HKCRRT Certified Magnetic Resonance Imaging Radiographers

1. Admission of Members

1.1 A candidate may admit as a Member of the HKCRRT (Magnetic Resonance Imaging) and is entitled to use the title MHKCRRT(MRI) if satisfying the enlisted requirements.

1.2 Being a Radiographer registered with the Hong Kong Radiographers Board; **AND**

1.3 Have had 5 years of post-registration working experience in radiography, medical imaging or radiotherapy; **AND**

1.4 Academic requirements

1.4.1 A recognized Master degree or above in Magnetic Resonance Imaging; **OR**

1.4.2 A recognized Bachelor degree in medical imaging or related fields or Professional Diploma in Diagnostic Radiography (PDDR) of the Hong Kong Polytechnic University or equivalent, plus a Magnetic Resonance Imaging specialist qualification recognized by the College (as outlined below in Section 2); **AND**

1.5 Have completed the required clinical training or experience (as outlined below in Section 3); **AND**

1.6 Being recommended by the Council.

2. Part A: Academic Requirements

Syllabus

(A) MRI Physical Principles

- Nuclear physics
- Relaxation mechanism
- Spatial encoding of MRI signals
- K-space sampling techniques
- Fourier transformation
- Image contrast mechanisms
- Image quality optimization
- Image compensation techniques – flow compensation, spatial saturation, spectral saturation, respiratory and cardiac gating / triggering, navigator echo, magnetization transfer etc.

(B) MRI Instrumentation

- Design of various magnet system used in MRI
- Spatial encoding gradient coils
- Radiofrequency system including phase array coils
- Basic quality assurance of MRI system

(C) MRI Safety

- Effect of static magnetic field
- Effect of time-varying gradient magnetic field

- Effect of radiofrequency field
- Magnetic and radiofrequency shielding and its consequences
- Cryogen-related issues
- Safety concerns of MRI site planning
- Patient screening
- Basic emergency procedures

(D) MRI Contrast Media

- Extra-cellular contrast agents
- Tissue-specific contrast agents
- Intravascular or blood pool contrast agents
- Positive & negative contrast agents
- Safety of MRI contrast agents

(E) Imaging Pulse Sequences

- MRI pulse sequence structure, design and imaging characteristics
- Concept of pulse sequence diagram
- Implications of changing pulse sequence parameters such as TR, TE, flip angle etc.
- Spin echo and fast spin echo imaging
- Gradient echo imaging
- Inversion recovery sequence
- Echo Planar Imaging (EPI)
- Diffusion weighted imaging (DWI)
- Diffusion tensor imaging (DTI)
- Perfusion imaging
- Single- and multi-voxel MR spectroscopy
- Flow dependent MR angiography / venography
- Contrast-enhanced MR angiography / venography
- Time-resolved imaging of contrast kinetics
- Parallel imaging techniques

(F) MRI Artifacts and Related Compensation

- Recognition of imaging artifacts induced by the system hardware, pulse sequences, poor operator choices, physiological and patient motion
- Basic principles of MRI artifacts and corresponding compensation techniques
- Motion artifacts
- Aliasing or wrap-around artifacts
- Magnetic susceptibility artifacts
- Gibbs or truncation artifacts
- Chemical shift artifacts
- RF leakage or Zipper artifacts
- Moire fringes
- Magic angle artifacts
- Other imaging artifacts due to hardware failure

(G) MRI Anatomy and Pathology

- Neuro-anatomy including grey/white matter differentiation, ventricular system and vascular structures
- Spinal anatomy

- Musculoskeletal anatomy
- Body anatomy including thorax, abdomen and pelvis
- Common MRI pathologies and their MRI appearance

3. Part B: Clinical Requirements

3.1 Candidates are required to complete 300 MRI examinations within a 2-year period. 300 MRI examinations shall include:

- Not less than 120 examinations of head and neck
- Not less than 80 examinations of spine
- Not less than 60 examinations of musculoskeletal regions
- Not less than 40 examinations of thorax, abdomen and pelvis

3.2 The clinical component requires the candidate's Supervisor to acknowledge completion of the required clinical examinations.

4. HKCRRT Certification Examination for MR

4.1 A MRI specialist qualification is available to candidates who have attained a grade of 75% or above in an examination set by the MRI Faculty Committee of HKCRRT **AND** performed the required clinical training as outlined in Section 3.

4.2 The formal examination will involve a 3-hour paper of not exceeding 150 multiple choice questions covering topics such as MRI safety, MRI physical principles, imaging pulse sequences, MRI instrumentation, imaging artifacts, MRI contrast media, MRI anatomy and pathology.

4.3 The approximate percentages of questions related to each topic are listed below:

MRI physical principles	*20%*
MRI instrumentation	*10%*
MRI safety	*10%*
MRI contrast media	*5%*
Imaging pulse sequences	*20%*
MRI artifacts	*15%*
MRI anatomy and pathology	*20%*
	100%

5. Admission of Fellows

5.1 A candidate may admit as a Fellow of the HKCRRT and is entitled to use the title FHKCRRT (Certified MRI Radiographer) if satisfying the enlisted requirements.

5.2 Being a Radiographer registered with the Hong Kong Radiographers Board; **AND**

5.3 In possession of the academic & clinical requirements:

5.3.1 A recognized Doctorate in Magnetic Resonance Imaging with 8 years of post-registration clinical experience; **OR**

5.3.2 A recognized Master degree in Magnetic Resonance Imaging or a MRI specialist qualification recognized by the HKCRRT; plus 3-year full time equivalent post specialization clinical experience of MRI; **AND**

5.4 2 publications in peer-reviewed journals; **AND**

5.5 2 episodes in teaching / lecturing / presentation in open conferences; **AND**

5.6 Being recommended by the Council.

5.7 The clinical experience component requires the candidate's Specialty Supervisor to acknowledge completion of the requirements.

5.8 If applicants apply for fellowship directly, the clinical requirements as stated in Section 3 should be fulfilled.

6 Continuing Professional Development (CPD)

6.1 Once certified in Magnetic Resonance Imaging (MRI), the radiographer must complete 45 CPD credits in each triennium, of which 15 credits are relevant to MRI in order to maintain the certified specialist credential.