CERTIFICATE PROGRAM

PET/CT CERTIFICATE

for the
NUCLEAR MEDICINE TECHNOLOGIST

CANDIDATE HANDBOOK
2025

Tel: 1-800-463-9729 or (613) 234-0012
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Introduction

Position Emission Tomography/Computed Tomography (PET/CT) has revolutionized medical diagnosis in many fields, by adding the precision of anatomical localization to functional imaging, which was previously lacking from stand-alone positron emission tomography (PET).

PET/CT is a medical imaging technique that allows for the functional imaging obtained by PET, which depicts the spatial distribution of metabolic or biochemical activity in the body, to be more precisely aligned or correlated with anatomic imaging obtained by computed tomography (CT). Two and three-dimensional image reconstruction following a procedure may be rendered as a function of a common software and control system of the PET/CT system.

In order to reflect the changes in technology and therefore resultant changes in practice, the CAMRT has revised the CT Imaging Certificate Program. Part of this revision was the development of a PET/CT certificate program for nuclear medicine technologists.

Candidates who successfully complete the didactic and clinical components from CAMRT are eligible to receive a Certificate in PET/CT and can use the credential "PET/CT".

Individuals with questions about certificate programs are encouraged to contact us. Email is preferred for the quickest service.

CAMRT
Tel: 1-800-463-9729 or (613) 234-0012
Email: specialtycertificates@camrt.ca.
Web site: ***www.camrt.ca***

Purpose of the Program

The intent of the certificate in PET/CT is to provide a mechanism for nuclear medicine technologists to demonstrate knowledge and competence in the field of PET/CT, to promote standards of excellence within this clinical area, and to identify those who have met a nationally recognized standard.

This certificate is intended to:

- be dynamic and progressive in nature
- address the current and future challenges in PET/CT
- provide a Canadian credential that is sought after by MRTs
- provide a Canadian credential that is advocated by employers
- provide an opportunity for continuing professional development for continued competence
- enhance safe and effective practice as described by the CAMRT Member Code of Ethics and Professional Conduct (https://www.camrt.ca/mrt-profession/professional-resources/code-of-ethics/)

The CTIC Committee strives to remain current with advancements in PET/CT imaging.

Program Eligibility

The CAMRT PET/CT Certificate program is available to:

- Medical Radiation Technologists who have been certified by the CAMRT in the practice of nuclear medicine
- Internationally educated medical radiation technologists (IEMRTs) in the specialty of nuclear medicine who are graduates of medical radiation technology programs similar to Canadian accredited programs
    - Documentation required from IEMRTs*
        - **Original letter** from entry-level education program verifying length of program to include both didactic and clinical components of the program
        - **Notarized copy** of diploma/degree/certificate from entry-level education program.
        - **Letter of Attestation – APPENDIX A**

*Required documentation not received within 30 days of program registration will result in a program cancellation/partial refund. CAMRT strongly recommends candidates obtain required documentation prior to program registration and send it electronically in a SINGLE SCAN or PDF within the required timeframe to CPD@camrt.ca or specialtycertificates@camrt.ca.

Candidates may begin working on the Summary of Clinical Competence (SCC) only upon confirmation and approval of received documentation from CAMRT. Contact specialtycertificates@camrt.ca for further information.

Program Registration

Registration for the PET/CT Certificate program is done through the CAMRT website. **The prerequisite for this Certificate Program** is the successful completion **or** Prior Learning Assessment and Recognition* (PLAR) of CAMRT's CT Imaging 1 exam or first eligible course from the didactic requirements. A minimum exam mark of 75% on the final examination is required.

The Summary of Clinical Competence for the program will be made available in the candidate's personal profile on the CAMRT website at the time of program confirmation. **Competencies performed before program registration will not be considered for this program.**

Required documentation for IEMRTs not received within 30 days of program registration will result in a program cancellation/partial refund.

See APPENDIX B for PLAR eligibility criteria

Program Overview

The PET/CT Certificate program has both didactic/coursework and clinical components. You must register in each course individually (didactic components) *and* into the certificate program to access the Summary of Clinical Competence (clinical component) after meeting any prerequisite requirements.

The PET/CT Certificate program must be completed within five years of successful completion of the CT Imaging 1 course or first eligible course in the program.

All components must be completed within the five-year timeframe.

After review and approval of all components by the CTIC Committee, the *Certificate in PET/CT* is granted to the technologist. The credential granted is PET/CT. It is the intent that those who earn the PET/CT credential will continue their professional development. Ongoing continuing education is recommended in order to remain current in the dynamic field of PET/CT.

NOTE: CAMRT both advises and expects that the candidate will hold sufficient personal liability coverage and any other employer required insurance coverage (ex: WSIB, AD & D) and receive the required permissions needed to complete the clinical requirements as outlined in the SCC. It is the candidate's responsibility to ensure they have the appropriate insurance coverage and permissions from their employer to complete this certificate program.

