

# HONG KONG COLLEGE OF RADIOLOGISTS

## Higher Training (Radiology)

### Subspecialty Training in Neuroradiology

[This document should be read in conjunction with the *General Guidelines on Higher Training (Radiology)*]

#### 1. INTRODUCTION

- 1.1 Neuroradiology is a subspecialty that involves diagnostic imaging and interventional radiology in the management of diseases of the central nervous system and spine.
- 1.2 Although diagnosis relies heavily on cross-sectional imaging, advances in technology enables not only morphological and anatomical diagnosis, but also physiological and functional diagnosis such as spectroscopy, cortical mapping and measurement of regional cerebral blood flow by MRI and PET.
- 1.3 Neuroradiology is a category A subspecialty.

#### 2. OBJECTIVES

At the completion of the training programme, trainees are expected to:

- (a) have acquired the knowledge of basic neuroanatomy and clinical knowledge relevant to neuroradiology;
- (b) be able to give advice on the best imaging method based on individual needs;
- (c) have a thorough understanding of the indications, contraindications, limitations and potential complications of neuroradiologic imaging;
- (d) have acquired some knowledge of the indications, contraindications, costs and risks of neuro-interventional procedures.

#### 3. TRAINING REQUIREMENTS

##### 3.1 TRAINING CENTRE REQUIREMENTS

###### 3.1.1 Equipment Requirements:

- (a) CT scanner with multidetector/spiral capability.
- (b) Ultrasound equipment with colour Doppler facility.
- (c) C-arm angiographic equipment.
- (d) MR scanner with at least one Tesla field strength
- (e) Access to nuclear medicine facilities for performance of radionuclide investigations.

###### 3.1.2 Clinical/Radiological Service Requirements:

- (a) Neurosurgical department or dedicated unit in Surgical department.
- (b) Neurologist service from Medical department.

- (c) Paediatric Neurology service, Psychiatry department, and Neuropathology service are optional though desirable.
- (d) Neurointerventional service.

### 3.2 TRAINER REQUIREMENTS

- (a) All trainers should have at least 2 years of continuous experience in Neuroradiology after the award of Fellowship or equivalent.
- (b) One trainer should head the team.
- (c) Each trainer should not involve in more than two subspecialty teams.

### 3.3 DURATION OF TRAINING

6 months of training is desirable; 3 months of training acceptable.

### 3.4 DUTY SESSIONS

Perform five or more neuroradiology related sessions per week, among which there should be at least

- 1 CT session,
- 1 MRI session and
- 1 angiography session.

The other 2 sessions can be CT, MRI or angiography.

### 3.5 MINIMUM NUMBER OF EXAMINATIONS / PROCEDURES REQUIRED FOR 6 MONTHS OF TRAINING

<b>Examination/Procedure</b>	<b>Training</b>	<b>Requirement (Exams)</b>
Diagnostic angiograms	Perform and report	60
CT examinations <i>Including</i> Brain Orbit Spine	Perform and report	300 150 20 20
MR examinations <i>Including</i> Brain Orbit IAM Pituitary Spine Others	Perform and report	350 150 25 20 25 50 10
Ultrasound examinations Ultrasound of the infant brain Doppler ultrasound of the carotid / vertebral arteries	Perform and report	10 20
Neurointerventional procedures	Observe	10

- 3.5.1 Please refer to the following appendices for the RIS coding:  
 Angiogram (Appendix I)  
 CT examination (Appendix II)

MR examination (Appendix III)  
US examination (Appendix IV)  
Interventional procedures and optional requirements (Appendix V)

3.5.2 The requirement for 3 months of training will be 50% that for 6 months of training.

3.6 CLINICAL RADIOLOGICAL CONFERENCES AND OTHER MEETINGS

Present cases in neuroradiology related CRC held at least twice a month.

3.7 PRESENTATIONS AND PUBLICATIONS

Please refer to the General Guidelines in Higher Training.

