

HONG KONG COLLEGE OF RADIOLOGISTS

Higher Subspecialty Training in Computed Tomography

[The following guidelines should be read in conjunction with the *Guidelines on Higher Specialist Training (Radiology)*]

1. INTRODUCTION

1.1 Computed tomography (CT) is a major modality of imaging technique applicable in emergent and elective investigations as well as in imaging guidance for interventional procedures. The introduction of multidetector scanners with dual energy scanning capability in recent years has opened up new fields of clinical applications.

1.2 As the trainee has been exposed to CT imaging in Basic Training, during this technique-based higher training in CT, emphasis will be placed on the following:

- (a) Appropriate use of CT in patient management
- (b) Limitations of CT imaging in general
- (c) In-depth knowledge of radiation dose reduction techniques
- (d) In-depth knowledge of workflow, scanning protocols and scanning parameters
- (e) In-depth knowledge of scanners with latest technology in terms of differences and limitations in technology implementation
- (f) In-depth knowledge of latest clinical applications in patient management
- (g) Awareness of recent advances in CT radiomics
- (h) Mastery of advanced software applications on post-processing workstations
- (i) In-depth knowledge of networking between CT scanners, post-processing workstations and archiving systems
- (j) Quality assurance

1.3 Computed tomography is classified by the College as a technique-based subspecialty (Category B).

2. OBJECTIVES

2.1 The trainee should understand the appropriate use of CT in different clinical scenarios with consideration of the ALARA principle as well as other imaging modalities available in the department. Vetting of CT requests is an integral part of training.

2.2 The trainee should be aware of limitations of CT and give advice to referring clinicians regarding the most appropriate imaging modality for the clinical scenario on hand.

2.3 The trainee should have in-depth knowledge of various radiation dose reduction techniques applicable to the scanner, in particular their limitations and possible

artefacts if not used appropriately. Coaching by physicists, if available, on the subject is desirable.

- 2.4 The trainee should be familiarized with workflow in the department, scanning protocols and scanning parameters and give advice on whether changes are required for different clinical scenarios on hand.
- 2.5 The trainee should have in-depth knowledge of optimal utilization of contrast media used in CT, their precautions, contraindications and associated risks / reactions. The trainee should be competent in the management of related adverse reactions.
- 2.6 The trainee should master basic post-processing techniques including but not limited to MPR, CPR, MIP, MinIP and volume rendering. Trainees should be aware of their clinical use and their limitations.
- 2.7 The trainee should master advanced post-processing techniques on workstations including but not limited to CT endoscopy, CT subtraction angiography, CT perfusion studies, dual energy applications such as virtual noncontrast and virtual monoenergetic image interpretation, material-specific image interpretation, urinary calculi characterization, differentiation of gout and pseudogout, bone marrow oedema detection and metal artefact reduction study in MSK imaging. Trainees should be aware of their clinical use and their limitations. Coaching may be required from the trainer, CT radiographers and application specialists in the use of related software.
- 2.8 The trainee should learn techniques of CT-guided interventional procedures with or without CT fluoroscopic assistance. The trainee should be aware of potential complications and their management.
- 2.9 The trainee should acquire in-depth knowledge of networking between CT scanners, post-processing workstations and archiving systems in order to promote reliable and efficient image flow in the department.
- 2.10 The trainee should acquire in-depth knowledge of CT scanners with latest technology from different vendors in terms of differences and limitations in technology implementation.
- 2.11 The trainee should be familiarized with the process of procurement of CT scanners, site preparation and equipment maintenance (optional).
- 2.12 The trainee should promote quality assurance and audit activities, and identify facets of CT service that can be improved.

3. TRAINING REQUIREMENTS

3.1 TRAINING CENTRE REQUIREMENTS

The trainee should have access to a modern CT scanner with at least one that is capable of dual energy scanning. The scanner should be able to perform:

- (a) Dual energy scanning
- (b) CT angiography with subtraction techniques
- (c) CT perfusion studies
- (d) Cardiac CT studies
- (e) CT-guided interventional procedures
- (f) CT fluoroscopy (optional)

3.2 TRAINER REQUIREMENTS

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

3.3 DURATION OF TRAINING

Training in the CT subspecialty can be taken in six months (extensive training) or in three months (short training).

3.4 DUTY SESSIONS

3.4.1 Irrespective of the training duration, the training program should comprise appropriate number of CT sessions per week in order to fulfil the minimum numbers of examinations required in Point 3.5. The trainee's duties should include vetting of CT requests, prescribing scanning protocols for patient with different indications, interpretation of imaging findings, preparation of reports, and performing CT-guided interventional procedures.

3.4.2 Participation in CT service management and quality assurance.

3.5 MINIMUM NUMBER OF EXAMINATIONS REQUIRED

3.5.1 Minimal number of cases for a six-month training:

Examination	RIS Coding*	Requirement
Brain	4101, 4102, 4119-4122	400
Head & Neck	4103 – 4116, 4123, 4124	50
Chest Abdomen Pelvis	4201-4225	600
Musculoskeletal	4301 – 4316	15
CT-guided IR procedures	7103, 7108, 7111	10
Miscellaneous	4401-4429	Please see below

At least 100 CT cases should involve advanced post-processing including, but not limited to, the following (the trainee should manually log case numbers and nature of studies if no specific RIS codes are available):

- 1. CT angiography of various body regions
- 2. Cardiac CT

3. CT endoscopy
4. CT perfusion studies
5. Virtual noncontrast, virtual monoenergetic, and material-specific image interpretation
6. Urinary calculi characterization
7. Gout and pseudogout differentiation
8. Bone marrow oedema detection

3.5.2 For a three-month period rotation, 50% of the above numbers is acceptable.

3.6 CLINICAL RADIOLOGICAL CONFERENCES AND OTHER MEETINGS

For six-month training, the trainee is expected to chair or present CT case materials in at least six clinico-radiological meetings.

3.7 PRESENTATIONS AND PUBLICATIONS

Please refer to the Guidelines on Higher Specialist Training (Radiology).

3.8 OTHER REQUIREMENTS

3.8.1 The trainee will select, jointly with the trainer, a facet of CT service for quality improvement activity and will deliver a presentation on the results and recommendations.

3.8.2 The program should also encompass other academic activities, including audit and quality assurance activities, management of and contribution to film museum and teaching files.

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