PET/CT Program Overview	
Certificate Components	Didactic (coursework) Requirement • CT Imaging 1 (prerequisite) • CT Imaging 2 • CT Imaging 3 • PET Theory and Clinical Applications for PET/CT • 75% or higher on final exam/quiz is required.
	Clinical (competencies) Requirement • Verification of Experience • A Summary of Clinical Competence (SCC)
Timelines	Candidates have 5 years from the date of completion of their first eligible pre-requisite course to complete all remaining requirements of this certificate program.
	The Verification of Experience is part of the SCC, and it is signed by your supervisor/manager before or during the completion of your clinical competencies. This is not a prior experience pre-requisite form. The candidate must practice in PET/CT for at least 400 hours within a 15-month block within the five-year timeframe of the certificate program. This clinical experience may only be acquired as a certified nuclear medicine medical radiation technologist.
	Once registered in the certificate program, the candidate may begin working on their SCC and complete the competencies under supervision.
SCC SUBMISSION IS THE FINAL STEP OF YOUR PET/CT.	

Didactic Component

The didactic component consists of:

- CT Imaging 1(or PLAR)*
- CT Anatomy Exam (or Sectional Anatomy 1 **and** Sectional Anatomy 2)**
- CT imaging 2***
- CT Imaging 3***
- PET Theory and Clinical Applications for PET/CT

Candidates must pass the courses and achieve a minimum score of **75%** on the final examinations of each didactic courses applied to the PET/CT Certificate.

Candidates are allowed two (2) rewrites within two years of their initial attempt on the CTI 1, CTI 2, CTI 3 and PET/CT course exams (if required) while only one (1) rewrite opportunity applies for the CT Anatomy Exam. After two failed attempts of the CT Anatomy Exam, candidates will be required to complete the two Sectional Anatomy full length courses. Rewrite fees will apply.

Candidates who feel that they have the essential knowledge gained through relevant work experience and professional development may **challenge** the final exams**** in each of the required courses. A minimum mark of 75% must be achieved on each challenged exam. Rewrites are not allowed on any Challenge exams. Full course policies are shared upon registration.

If the candidate fails the challenge exam and wishes to continue in the program, they must take the required course.

**See APPENDIX B for PLAR criteria*

***This CT Anatomy exam is a **mandatory** requirement for ANY candidate who did not successfully complete CT Imaging 2 and/or CT Imaging 3 as of January 2021 and wishes to proceed to the PET/CT program.*

****See APPENDIX C for course objectives,*

*****See APPENDIX D for exam blueprints.*

Clinical Component

The **Summary of Clinical Competence (SCC)** is a list of procedures and associated competencies that must be assessed by a clinical advisor and/or delegated assessors. This represents the clinical component of the certificate program. **Only competencies performed *after* program registration will be accepted in the SCC.**

The clinical component includes a practicum that requires the candidate to practice in and complete competencies under the following conditions:

- Practice in PET/CT under the supervision of an eligible Clinical Advisor (CA) with at least one per site.
- Complete the competencies listed in the SCC.
- Complete the experience requirement outlined in the SCC, by practicing in PET/CT for at least 400 hours in a 15-month block, as a certified nuclear medicine medical radiation technologist, within the allowed five-year timeframe of the certificate program:
    - This experience may predate registration into the certificate program, but may not predate completion of the first pre-requisite to the program,
    - This experience requirement is signed off on by the supervisor or manager of the site(s) at which the candidate completed their work experience.
    - Please ensure that you include a full start and end date (day, month, year) for the experience beginning and being achieved on the experience form.

The candidate is responsible for ensuring that all sections of the Summary are complete. A resubmission fee will apply for any incomplete submission, including any outstanding didactic requirements.

Dates and signatures must be full (no initials, please make the date, month and year clearly identifiable) and in "ink" (digital signatures are not accepted at this time).

Audits will be conducted at the Committee's discretion to ensure the proper process has been followed. Approximately 10% (or higher) of SCCs are audited per year.

Clinical Advisor

It is the candidate's responsibility to obtain a CA and site for the clinical component of the program. If multiple sites are used, a CA must be identified at each site. Please ensure that the CA completes all SCC introductory forms (contact information, checklist, roles and responsibilities form) once you register into the program to ensure the clinical advisor/delegated assessor is made aware of their role.
Each Advisor is responsible for assigning their own Delegated Assessor (DA), if applicable, and to ensure they have signed all forms and pages where these signatures appear. All signatures throughout the SCC must match. The following criteria also apply to international CAs for international candidates.

The clinical advisor must:

- Be a medical radiation technologist with a CAMRT PET/CT credential **and/or** a nuclear medicine technologist with a minimum of five (5) years' experience in the practice of PET/CT *
- Be currently practicing in PET/CT
- Not be currently registered in any of the CAMRT CT Certificate Programs
- Identify others delegated to assess the candidate and ensure they are credentialed and competent in their practice
- Perform the assessment on the candidate for all procedures/associated competencies or delegate the assessment to another credentialed technologist
- Attest to the overall competency of the candidate by signing at the end of each module.

