Certification Examination of Computed Tomography (CT)

Objective

The objective of the Certification Examination of Computed Tomography (CT) is to provide a channel for Radiographers to attain the recognized standard in Computed Tomography to be admitted as a Member of the Hong Kong College of Radiographers and Radiation Therapists (HKCRRT) (Computed Tomography) MHKCRRT(CT)

Entry Requirements

- Being a Radiographer registered with the Hong Kong Radiographer’s Board
- 5 years of post-registration working experience in medical imaging
- 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

Format of Certification Examination

150 Multiple Choice Questions covering basic principles and clinical applications of CT such as:

- CT system design and instrumentation (10%)
- CT image reconstruction and quality assurance (20%)
- Clinical application in CT imaging (30%)
- CT anatomy and pathology (20%)
- Advance CT imaging and processing technique (10%)
- CT contrast media and application (5%)
- Radiation safety and dose optimization technique in CT (5%)

Duration of Examination

3 hours

Schedule of Examination

15 November 2014 (Saturday) 2:30pm – 5:30pm

HKCRRT_CT Faculty_Nov_2014
**Venue of Examination**
Room Y602, The Hong Kong Polytechnic University, Hung Hom, Kowloon

**Examination Fee**

$600
The first-year membership fee ($600) will be waived if the candidate can be admitted as a member of HKCRRT.

**Syllabus of Examination**

**(A) CT system design and instrumentation**
- Generations of CT scanners
- Nowadays state-of-art technology of CT system
- X-ray tube, filters and collimators
- Detectors
- Data Acquisition System

**Sample question**

*Which of the following is NOT an advantage of MDCT?*

a) Reducing scanning time  
b) Isotropic imaging  
c) Better surface display and volume rendering  
d) Reduce the concentration of contrast medium requirement  
e) Reduce movement artifact

**(B) CT image reconstruction and quality assurance**
- Factors affecting radiation attenuation through patient
- Linear attenuation coefficient
- CT voxel, projections and CT numbers
- Types of image reconstruction methods
- CT image qualities and methods of measurements
- Spatial resolution
- Contrast resolution
- Image noise
- Uniformity and linearity
- CT phantoms for quality assurance
- Types of QA testing
Sample question

For fixed kVp and mAs, the value of the standard deviation in a region of interest can be reduced by:

a) Increasing the slice thickness
b) Decreasing the slice thickness
c) Increasing the mA
d) Increasing the scan time
e) b, c and d

(C) Clinical application in CT imaging

- Patient preparation, contrast enhancement and scan protocols of:
  - head & neck region including orbit, face, paranasal sinuses, skull base, sella, temporal bone, oral cavity, pharynx, larynx, neck and salivary glands
  - thorax region including routine scan, high resolution scan, dissection, pulmonary embolism, pulmonary ablation, virtual endoscopy
  - abdomen & pelvis region including peritoneal cavity and vessels, liver, gall bladder, pancreas, spleen, kidneys, adrenals and gastrointestinal
  - musculoskeletal & spine region

Sample question

Prone positioning is useful in CT thorax imaging to

a) delineate tumour at the costo-marginal region
b) delineate pleural effusion from adhesion
c) differentiate atelectasis from lung nodule
d) all are true
e) (b) and (c) only

(D) CT anatomy and pathology

- Cross-sectional anatomy of:
  - head and neck regions
  - thorax, abdomen and pelvis regions
  - musculoskeletal & spine regions

- Common CT pathologies and their CT appearances

Sample question

Which of the following statement is true about abdominal aortic aneurysm?

a) >1.5 times of the original diameter
b) >2 times of the original diameter
c) >2.5 times of the original diameter
d) >3 times of the original diameter
e) None of the above

(E) Advance CT imaging and processing technique
- CT Cardiac imaging
- CT Perfusion studies
- CT Colonoscopy imaging
- CT Dental imaging
- CT Bone density measurement
- Common processing techniques of basic to advanced CT imaging

Sample question
QRS complex in the ECG pattern represents
a) atrial activation
b) atrioventricular conduction/ atrial contraction
c) ventricular activation
d) ventricular recovery
e) closure of aortic valve/ end of ventricular contraction

(F) CT contrast media and application
- X-ray photon attenuation by Compton reaction
- Factors affecting tissue attenuation and lesion detectability
- Different phases of intravenous contrast administration
- Contrast dosage calculation
- Contrast medium administration and helical CT

Sample question
The use of normal saline as a chaser after the contrast medium injection is to
a) dilute the contrast
b) better contrast bolus utilization
c) minimize streak artifact from right atrium
d) (a) & (b)
e) (b) & (c)

(G) Radiation safety and dose optimization technique in CT
- Factors affecting patient dose
- Dose measurement of CT scanning
- Radiation protective devices
- Radiation safety in CT suite
- Code of Practice of Radiation & Safety in HA Hospitals
- Dose optimization technique of CT scanning
Sample question
The three basic principles that guide radiation protection are:

a) time, distance & kVp
b) distance, shielding & mAs
c) time, kVp & mAs
d) time, distance & shielding
e) none of the above

Suggested Reading Materials
These reading materials would provide the candidates with a sound understanding necessary to complete the Certification Examination of Computed Tomography. The suggested texts and references are provided as alternative sources of information that will assist the candidates and are not considered to be mandatory reading.

