

# 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, clinical knowledge relevant to neuroradiology and interpretation of the various imaging modalities relevant to the diseases of the central nervous system and spine;
- (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) Multidetector CT scanner.
- (b) Ultrasound equipment with colour Doppler facility.
- (c) Biplane Digital subtraction angiographic equipment is preferable.
- (d) MR scanner with at least 1.5 Tesla field strength.
- (e) Access to nuclear medicine facilities for performance of radionuclide

investigations.

3.1.2 Clinical/Radiological Service Requirements:

- (a) Neurosurgical 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

As specified in the General Guidelines on Higher Training (Radiology).

3.3 DURATION OF TRAINING

6 months of training is desirable; 3 months of training is 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	Perform and report	300
<i>Including</i> Brain		150
Orbit		20
Spine		20
CT angiogram		40
MR examinations	Perform and report	400
<i>Including</i> Brain/Brain stem		150
Orbit		25
IAM		20
Pituitary		25
Spine		50

MR angiography (plain/contrast)		20
Single/Multi-Voxel MR spectroscopy		10
Diffusion weighted imaging		50
Functional MRI (brain mapping)		2
MR brain perfusion		2
CSF flow analysis		2
Ultrasound examinations	Perform and report	40
Ultrasound of the infant brain		10
Doppler ultrasound of the carotid / vertebral arteries		20
Neurointerventional procedures	Assist or Perform under direct supervision by radiologists	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 on Higher Training (Radiology).

### 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/CT myelography,
- (e) PET or SPECT isotope brain scanning,

- (f) Imaging for stereotactic brain biopsy/planning,
- (g) Neuro-navigation procedures.
- (h) Vessel wall imaging
- (i) Observing open neurosurgical operations

*Last version endorsed by HKAM Council Meeting on 17 November 2011 and effective from 1 July 2012*  
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**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	
	<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.	
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.	
4119	Brain Perfusion	
4120	Brain Perfusion+Diamox	
4404	Contrast CT-Angio.	
4419	Plain Neurosurgery stereotactic planning	
4420	Contrast Neurosurgery stereotactic planning	
	<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 400 examinations in 6 months or 200 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.	
8113	Brain stem and craniocervical junction plain	
8114	Brain stem and craniocervical junction plain + 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/CP angle and brain stem: 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/CP angle plain	
8106	IAM/CP angle + 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>	

**Special MRI Examination: At least 90 examinations for 6 months or 45 examinations for 3 months (Please see the table in section 3.5 for the minimum requirement for each subtype of special MRI examination)**

<i>RIS Coding</i>	<i>Name of Procedures</i>	<i>No. of Examinations</i>
8501	Plain MR Angiography	
8521	MRA/V (Head&Neck) + con.	
8601	Single voxel Proton MR Spectroscopy	
8605	Multi-voxel Proton MR Spectroscopy	
8608	Diffusion Weighted Imaging(Brain)	
8609	Diffusion Tensor Imaging (optional)	
8603	Functional MRI (Brain mapping)	
8610	MR Brain Perfusion Imaging (including Arterial Spin Labelling)	
8611	Quantitative 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 assisted or performed under direct supervision by radiologists 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	
8520	Plain MR Venography	
9001	SPECT	
9004	SPECT/CT without CT reporting	
9005	SPECT/CT with CT reporting	
9020	Cisternography In-DTPA	
9021	Cisternography Tc-DTPA	
9022	Cisternography In-DTPA CSF Leak	
9023	Cisternography Tc-DTPA CSF Leak	
9040	Cerebral perfusion (HMPAO)	
9040.01	Cerebral perfusion (HMPAO) with Diamox	
9041	Cerebral perfusion (HMPAO with stabilising agent)	
9042	Cerebral perfusion (HMPAO with stabilising agent) + Diamox	
9045	Cerebral perfusion (ECD)	
9046	Cerebral perfusion (ECD) + Diamox	
9050	Dacryoscintigraphy	
9099	Miscellaneous Neurology	
9P13	Brain PET-CT FDG (3D)	
9C13	Brain PET-CT FDG (3D) + con.	
9P19	Miscellaneous Neurology PET-CT	
9C19	Miscellaneous Neurology PET-CT + con.	
9P90	Regional Brain PET-CT scan	
	<b>Total</b>	

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

Neuroradiology Trainer