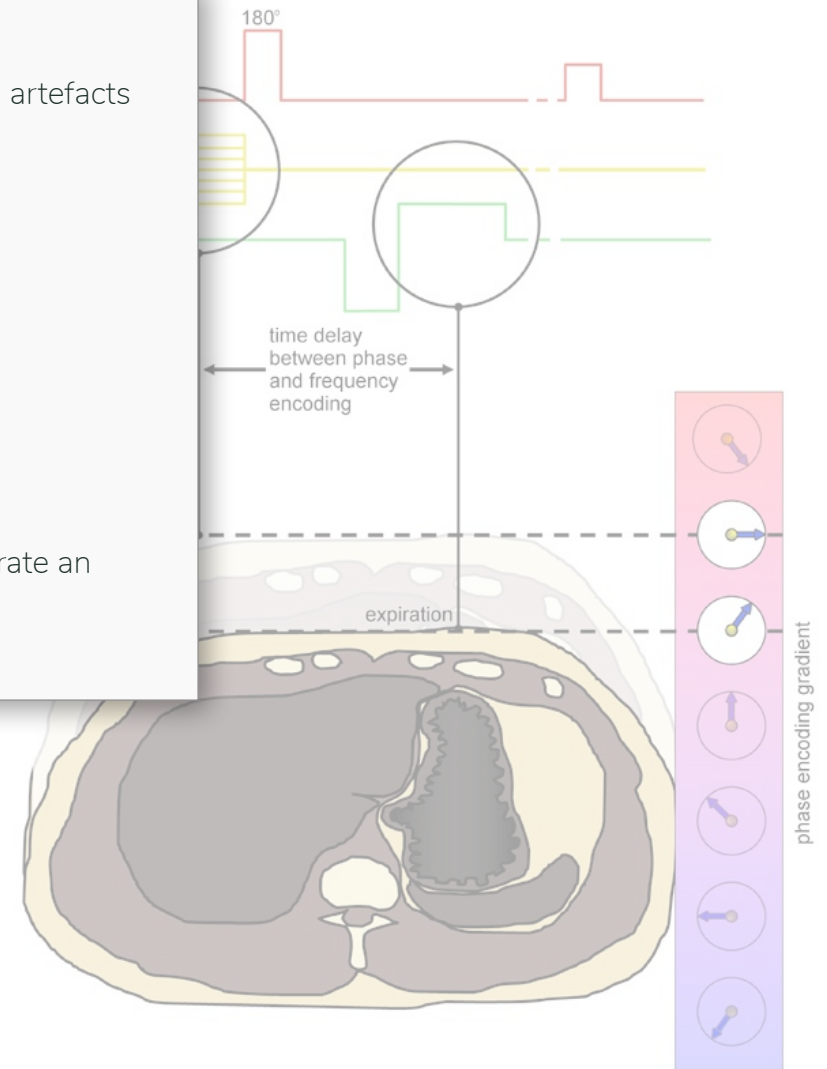
## Day 4 PM

### Artefacts II (Talbot) lecture timing varies

Aim: To explore the appearances, causes and remedies in relation to complex MRI artefacts may include:

- Chemical Shift
- Inhomogeneity
- RF anomalies
- The magic angle
- Moiré fringing
- Dielectric effects
- Cross excitation

Delegates are welcome to bring digital images (on USB flash-drive) that demonstrate an artefactual appearance from their own department.





## Delegate Feedback

The following testimonials are genuine comments taken from the anonymous delegate satisfaction survey forms handed in at the end of each course, and from unsolicited letters that we receive from delegates.

We have just collated the delegate feedback and your presentations averaged 98 out of 100 - thank you for the great job you have done over the four days. (Bucharest Course Hosts)

*As a teacher myself, the thing that I have learned is that in MRI education we need genuine experts to teach it, because this fascinating modality deserves nothing less. For my part your job is safe for the foreseeable future! Many thanks.*

"I am a MSK radiologist. This is not just the best MRI course I have been on - it is the best course I have ever attended. Your graphics were so clever and the presentations were fantastic." (Oslo Course)

The results from electronic evaluation of the course are fantastic! An average score of 5-6 on a scale to 6. Congratulations, you charmed us all!

