

# Hong Kong Institution of Physicists in Medicine

## Training Course on Physics of MR Imaging

### Course Content

#### 1. MRI Instrumentation and Basic Safety

Introduction to main components of MRI scanner (magnet, gradient and RF systems) and to discuss how the operation of these systems has a direct relationship with MRI safety.

#### 2. Practical MRI Safety

In this part of the lecture, we shall further explore MRI safety from a clinical point of view. The theory behind RF heating will be explained to aid our understanding why some implants heat-up while others don't when exposed to similar MRI conditions. MRI safety recommendations by the ACR and contrast agents' safety in MRI will also be discussed.

#### 3. MRI Physics

Theory on the origin of MR signal will be explained. The mechanisms of spin relaxation will be discussed to show how this phenomenon leads to image contrast in MR imaging. Basic principles of spin-echo and gradient echo will be given.

#### 4. Theory of Image Formation

In this lecture, we will discuss how an image is formed in the imaging process. Concepts such as slice selection, phase encoding and frequency encoding will be explained.

#### 5. Basic MRI Sequences

Commonly used pulse sequences in MRI will be discussed as well as the main types of image contrast derived from these pulse sequences will be explored. Technical terms such as TR and TE and how these parameters relate to image contrast in MRI will be explained.

#### 6. Advanced MRI Sequences

Here we will further explore pulse sequences used in MRI that allow clinicians to derived important physiological information to aid diagnosis. How echo-planar imaging is used to obtain functional information in the imaging process will be discussed.

#### 7. Functional MRI Applications

DWI, BOLD, Perfusion-weighted MRI, DCE-MRI and MRS. In this last lecture, we will explore some of the most commonly used techniques that could improve the diagnostic accuracy of MR imaging. Examples showing how diffusion-weighted imaging may be used to improve the detection of cancer in the brain, breast, prostate and head and neck will be given. BOLD imaging for brain function mapping will be explained and examples showing how this technique is relevant in neuro-surgery will

be discussed. Using contrast injection, we will show how perfusion-weighted MRI and dynamic-contrast enhanced (DCE)-MRI may be useful for the assessment of tumours in the brain, breast and prostate. Finally, we will also discuss how proton MR spectroscopy may be useful to characterize lesions and how this technique may also be used to monitor treatment response.

**Date, Time and Venue:**

**The course will be held on:**

Date	Time
9 November 2013	2:00pm-6:00pm
16 November 2013	2:00pm-6:00pm

**Duration of course:**

8 hours lectures and Q&A

**Venue:**

Room 1102, 11/F, Li Shu Pui Block,  
Nursing School, Hong Kong Sanatorium & Hospital

**Speaker**

David Yeung, Ph.D.  
Physicist  
Medical Physics Unit  
Prince of Wales Hospital

**Target participants:**

Physicists, doctors, radiographers, radiation therapist, biomedical engineers.  
Preference will be given to applicants who are currently working with imaging and radiation therapy in hospital environment.

**Assessment:**

Open book MCQ examination at 5:00pm on 16 November 2013.

**Accreditation:**

This course has been approved by the Hong Kong Institution of Physicists in Medicine.

8 Cat. A CME credits have been approved by HK College of Radiologists (CME approval code: AM42250C)

8 CPD credits approved by Hong Kong Radiographer's Board

8 CMD units approved by Medical Dosimetrist Certification Board (approval code: MDCB20130707)

**Teaching Medium**

The course will be conducted in English

**Tuition Fee:**

HKD \$300 (HKIPM member)

HKD \$600 (member of HKART and HKRA)

HKD \$2,000 (NON-HKIPM member)

\* A 50% discount will be given to HKIPM members from the hospital that provides venue for the training.

**Enrollment:**

Completed registration form shall be sent with a cheque for the tuition fee to Ms. Ruby Ho, Secretary of the Hong Kong Institution of Physicist in Medicine at the address give below. The cheque should be crossed and made payable to "Hong Kong Institution of Physicists in Medicine". (Full payment must be made and no refund for withdrawal will be entertained due to any circumstances).

Ms. Ruby Ho  
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Hong Kong Sanatorium & Hospital  
2 Village Road  
Happy Valley  
Hong Kong Island .

**Closing Date for Application:**

Saturday 2 November 2013