**If this is not possible, please contact CAMRT.*

The Role of a Clinical Advisor (CA) can be found in *APPENDIX E*.

Delegated Assessor(s)

It is the clinical advisor's responsibility to identify and assign Delegated Assessor (DA) at their clinical site, if they wish to use one, and to ensure they are aware of their role. All professionals acting as delegated assessors must be identified on the Delegated Assessors Contact Information page in the SCC.

The delegated assessor must:

- Be a nuclear medical radiation technologist with a PET/CT credential ***OR*** a nuclear medicine technologist with a minimum of two (2) years' experience in the practice of PET/CT
- Be currently practicing in PET/CT
- Not be currently registered in the CAMRT PET/CT Certificate Program.

The CA and/or DA will observe and assess each procedure/competency and sign/date the Summary of Clinical Competence (SCC) on the date the competency has been verified and confirmed.

The **module** sign-off and date must be completed by your CA and must represent the date by which all competencies have been verified and completed. You must retain a record (or have access to a record) of the completion of all mandatory competencies in case of audit.

Clinical Advisors outside of Canada:

The following must be submitted within 30 days of program registration*:

- A notarized copy of the advisor's credentials (degree, diploma, or certificate)
- A copy of the ***Internationally Educated Medical Radiation Technologist Clinical Advisor Verification of Experience*** **form (See APPENDIX F)**. The hospital seal must be affixed to this form prior to submission.
- Clinical Advisor (CA) Check List (**See APPENDIX G**)

All internationally educated clinical advisors must submit the *IEMRT Clinical Advisor Verification of Eligibility Form*.**

**Required documentation not received within 30 days of program registration will result in a program cancellation/partial refund.*

*****Including those who have the PETCT credential.***

CAMRT strongly recommends candidates obtain required documentation prior to program registration and send it electronically in a SINGLE SCAN or PDF within the required timeframe to CPD@camrt.ca or specialtycertificates@camrt.ca.

Candidates may begin working on the Summary of Clinical Competence only upon approval of received documentation from CAMRT.

Format of the Summary of Clinical Competence

You must retain a record (or have access to a record) of the completion of all mandatory competencies in case of audit. The following provides an overview of the requirements in the SCC:

- Contact/Demographic information
- PET/CT Checklist
- Identification of the clinical advisor and delegated assessor(s)
- Verification of practice/experience in PET/CT
- Guidelines for assessment of competency requirements
- Professional Accountability Form
- Declaration of Completion

The list of procedures and associated competencies required are presented in the following modules:

- Module 1 Patient Care (**All mandatory**)
  - Certified in CPR (BLS or equivalent) *
  - Monitor patient vital signs
  - Follow universal/Standard precautions
  - Perform patient transfer
  - Monitor 0_2 administration

  * *The CPR must be Basic Life Support (BLS) level or higher, the Heart and Stroke and St. John's Ambulance BLS is most common; we can review an equivalent. The CPR should be valid throughout the completion of the SCC competencies and must be valid at the time of submission.*

- Module 2 Patient Preparation **(all mandatory)**
  - Patient assessment
  - Verify exam indications
  - Assess contraindications
  - Patient education
  - Verify informed consent
  - Blood glucose monitoring
  - Establish venous access
  - Implement dose reduction strategies (occupational)
  - Apply dose reduction strategies (patient)
  - Dispense radiopharmaceutical dose
  - Inject radiopharmaceutical dose

- Module 3 Contrast Media Administration **(All elective)**
  - Evaluate lab values
  - Select contrast media
  - Prepare/Administer oral contrast media
  - Prepare/Administer IV contrast media

Operate power injector
Monitor patient pre and post

- Module 4 PET/CT Imaging Procedures
  (4 mandatory/6 elective*)
  Half-body
  Whole-body
  Brain
  Radiotherapy Planning
  Dynamic/List mode
  Respiratory gating
  Cardiac
  Pediatrics
  Infection
  Ga-68 Dota
  Other

** A minimum of three of the 10 required electives must come from Module 4.**

- Module 5 Image Manipulation
  (All mandatory)
  Perform post processing
  Perform measurement
  Create ROI
  Perform Zoom
  Perform image fusion

- Module 6 Quality Control (QC) Procedures
  (4 mandatory/1 elective)
  Air calibration
  Daily CT QC
  Daily PET QC
  Weekly CT QC
  Weekly PET QC
  Cross Calibration

- Module 7 Dedicated CT
  (6 electives – observation)
  Brain
  Neck
  Chest
  Abdomen\Pelvis
  Extremities
  Spine

- Module 8 CT Simulator
  (6 electives – observation)
  Brain
  Thorax, lung or breast
  Prostate
  GI/Esophagus or Rectum
  Cervix/Ovary/Endometrium
  Head & neck

Competencies should not include any patient identifiers (health or exam number).