*In addition to competent teaching you have a real gift for developing witty and animated graphics. Your work is absolutely exceptional - the resource you have developed is better by far than anything I have come across before*

Excellent lectures, I loved the use of analogies to explain complex processes - especially in the spatial encoding lecture.

*An excellent course, I am new to MRI and having attended the course things have now started to fall into place.*

*A colleague told me that the animated graphics would change my life, I was sceptical but I now feel the same way.*

*I am a Radiologist this is my 3rd or 4th attendance and the course keeps getting better and better. Highly recommended. (Sydney 2017)*

I thought the course was brilliant, all topics were covered and explained very well. I will definitely recommend this course to others.

*"All of the lectures and the contents within those lectures were absolutely terrific."*

## Enrolment Information

MRI in Practice is organised on our behalf by various individuals and companies around the World. You can always get the latest info on course dates, reserve a place etc. by visiting our website [www.mrieducation.com](http://www.mrieducation.com) or subscribing to our RSS feed on Twitter.

Australasia (Sydney)	contact Dr. Peter Cox	email <a href="mailto:peter@moonpython.com">peter@moonpython.com</a>
Africa (Kenya)	contact Veronica Njagi	<a href="mailto:ronnynjagi@yahoo.com">ronnynjagi@yahoo.com</a>
Amsterdam	registration link	<a href="https://www.mrieducation.com/europe">https://www.mrieducation.com/europe</a>
Scandinavia (Norway)	contact Mr Hans Flaata	email <a href="mailto:hans@radiograf.no">hans@radiograf.no</a>
UK	registration link	<a href="http://www.mrieducation.com/uk/">http://www.mrieducation.com/uk/</a>
USA	registration link	<a href="http://cvm.missouri.edu/mriinpractice/">http://cvm.missouri.edu/mriinpractice/</a>

If your country is not listed above and you would like us to run a course, why not consider a partnership with MRI in Practice - contact us!

For up-to-the-minute venue location info, you can access our world venue map [here](#).



## What makes our course the best MRI course in the World?



If you are trying to decide between MRI in Practice and another course, you will want to make a sound, evidence-based decision. please print out this quick summary to see how we compare to other courses on the following important points:

**The Course** MRI in Practice has been running continuously for over 25 years (formerly known as the Oxford MRI Course) and has been taught in 20 countries across 5 continents. We have presented in the UK since 1992, mainland Europe since 2005 and Australia since 2004. We engage and educate hundreds of delegates per year, and their feedback sheets consistently rate our lectures as being excellent. Unlike many other MRI courses, MRI in Practice is completely independent of any private “learning” company or institution. This is most important, because we can guarantee that our delivery is unbiased and we are free to say what we want to say. In the UK, any profits made by the course, go to the good causes of our partner-charity Cobalt UK - not into the coffers of a private company.

**The Content** MRI in Practice - The Course is based on the the World's best selling MRI book\*. MRI in Practice is consistently at the top of its league on the Amazon.com bookstore and overwhelmingly attracts five star reviews from the public, which for us, are the ones that count. It outsells its next closest rival (Handbook of MRI Technique) many times over (in case you wondered - that book is also one of ours). MRI in Practice is famed as the reference text for practitioners taking the US registry exam - so you can rest assured that our course content is tried, trusted and relevant. You don't have to take our word for it though - this course has been accredited/endorsed by The UK College of Radiographers (CPD NOW), The British Institute of Radiology, Trinity College Dublin, The Australian Institute of Radiology, The University of Sharjah (Emirates), The Romanian Radiology Society/College of Physicians, the American Society of Radiologic Technologists and many other respected institutions.

**The Presentation** MRI in Practice - The Course has evolved over the years, always taking advantage of the very latest technology. We were using data projection before anyone else (as long ago as 1997), and our computer graphics have also developed in line with broadcast production values. Having taken advice from experts in the cinema and TV industries, the latest version of the course utilises over 300 computer generated imagery models, rendered into photo-realistic HD - you can see some small teasers in this brochure (pages 6, 8 and 10). The lectures are screened using state-of-the-art presentation software and hardware over a bright, sharp, digital projector. Delegates repeatedly tell us that our 3D graphics help to clarify difficult concepts, by bringing them to life in a way that a conventional book or PowerPoint lecture can never achieve. That said - to give you the best of both worlds - we usually throw in a free copy of our book\* so you won't need to sit and scribble copious course notes.