3.8 OTHER REQUIREMENTS

3.8.1 The appendices must be completed and attached to the trainee's logbook to reflect the training experience.

3.8.2 Optional exposure requirements:

It would be an advantage if the trainee has the following working experience:

- (a) Reporting of plain radiographs in the investigation of neurological disorders,
- (b) Transcranial Doppler of intracranial circulation,
- (c) Orbital ultrasonography,
- (d) Conventional myelography,
- (e) PET or SPECT isotope brain scanning,
- (f) Imaging for stereotactic brain biopsy/planning,
- (g) Neuro-navigation procedures.

**Trainee Experience in Neuroradiology Training****[Angiograms]**

Trainee's Name:

Training Period: \_\_\_\_\_ to \_\_\_\_\_

***Perform and report at least 60 examinations (performed & report) for 6 months or  
30 examinations(performed & report) for 3 months***

<i>RIS Coding</i>	<i>Name of Procedures</i>	<i>No. of Examinations</i>
6105	Carotid arteriogram	
6106	Vertebral arteriogram	
6113	Spinal arteriogram	
6201	Orbital venogram	
6202	Jugular venogram	
	<b>Total</b>	

***Other Angiogram examinations***

<i>RIS Coding</i>	<i>Name of Procedures</i>	<i>No. of Examinations</i>
6102	Arch aortogram	
6107	Subclavian arteriogram	
	<b>Total</b>	

***Total number of Angiogram examinations experienced***

***in \_\_\_\_\_ months is \_\_\_\_\_.***

(Signed) \_\_\_\_\_

**Neuroradiology Trainer**

**Trainee Experience in Neuroradiology Training****[CT Examination]**

Trainee's Name:

Training Period: \_\_\_\_\_ to \_\_\_\_\_

**Overall Requirement: Perform and report at least 300 examinations for 6 months or 150 examinations for 3 months****Brain: At least 150 examinations for 6 months or 75 examinations for 3 months**

<i>RIS Coding</i>	<i>Name of Procedures</i>	<i>No. of Examinations</i>
4101	Brain plain	
4102	Brain +con.	
	<b>Total</b>	

**Orbits: At least 20 examinations for 6 months or 10 examinations for 3 months**

<i>RIS Coding</i>	<i>Name of Procedures</i>	<i>No. of Examinations</i>
4105	Orbit plain	
4106	Orbit +con.	
	<b>Total</b>	

**Spine: At least 20 examinations for 6 months or 10 examinations for 3 months**

<i>RIS Coding</i>	<i>Name of Procedures</i>	<i>No. of Examinations</i>
4305	Cervical spine plain	
4306	Cervical spine +con.	
4307	Thoracic spine plain	
4308	Thoracic spine +con.	
4309	Lumbar spine plain	
4310	Lumbar spine +con.	
4311	LS spine plain	
4312	LS spine +con.	
4313	Sacrum plain	
4314	Sacrum +con.	
	<b>Total</b>	

**Others:**

<i>RIS Coding</i>	<i>Name of Procedures</i>	<i>No. of Examinations</i>
4103	Temporal plain	
4104	Temporal +con.	
4404	CT-Angio.	
4119	Brain Perfusion	
4120	Brain Perfusion+Diamox	
4121	Xenon Brain	
4122	Xenon Brain+Diamox	
	<b>Total</b>	

**Total number of CT examinations performed and reported  
in \_\_\_\_\_ months is \_\_\_\_\_.**

*(Signed)* \_\_\_\_\_

**Neuroradiology Trainer**

**Trainee Experience in Neuroradiology Training [MR Examination]**

Trainee's Name:

Training Period: to

**Overall Requirement: Perform and report at least 350 examinations in 6 months or 175 examinations for 3 months****Brain: At least 150 examinations for 6 months or 75 examinations for 3 months**

<i>RIS Coding</i>	<i>Name of Procedures</i>	<i>No. of Examinations</i>
8101	Brain plain	
8102	Brain+con.	
	<b>Total</b>	

**Orbits: At least 25 examinations for 6 months or 13 examinations for 3 months**

<i>RIS Coding</i>	<i>Name of Procedures</i>	<i>No. of Examinations</i>
8103	Orbit plain	
8104	Orbit +con.	
	<b>Total</b>	