Candidates must competently clinically perform all mandatory competencies in the clinical environment and must also complete ***at least 10 elective competencies***. All elective competencies must be performed clinically (except for Modules 7 and 8 which may be observed). **At least 3 of the 10 electives must be from Module 4 (PET/CT Imaging Procedures).**

Proficiency for achievement of competency for this program is characterized as follows:

- When presented with situations, the MRT performs relevant competencies in a manner consistent with generally accepted standards and practices in the profession, independently and within a reasonable timeframe. The MRT anticipates what outcomes to expect in a given situation, and responds appropriately, selecting and performing competencies in an informed manner.

- The MRT recognizes unusual or difficult to resolve complex situations which may be beyond their capacity. The MRT takes appropriate and ethical steps to address these situations, which may include consulting with others, seeking supervision or mentorship, reviewing literature or documentation, or referring the situation to the appropriate healthcare professional.

Program Extension

Extensions beyond the five-year time frame are available under exceptional circumstances**.** Contact CAMRT **prior to your program expiration date** for information.

There is a fee associated with extension requests. Extensions are not guaranteed. You can view your program end date in your Portal.

Submission of Summary of Clinical Competence

Candidates must submit the completed Summary of Clinical Competence to CAMRT Office for review and approval by the CT Imaging Certificate Committee.

Electronic copies submitted as one file may be submitted to specialtycertificates@camrt.ca (PDF format).

Incomplete Summary of Clinical Competence – Resubmission Fee

Any Summary of Clinical Competence deemed incomplete by a reviewer will be subject to a resubmission fee. This also applies to any outstanding didactic component.

Continuing Professional Development

It is the intent that those who earn the PET/CT credential continue their professional development. Continuing education is recommended in order to remain current in the dynamic field of PET/CT.

APPENDIX A

INTERNATIONALLY EDUCATED MEDICAL RADIATION TECHNOLOGISTS CERTIFICATE PROGRAM REGISTRATION ATTESTATION STATEMENT

Included with this signed statement, is the required documentation to finalize my Certificate Program Application with the Canadian Association of Medical Radiation Technologists.

Candidate Name: _____

Certificate Program: _____

Title of Program Completed: _____

Name of Diploma/Degree: _____

Educational Institution for theoretical instruction: _____

Institution for Clinical Training: _____

Length of Total Program: Theoretical (months) [ ] **Clinical (months)** [ ]

By signing below, I verify that:

- ✓ All statements and documentation in this application are accurate. I understand that a false or misleading statement, omission or misrepresentation may compromise my registration request.
- ✓ The documentation attached regarding my education program and/or my clinical advisor is original and has not been modified in any way.
- ✓ I authorize CAMRT to contact any authority, institution, association, body or person in any jurisdiction to verify the statements in my application and related documents.
- ✓ I understand that I may be required to submit further information if required.

_____ _____

Signature of Applicant Date (month/day/year)

APPENDIX B

Prior Learning Assessment and Recognition (PLAR) for CT Imaging 1 – ELIGIBILITY REQUIREMENTS

The following criteria has been established to determine eligibility for consideration of PLAR for CT Imaging 1:

1. Graduated from a Canadian accredited radiological technology or nuclear medicine program, **April 2018** or later and whose applicable courses have been reviewed and approved by the CAMRT.
2. Graduated from the accredited education program within the last 3 years
3. Provide evidence, via official transcript*, of an overall 75% average (or greater) in all relevant didactic courses. A resubmission fee will apply for candidates submitting unofficial documents.
4. Pay a non-refundable $75 prior learning assessment and recognition fee.

Approval of the prior learning assessment and recognition for CT Imaging 1** will trigger the candidate's CTIC 5-year timeline. This program start date will be automatically defaulted to the closest CAMRT exam date (May or November).

An **official transcript is a complete and final representation of a student's **academic** record on **school letterhead**. It must bear the embossed seal, date issued and the Registrar's signature.*

* ***or upon completion of any of the other CAMRT CT Imaging courses (whichever occurs first).***

Applications are accepted online. Search for "PLAR" in the course catalogue.

For more information, please contact cpd@camrt.ca

APPENDIX C

CT Imaging 1 Course Objectives

Chapter 1

Upon completion of this chapter, you should be able to:

- outline the process of CT.
- explain the role of Godfrey Hounsfield
- chart and break down the four basic steps to achieve a CT image.
- discuss the concept of digital processing.
- determine the role of applications and systems software.
- recognize the role of CT applications.
- explain the principle and role of mobile CT.
- explain the principle and role of CT fluoroscopy.
- explain the principle and role of dual source CT.
- explain the principle and role of CT simulation.
- explain the principle and role of CT in Nuclear Medicine.
- characterize the various acquisition components comprising a CT scanner.