**The Presenters** Some courses rely on the good-will of amateur external speakers, so the quality can vary from course-to-course. MRI in Practice is consistently presented by authors Dr Catherine Westbrook and Dr John Talbot. We firmly believe that radiographers should be taught by radiographers; it seems obvious, we speak the same language, and can apply the basic principles to the real world of scanning and patient care. It goes without saying that the presenters should know their subject, Cathy and John are both clinical MRI specialists, but are also both educated in MRI to Masters level. It is (understandably) essential that course presenters should be qualified in teaching and learning. As academics, Cathy and John have formal post-graduate qualifications in teaching and learning, are both supervising students to Masters or Doctoral level and both hold Doctorates in education. We do not believe that any other course of this kind has a more highly-qualified faculty for presenting MRI education.

**If you are considering attending a course run by anybody else, we recommend that you check that the entire faculty are qualified to the level described above, otherwise it is highly unlikely that they are qualified to be selling educational services, or creating and presenting educational materials.**

## Geographic Variations to the Programme

In some countries we offer a three-day version of the course.

MRI in Practice three-day programme	Day One	Day Two	Day Three
9.00 to 10:30	Basic Principles and Image Contrast Westbrook	Spatial Encoding Talbot	k-Space 01 Westbrook
Break			
10:45 to 12:00	Equipment Talbot	Image Artefacts Talbot	k-Space 02 Westbrook
Lunch			
14.00 to 15.30	Spin Echo Sequences Talbot	Image Optimisation Westbrook	Gradient Echo 2 Westbrook
Break			
15.45 to 17.00	MRI Safety Talbot	Gradient Echo Westbrook	Flow & MRA Talbot



\*The names MRI in Practice, and MRI in Practice / The Course are copyright (1992-Date) Blackwell Science (Wiley Books) & Catherine Westbrook.

All graphics in this brochure and in the course materials are copyright (1992-Date) Blackwell Science (Wiley Books) and John Talbot. The course content is also protected by copyright, and as such, audio and video recording of the live course content is strictly prohibited (including, but not limited to the use of mobile phones, voice recorders and digital cameras).

Course pricing may vary according to venue charges, location, AV charges, catering etc. and is set by the individual organisers. MRI in Practice (The Book) may be offered inclusive of the course fee in certain venues. Please check with the course organiser at the time of application. In the unlikely event of a course cancellation the organiser is not responsible for reimbursing any pre-paid travel costs or accommodation costs incurred by delegates. These are not included in the course price and are the sole responsibility of the delegates. We recommend that you take out personal insurance to cover such losses.

The course materials are updated constantly, to keep pace with changes within the field of MRI and to take advantage of the latest presentation technology and as such the course content may vary over time. The example programme provided on page 3 is indicative of a typical UK course delivery. The length, order, content and timing may vary slightly from country to country depending on the requirements of the local organiser, sponsors, climate and cultural norms. The international versions of the course are not usually offered on a flexible attendance basis.

Our books may be offered as course notes on some course deliveries and in some countries. These are provided free of charge at our discretion. They are not “automatically included” or “included in the course fee”. If you wish to check whether a free book is offered, please contact the course organiser before applying.

MRI in Practice was formerly known as “The Oxford MRI course”, but is not connected with the currently running course of that name. The new Oxford MRI Course is a clinical course, principally aimed at radiologists. Cathy Westbrook and John Talbot both lecture on the new Oxford MRI Course, but note that this is NOT the same course as MRI in Practice.

Some deliveries of the MRI in Practice course are kindly sponsored and organised by Philips Medical Systems, under the title of The Essentials of Philips in MRI - a version of the course that is contextualised for Philips MRI users. Some of our international course organisers also rely on sponsorship from private medical companies however MRI in Practice - The Course is completely independent of any private company, healthcare provider or equipment/consumables manufacturer.

As senior lecturers in under-graduate and post-graduate MRI pathways, Cathy and John are well placed to provide delegates with information about CPD and formal post-graduate education options. MRI in Practice is NOT formally affiliated with any educational institutions.

Statements relating to the popularity of the book MRI in Practice are based on sales figures from Amazon.com.

MRI in Practice is a eco-conscious course, we always seek to offset our carbon footprint and would encourage you not to print this brochure, but to share it electronically with anyone you feel might be interested.