◆ Spiral CT. Principles, Techniques, and Clinical Applications; Elliot K, R. Brooke Jeffrey; Lippincott – Raven, 1996
◆ Computer Tomography for Radiographers, Brooker, M.J. USA. MTP Press Limited. 1986
◆ Multidetector CT. Elliot K. Fishman & R.Brooke, Jeffrey, JR, Lippincott Williams & Williams 2004
◆ Clinical Applications of Cardiac CT, Cademartiri, Casolo, Midiri, Springer-Verlag 2007
Passing Mark and Membership of the Hong Kong College of Radiographers and Radiation Therapists

Candidates will be regarded as pass if they have attained a grade of 75% or above in the certification examination.

Candidates can be admitted as a Member of the Hong Kong College of Radiographers and Radiation Therapists (HKCRRT) (Computed Tomography) MHKCRRT(CT) if they have attained a grade of 75% or above in the certification examination AND achieved the requirements of CT clinical experience as set by HKCRRT. A Computed Tomography Certificate will be issued by HKCRRT for those candidates who attained a grade of 75% or above in the certification examination.

Requirements of Computed Tomography Clinical Experience

The candidates are required to complete 400 CT examinations within a 2-year period. The 400 CT examinations shall include:

- Not less than 150 CT examinations of head & neck
- Not less than 100 CT examinations of thorax, abdomen & pelvis
- Not less than 50 CT examinations of musculoskeletal regions
- Not less than 50 CT examinations of spine
- Not less than 50 CT examinations of CT angiography

The clinical component requires the candidate’s supervisor to acknowledge completion of the required clinical examinations.

(Please refer to Appendix I for the Statement of Clinical Training in Computed Tomography for Admission of Member of HKCRRT)
The Hong Kong College of Radiographers and Radiation Therapists

Statement of Clinical Experience in Computed Tomography for Admission of Member of HKCRRT

This statement must be completed in full and signed by the applicant and his/her supervisor before it can be processed. The HKCRRT reserves the right to request the applicant to provide the detailed records of clinical experience.

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<tr>
<th>To be completed by the applicant</th>
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<tr>
<td>Title (circle one): Mr.  Mrs.  Ms.  Dr.</td>
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<tr>
<td>Surname: _______________________ Given Name: _______________________</td>
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<tr>
<td>Address: ____________________________________________________________</td>
</tr>
<tr>
<td>Tel. (Work): ________________  Tel. (Mobile): ________________  E-mail: _____________</td>
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<tr>
<td>Certification Examination of CT of HKCRRT undertaken on ______________ (dd/mm/yy)</td>
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<td>I, _____________________________ certify that I have performed the followings:</td>
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<tr>
<td>● Not less than 150 CT examinations of head &amp; neck</td>
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<tr>
<td>● Not less than 100 CT examinations of thorax, abdomen &amp; pelvis</td>
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<td>● Not less than 50 CT examinations of musculoskeletal regions</td>
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<td>● Not less than 50 CT examinations of spine</td>
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<td>● Not less than 50 CT examinations of CT angiography</td>
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<td>during the 2-year period between ______________ (mm/yy) and ______________ (mm/yy)</td>
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<th>Supervisor’s Verification</th>
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<td>I, _____________________________ supervisor of the individual identified on the statement verify that the individual has successfully completed the clinical experience requirement during the time period described above.</td>
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<td>Signed: _____________________  Date: _____________________</td>
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<td>Position: _____________________  Name of Institution: _____________________</td>
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The Hong Kong College of Radiographers and Radiation Therapists

Certification Examinations
for

Magnetic Resonance Imaging & Computed Tomography

15 November 2014 (Saturday)  2:30pm – 5:30pm

Please complete in BLOCK LETTERS

Name (Dr./Mr./Mrs./Ms)*  ________________________________

Examination to join:  ☐ Magnetic Resonance Imaging  ☐ Computed Tomography

HKCRRT Membership:  ☐ Fellow  ☐ Member  ☐ Associate Member  ☐ Non-member

Hospital / Institution:  ________________________________  Position:  ________________________________

Tel. No. (Office):  ________________________________  Fax. No. (Office):  ________________________________

E-mail:  ________________________________

Examination Fees:  $600

Payment

By Cheque: addressed to “The Hong Kong College of Radiographers and Radiation Therapists”.
Send registration form together with the cheque by post to the HKCRRT Secretariat.

By ATM or Internet: transfer to HKCRRT account at HSBC, A/C: 808-356877-838
Post, fax or email the registration form and the printout receipt of bank payment to the HKCRRT Secretariat.

Deadline for registration: 1st November 2014

*Delete as appropriate