Chapter 2

Upon completion of this chapter, you should be able to:

- recognize the principle and role of the localizer scan.
- evaluate and diagram the various types of multi-row detector systems.
- compare and contrast the two types of detector arrays.
- list the advantages of the higher slice scanners.
- discuss the principle and role of the data acquisition system.
- outline and evaluate the options available in a CT scan set-up.
- determine and demonstrate the optimal use of scan parameters.
- classify and characterize the four factors that affect radiation.
- explain and apply Beer's Law.
- explain and apply Euler's number.
- explain and apply the linear attenuation coefficient.
- solve for the linear attenuation coefficient given the number of photons involved.
- characterize the role of voxels and views in CT.
- explain and apply the concept of CT numbers.
- solve for the CT number given the linear attenuation coefficient of a tissue.
- solve for the linear attenuation coefficient given the CT number of a tissue.
- assess the role of the array processor.
- illustrate the concept of back-projection form of reconstruction.
- assess the role of filtered back projection.

- assess the role of adaptive statistical iterative reconstruction.

Chapter 3
Upon completion of this chapter, you should be able to:

- explain and demonstrate the concept of windowing.
- contrast and compare typical CT number ranges for various tissues.
- evaluate the role of image display software available.
- implement the various types of image display software available.
- analyse the role of the diagnostic imaging workstation.
- analyse the role of the CT simulator workstation.
- list the scanning restrictions for an MPR image.
- explain the concept of maximum intensity projection.
- explain the concept of three-dimensional imaging.
- explain the concept of isocentre marking and contouring for CT Simulation.
- characterize the placement of radiation treatment fields.
- assess the role of shielding in therapy.
- evaluate the role in therapy of fusion involving CT, MRI & PET images.

Chapter 4
Upon completion of this chapter, you should be able to:

- classify and illustrate temporal resolution.
- determine the factors that affect temporal resolution.
- classify and explain spatial resolution.
- determine the factors that affect spatial resolution.
- classify and explain contrast resolution.
- determine the factors that affect contrast resolution.
- classify and explain image noise.
- determine the factors that affect image noise.
- describe the concept of uniformity.
- describe the concept of linearity.
- recognize and explain patient–related artifacts.
- determine the factors that cause patient-related artifacts.
- recognize and explain equipment–related artifacts.
- determine the factors that cause equipment-related artifacts.
- develop and design a CT preventative maintenance program.
- evaluate current CT preventative maintenance program.
- evaluate the role of a Catphan phantom.
- know the guideline for laser QA for CT simulators.
- develop and design a CT quality assurance program.
- evaluate current CT quality assurance program.

Chapter 5
Upon completion of this chapter, you should be able to:

- compare dose expression quantities and measurements.
- determine contrast dose expression quantities and measurements.
- evaluate typical patient dose values.
- determine scanner design factors that affect patient dose.
- implement steps to reduce patient dose for each of these factors.
- determine operating parameter factors that affect patient dose.
- implement steps to reduce patient dose for each of these factors.
- determine patient factors that affect patient dose.
- implement steps to reduce patient dose for each of these factors.
- apply recommendations of dose reduction campaigns.
- evaluate current site radiation protection program.
- implement a program of radiation protection.

Chapter 6
Upon completion of this chapter, you should be able to:

- evaluate the role of patient screening.
- discuss the concept of consent and develop a consent form.
- evaluate the role of patient education regarding contrast media injection.
- apply tools to assess and monitor the patient for contrast medium injection.
- assess the risk of contrast-induced nephropathy.
- assess the patient for signs of adverse reactions.
- compare various types on contrast media available.
- apply measures to reduce the risk of contrast-induced nephropathy.
- evaluate current site IV injection program.
- implement an IV injection program.
- evaluate current site contrast media handling and administration.
- implement a contrast media handling and administration program.
- determine the factors that affect contrast enhancement and scan timing.
- implement steps to optimize contrast enhancement.

CT Imaging 2 Course Objectives

Chapter 1
At the conclusion of this section, the learner will be able to:
» Indicate reasoning for performing or not performing CT scans of the head
» Recognize when contrast media is indicated and contraindicated when imaging the head
» Outline different features of different contrast media injection techniques

» Recognize key indicators for performing head scans for trauma and headache and spine
» Outline key principles of dual energy scanners and their applications to imaging of the head and neck

Chapter 2
Upon completion of this chapter, the learner will be able to:
» Recognize normal features and variants in soft tissue areas of the brain
» Recognize how contrast media enhances diagnosis of some pathology
» Identify features that describe pathological processes in the brain
» Select and modify the correct scan protocol to confirm the diagnosis
» Adapt scan parameters to optimize imaging of brain or cranium for interpretation based on provisional diagnosis
» Identify key indicators of pathology in the brain and the impact they have
» Identify common CT findings of congenital, infectious, and neoplastic pathological processes of the brain and the resulting radiographic manifestations