**IAM: At least 20 examinations for 6 months or 10 examinations for 3 months**

<i>RIS Coding</i>	<i>Name of Procedures</i>	<i>No. of Examinations</i>
8105	IAM plain	
8106	IAM +con.	
	<b>Total</b>	

**Pituitary: At least 25 examinations for 6 months or 13 examinations for 3 months**

<i>RIS Coding</i>	<i>Name of Procedures</i>	<i>No. of Examinations</i>
8107	Pituitary plain	
8108	Pituitary +con.	
	<b>Total</b>	

**Spine: At least 50 examinations for 6 months or 25 examinations for 3 months**

<i>RIS Coding</i>	<i>Name of Procedures</i>	<i>No. of Examinations</i>
8201	Cervical spine plain	
8202	Cervical spine +con.	
8203	Thoracic spine plain	
8204	Thoracic spine +con.	
8205	Lumbar spine plain	
8206	Lumbar spine +con.	
8207	Survey plain	
8208	Survey +con.	

8210	MR Myelography	
	<b>Total</b>	

**Appendix III (Cont'd)**

**Others: At least 10 examinations for 6 months or 5 examinations for 3 months**

<i>RIS Coding</i>	<i>Name of Procedures</i>	<i>No. of Examinations</i>
8109	C-P Angle plain	
8110	C-P Angle+con.	
8113	Brainstem plain	
8114	Brainstem +con.	
8501	Plain MR angiography	
8520	Plain MR Venography	
8521	MRA/V (Head&Neck)+con.	
8601	Brain voxel Proton MR Spectroscopy	
8603	Brain mapping studies	
8608	Diffusion weighted imaging	
8609	Diffusion Tensor Imaging	
8610	MR Perfusion Imaging	
8611	Flow analysis	
	<b>Total</b>	

**Total number of MRI examinations performed and reported in \_\_\_\_\_ months is \_\_\_\_\_.**

(Signed) \_\_\_\_\_

**Neuroradiology Trainer**



**Trainee Experience in Neuroradiology Training**

**[Ultrasound Examination]**

Trainee's Name:

Training Period: \_\_\_\_\_ to \_\_\_\_\_

**Perform and report at least 40 examinations for 6 months or 20 examinations for 3 months**

**Brain: At least 10 examinations for 6 months or 5 examinations for 3 months**

<i>RIS Coding</i>	<i>Name of Procedure</i>	<i>No. of Examinations</i>
3201	Infant brain	

**Doppler Examination: At least 20 examinations for 6 months or 10 examinations for 3 months**

<i>RIS Coding</i>	<i>Name of Procedures</i>	<i>No. of Examinations</i>
3302	Doppler carotids	

**Optional:**

<i>RIS Coding</i>	<i>Name of Procedure</i>	<i>No. of Examinations</i>
3303	Doppler orbits	
3305	Doppler Transcranial	
	<b>Total</b>	

**Total number of Ultrasound examinations performed and reported in \_\_\_\_\_ months is \_\_\_\_\_.**

(Signed) \_\_\_\_\_

**Neuroradiology Trainer**

**Trainee Experience in Neuroradiology Training**

Trainee's Name:

Training Period: \_\_\_\_\_ to \_\_\_\_\_

(A) Total number of Interventional Neuroradiology procedures observed in \_\_\_\_\_ months is \_\_\_\_\_.

(B) Optional Exposure

<i>RIS Coding</i>	<i>Name of Procedures</i>	<i>No. of Examinations</i>
1601, 1602, 1603, 1604, 1610, 1611	Plain film reporting	
2301, 2302, 2303, 2304	Myelography	
3303	Doppler orbits	
3305	Transcranial Doppler	
8101, 8102	Viewing Wand planning	
8604	Stereotactic planning	
8606	Multi-Nuclear MR Spectroscopy	
	Neuro-navigation	
9001	SPECT	
	PET	

(Signed) \_\_\_\_\_

**Neuroradiology Trainer**