The Hong Kong College of Radiographers and Radiation Therapists

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

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.

- CAMRT CT Imaging I – Theory. Rob Gamberg, 1997
- Radiographic Contrast Agents. Jovitas Skucas, An Aspen Publication, 1989
- Spiral CT. Principles, Techniques, and Clinical Applications; Elliot K, R. Brooke Jeffrey; Lippincott – Raven, 1996
- Whole Body Computed Tomography. Otto H. Wegener, Blackwell Scientific Publication 1992
- 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
- Multidetector Computed Tomography Technology, Lorenzo Bonomo, The Royal Society of Medicine Press, 2003
- 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}

Appendix I

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.

To be completed by the applicant

Title (circle one): Mr. Mrs. Ms. Dr.

Surname: _____ Given Name: _____

Address:_____

_____

Tel. (Work): _____ Tel. (Mobile): _____E-mail: _____

Certification Examination of CT of HKCRRT undertaken on _____(dd/mm/yy)

I, _____ certify that I have performed the followings:

- **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**

during the 2-year period between _____ (mm/yy) and _____ (mm/yy)

Supervisor's Verification

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.

Signed: _____ Date: _____

Position: _____ Name of Institution: _____

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*

HKCRRT Secretariat, 22/F, Hang Seng Bank N.P. Branch Building, 339 King's Road, North Point, HK
Tel: 28051278 Fax: 27720730 Email: info@hkcrrt.org