Chapter 3
Upon completing this chapter, the learner will be able to:
» Adapt scan parameters to optimize imaging of facial bones, sella, and temporal bones for interpretation based on provisional diagnosis
» Interpret the appearance of most common pathologies seen on computed tomography (CT) scans of the skull, facial bones, sella, and temporal bones
» Illustrate the pathological process behind the most common pathologies seen on CT scans of the skull, facial bones, sella, and temporal bones
» Assess, and solve for diagnosis, a case study presentation involving facial bones, sella, and temporal bones
» Make a diagnosis based on patient symptoms and injuries
» Identify the target anatomical area based on the diagnosis

Chapter 4
Upon completing this chapter, the learner will be able to:
» Adapt scan parameters to optimize imaging of orbits and sinuses for interpretation based on provisional diagnosis
» Interpret the appearance of most common orbit and sinus pathologies seen on computed tomography (CT) scans
» Illustrate the pathological process behind the most common pathologies seen on CT scans of the orbits and sinuses
» Assess, and solve for diagnosis, a case study presentation involving the orbits and sinuses
» Make a diagnosis based on patient symptoms and injuries
» Identify the target anatomical area based on the diagnosis
» Select and modify the correct scan protocol to confirm the diagnosis

Chapter 5
Upon completing this chapter, the learner will be able to:
» Adapt scan parameters to optimize imaging of the neck and spine for interpretation based on provisional diagnosis
» Interpret the appearance of most common neck and spine pathologies seen on CT scans
» Illustrate the pathological process behind the most common pathologies seen on CT scans of the neck and spine
» Identify features that describe pathological processes in the brain and arteries that supply it
» Assess, and solve for diagnosis, a case study presentation involving the neck and spine
» Make a diagnosis based on patient symptoms and injuries
» Identify the target anatomical area based on the diagnosis
» Select and modify the correct scan protocol to confirm the diagnosis

CT Imaging 3 Course Objectives

Chapter 1
At the conclusion of this section, the learner will be able to:
» Indicate reasons for performing a CT scan of the thorax.
» Acknowledge the role of technologists in preparing for CT scans.
» Recognize the importance of contrast media administration in thoracic CT.
» Outline features of different contrast optimization techniques.
» Identify unique features of thoracic CT protocols.
» Describe key anatomical components of the lung and vessel layers
» Recognize normal features of the lung on CT
» Recognize common lung patterns described in CT
» Identify features that describe pathological processes in the thorax
» Identify common CT findings of pathological processes in the thorax

Chapter 2
At the conclusion of this section, the learner will be able to:
» Indicate reasons for performing a CT scan of the abdomen and pelvis.
» Recognize the different forms of contrast media for abdominal CT.
» Identify contraindications of IV contrast media.
» Identify unique features of abdominal CT protocols.
» Recognize normal features of the abdomen and pelvis in CT
» Discuss the diagnostic process and related findings
» Identify features that describe pathological processes in the abdomen & pelvis
» Identify common CT findings of pathological processes in the abdomen & pelvis

Chapter 3
Upon completing this chapter, the learner will be able to:

» Determine the role of CT in extremity evaluation
» Identify unique features of extremity
» Reflect on various positioning considerations
» Identify features that describe pathological processes in the extremities
» Identify common CT findings of pathological processes in the extremities

Chapter 4
Upon completing this chapter, the learner will be able to:
» Describe what CT guidance provides during interventional procedures
» Indicate three types of interventional procedures that utilize CT imaging
» Compare the two acquisition methods used for CT guidance
» Describe the benefits that CT guided intervention provides
» Recognize the role of technologists in CT guided procedures
» Explain the importance of laboratory values prior to CT guided procedures
» Recognize the value of skin marking and breathing instructions in CT guided intervention
» Compare two techniques used to introduce a biopsy needle
» Compare fine needle aspiration and core needle biopsy
» Describe the single step and two step techniques used to introduce percutaneous drainage devices.
» Indicate how a joint injection differs from percutaneous biopsy or drainage
» Describe the needle tip artifact
» Outline potential contraindications to CT guided procedures
» Recognize potential complications from percutaneous procedures

PET Theory and Clinical Applications for PET/CT Course Objectives

Chapter 1:

1. Understand the physics of positron decay.
2. Describe the design and operation of a cyclotron.
3. Explain nuclear reactions and perform related calculations.
4. Describe factors that impact cyclotron yield.
5. Discuss the concept of nuclear cross sections and excitation functions.
6. Discuss what variables need to be considered to determine the best nuclear reaction to produce a given radionuclide.
7. Apply presented mathematical concepts to perform threshold energy calculations
8. Evaluate the requirements for a cyclotron based on the needs of a PET/CT department.
9. Consolidate available information to determine best nuclear reaction for radionuclide production.

Chapter 2:

1. Discuss design requirements of a PET center.
2. Explain variation in radiation protection practices from general nuclear medicine.
3. Explain what good manufacturing practices (GMP) standards are.
4. Demonstrate how GMP standards affect practice in radionuclide production.

Chapter 3:

1. Discuss common PET radiopharmaceuticals and their applications
2. Describe synthesis of common PET radionuclides
3. Discuss the use of automated synthesis modules for PET radionuclides
4. Explain the quality control (QC) necessary for PET radiopharmaceuticals
5. Understand and be able to discuss the role of generators used in PET/CT

Chapter 4:

1. Understand and discuss the instrumentation of a PET/CT scanner.
2. Discuss the configuration of detectors in PET scanners.
3. Explain how the block detector configuration affects PET imaging.
4. Understand and discuss the concepts of 2D and 3D acquisition in PET.
5. Discuss the range of positrons in matter.
6. Explain the physics of coincidence detection.
7. Relate positron range and non-collinearity to PET image resolution.
8. Demonstrate an understanding of the role the blank scan, emission scan and transmission scan play in PET/CT imaging.
9. Understand time of flight technology and its effect on image quality.
10. Explain the need for attenuation correction.
11. Discuss the use of CT for attenuation correction.
12. Discuss the impact of contrast media on CT based attenuation correction.
13. Understand and discuss the acceptance testing and quality assurance programs necessary for PET scanners.
14. Understand what calibrations are required for quantitative accuracy in PET scans.
15. Understand the concept of digital PET detectors.

Chapter 5:

1. Describe the steps in a typical WB PET/CT acquisition protocol.
2. Discuss the advantages and drawbacks of iterative reconstruction (IR) in PET/CT imaging.
3. Evaluate image quality including contrast resolution, spatial resolution, and noise.
4. Describe the methods available for PET/CT image display.
5. Discuss image co-registration in PET/CT.

6. Describe quantitative analysis in PET including the use of regions of interest (ROIs) and SUVs
7. Discuss common artifacts and their causes in PET/CT.
8. Discuss normal bio-distribution of ^{18}F-FDG.
9. Describe any special patient instructions for a WB ^{18}F-FDG scan.
10. Explain variations in normal bio-distribution of ^{18}F-FDG

Chapter 6:

1. Discuss the applications of PET in oncology
2. Discuss the applications of PET in cardiology
3. Discuss the applications of PET in neurology
4. Discuss the applications of PET in inflammatory processes
5. Discuss the applications of PET in the pediatric population
6. Discuss the applications of PET in radiation therapy planning

APPENDIX D

CAMRT CT Imaging 1 Exam Blueprint

Item presentation - % of question types	
Multiple Choice: 100%	
Exam structure	
Exam length: 2 hours 15 minutes Number of questions: 100	
Exam delivery format	
Online	
Course content and question weighting	
Chapters	**Percentage weighting of number of questions/chapter**
1 – CT Principles and CT Physics	15-18%
2 – Data Acquisition and Image Reconstruction	15-18%
3 – Image Manipulation and Management	15-18%
4 – Quality Control and Quality Assurance	15-18%
5 – Radiation Dose, Patient Dose, and Protection	15-18%
6 – Contrast Media and Injection Techniques	15-18%

CAMRT CT Anatomy Exam Blueprint

Item presentation - % of question types	
Multiple Choice: 100%	
Exam structure	
Exam length: 2 hours 15 minutes Number of questions: 100	
Exam delivery format	
On-line	
Course Content and question weighting	
Chapters	**Percentage weighting of number of questions/chapter**
1 – Brain	15%
2 – Cranium and Facial Bones	15%
3 – Neck	10%
4 – Spine	10%
5 – Chest	15%
6 – Abdomen and pelvis	30%
7 – Extremities	5%

CAMRT CT Imaging 2 Exam Blueprint*

Item presentation - % of question types	
Multiple Choice:	75%
Case Studies (multiple choice):	25%
Exam structure	
Exam length:	2 hours 15 minutes
Number of questions:	100
Exam delivery format	
On-line	
Course Content and question weighting	
Chapters	**Percentage weighting of number of questions/chapters**
1 – Introduction to CT of the Head Neck and Spine	5-10%
2 – Brain	24-28
3 – Skull, Facial Bones, Sella & Temporal Bones	16-20%
4 – Orbits and Sinuses	12-16%
5 – Neck and Spine	18-22%

**Blueprint for 2021 version of CT Imaging 2 exam*

CAMRT CT Imaging 3 Exam Blueprint*

Item presentation - % of question types	
Multiple Choice: 100%	
Exam structure	
Exam length: 2 hours 15 minutes Number of questions: 100	
Exam delivery format	
Online	
Course Content and question weighting	
Chapters	**% weighting of number of questions/chapters**
Thorax	25-30%
Abdomen & Pelvis	25-30%
Extremities	20-25%
CT-Guided Interventional Procedures	15-20%

**Blueprint for 2021 version of CT Imaging 3 exam*

CAMRT PET Theory and Clinical Applications in PET/CT – Exam blueprint

Item presentation - % of question types	
Multiple Choice: 100%	
Exam structure	
Exam length: 3 hours Number of questions: 145	
Exam delivery format	
On-line	
Course Content and question weighting	
Chapters	**Percentage weighting of number of questions/chapter**
1 – Positron Decay and Radionuclide Production	15-18%
2 – Radiation Protection and Departments Design	11-12%
3 – Radiopharmaceuticals	11-15%
4 – PET Instrumentation and Quality Control	20-22%
5 – ^{18}F-FDG Acquisitions and Reconstruction	13-15%
6 – Clinical Application	20-24 %

APPENDIX E

The Role of a Clinical Advisor

To maintain the integrity of CAMRT Certificate programs, it is essential that all parties involved in the training and evaluation of certificate program candidates follow the procedures set out in the Program Handbook and Summary of Clinical Competence (SCC). A CAMRT Certificate indicates a level of competence above entry-to-practice that has been verified through the requirements of the program.

Clinical Advisor's responsibilities include:

- review the Program Handbook and SCC with the candidate.
- mentor and support candidates in their skill development
- assess firsthand competency/procedures performed by the candidate and verify competence by signing and dating each procedure in the SCC at the time competence is established and/or
- delegate assessment duties to individuals who have the expertise and qualifications outlined in the Program Handbook.
- ensure all delegated assessors have read the most current version of the Program Handbook and SCC. These documents are updated on an annual basis, so clinical advisors and delegated assessors must review the handbook and SCC with each new candidate.
- attest to overall competency by signing at the end of each module
- verify the overall competence of the candidate at the end of the clinical placement by signing the Declaration of Completion.

During clinical placements, the following criteria must be upheld:

All competencies must be **performed** independently by the candidate on a patient. A candidate cannot be deemed competent if they have only observed or simulated a procedure, unless otherwise indicated in the SCC.

The clinical advisor/delegated assessor must witness competent practice for a procedure/competency multiple times prior to the date of the final assessment. A signature in the SCC verifies that the technologist has **consistently shown** they have the knowledge, skill and judgement to be declared competent in each aspect of practice. It is recognized in some circumstances that procedures are not performed frequently; however, it is appreciated that there is a transference of skills between many procedures. ***It is the responsibility of the clinical advisor or delegated assessor to ensure this expected level of competence as evidenced by their signatures in the appropriate areas.***
If there are procedures in the SCC that are not performed at your clinical site it is the responsibility of the candidate to contact CAMRT to determine an alternate option (if any).

Detailed guidelines for assessment of competency are found in each module of the SCC. The guidelines listed provide an overview of the expectation for assessment by the clinical advisor or delegated assessor.

It is recognized being a clinical advisor or delegated assessor adds to your already heavy workload and responsibilities in your daily practice. The CAMRT appreciates your professionalism and commitment to help the candidate continue their education in an ever-changing healthcare environment.

APPENDIX F

Internationally Educated Medical Radiation Technologist
Clinical Advisor Verification of Experience

Hospital/Organization: _____

Name of Supervisor: _____

Supervisor Credential(s): _____

Supervisor Email: _____

NAME OF PET/CT CANDIDATE: _____

To CAMRT Certificate Programs:

This is to confirm _____ (name of Clinical Advisor) is a current employee of the above noted hospital/organization.

The Clinical Advisor listed above is:

- A registered medical radiation technologist with a minimum of five years' experience in the practice of PET/CT
- Currently practicing in PET/CT

My signature below confirms the above meets the CAMRT's eligibility requirement to act in a Clinical Advisor (CA) role for the purpose of the PET/CT Certificate (PET/CT) program.

The affixed hospital seal confirms the authenticity of this submission.

_____ _____

Signature of Clinical Advisor Supervisor/Employer **Date**

APPENDIX G

Clinical Advisor (CA) Check List

To maintain the integrity of CAMRT Certificate programs, it is essential all parties involved in the training and evaluation of certificate program candidates follow the procedures set out in the Program Handbook and Summary of Clinical Competence (SCC). A CAMRT Certificate indicates a level of competence above entry-to-practice that has been verified through the requirements of the program.

As such, CAMRT must ensure all Clinical Advisors meet the same standards and are eligible to take on this assessment role. This form must be submitted to the CAMRT along with the notarized documentation required for all internationally educated medical radiation technologists.

I, _____, acknowledge by my initials, the following to be true.

	I am a medical radiation technologist* with a CAMRT PET/CT credential **OR**** a medical radiation technologist having a minimum of five years' experience in the practice of PET/CT **or other:* _____
	I am **currently practicing** in PET/CT.
	I am not currently registered in any of the CAMRT CT Certificate programs.
	I have no conflicts of interest* with the PET/CT candidate. ***Conflicts of interest may include:** • Close personal relationships that could threaten independence or objectivity during assessments • Spouse or family member • A direct report (i.e. the assessor reports to the candidate)

I understand that any false or misleading statement, omission or misrepresentation may result in the candidate's automatic withdrawal from the program and/or revocation of the PET/CT designation.

_____ _____

Clinical Advisor Signature Date