

**CERTIFICATE PROGRAM**

**CERTIFICATE IN BREAST IMAGING  
DIAGNOSTIC**



**CANDIDATE HANDBOOK**

**2023**

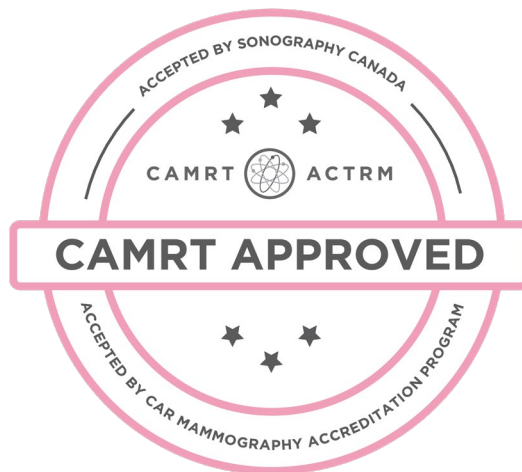
© **Canadian Association of Medical Radiation Technologists**  
1300-180 Elgin Street Ottawa ON K2P 2K3  
Tel: 1-800-463-9729 or (613) 234-0012  
[www.camrt.ca](http://www.camrt.ca)  
[specialtycertificates@camrt.ca](mailto:specialtycertificates@camrt.ca)

## PROGRAM TIMELINES EFFECTIVE JANUARY 2023

The CBIS program must be completed within **five years of successful completion of the first eligible full-length Breast Imaging course. This is the “established 5-year timeframe” of the certificate program.**

Once registered in the certificate program, the candidate may begin working on their Summary of Clinical Competencies (SCC). **The SCC must be completed within three years of the date of first clinical entry.**

Imaging Breast Pathology is not a pre-requisite for entry into the CBID program but must be no more than 5 years old at the time the Summary of Clinical Competence (SCC) is submitted for review. Imaging Breast Pathology and the Summary of Clinical Competence (SCC) can be worked on simultaneously however the SCC may not be submitted for review until all didactic courses are complete.



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## Introduction

Breast cancer is a complex disease that will affect [1 in 8](#) Canadian women during their lifetime. It is the most common cancer in Canadian women over the age of 20 representing 25% of all cancer cases in Canadian women. It is the second leading cause of cancer deaths in Canadian women and the 3<sup>rd</sup> leading cause of death. Since the peak of breast cancer deaths in 1986 there has been a decrease by almost 40% due to earlier detection through regular mammography screening, advances in imaging technology and improved treatments.

Breast imaging dates to the early 1900's with standard x-ray equipment, high kV techniques, non-screen film with manual processing, minimal if any compression and radiation doses far exceeding today's standards. In 1960 the concept of low kV / high mA techniques with dedicated imaging units was introduced and the next few decades found changes in equipment design, and film/screen and processing technology. Breast imaging today uses digital technology and includes many imaging modalities. Advances in breast screening technology and quality standards have increased the breast cancer survival rate by helping to reduce death and disability caused from breast cancer.

Medical radiation technologists (MRTs) who perform screening mammography and other breast imaging procedures have a special role in the healthcare of the public. MRTs must be highly competent practitioners excelling in their ability to produce quality images and to manage the patient with care and expertise in a highly technical environment.

The CBI programs in screening and diagnostic breast imaging are designed to provide a means that will provide knowledge and clinical competence. It is recognized with a designation that will be sought after by technologists and encouraged and advocated for by employers.

Individuals with questions about certificates are encouraged to contact:

**Canadian Association of Medical Radiation Technologists**

1300-180 Elgin Street Ottawa ON K2P 2K3

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

[specialtycertificates@camrt.ca](mailto:specialtycertificates@camrt.ca)

## Purpose of the Program

This Certificate in Breast Imaging - Diagnostic (CBID) is intended to provide a mechanism for radiological technologists to demonstrate knowledge and competence in the field of diagnostic breast imaging, 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 diagnostic breast imaging
- become the Canadian *gold standard* for those working in this clinical area
- provide a Canadian credential that is admired and sought by employers
- provide a recognition mechanism for the public to identify technologists who have achieved a level of excellence in breast imaging
- provide an opportunity for continuing professional development
- enhance safe and effective practice as described by the CAMRT Member Code of Ethics and Professional Conduct– see <https://www.camrt.ca/mrt-profession/professional-resources/code-of-ethics/>.

The CBI Committee strives to keep aware of current practice in breast imaging. As such, the CBID Handbook is updated regularly.

## Eligibility

The CAMRT's Certificate in Breast Imaging- Diagnostic program is available to:

- Medical Radiation Technologists who have been certified by the CAMRT in the practice of Radiological Technology
- Internationally educated medical radiation technologists (IEMRTs) in the specialty of radiological technology who are graduates of medical radiation technology programs substantially like Canadian accredited programs
  - Documentation required from IEMRTs\*
    - Notarized copy of diploma /degree/certificate from entry-level education program.
    - Original letter from entry-level education program verifying length of program to include both didactic and clinical components.
    - IEMRT Attestation Letter (**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](mailto:CPD@camrt.ca) or [specialtycertificates@camrt.ca](mailto:specialtycertificates@camrt.ca).***

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

## Prerequisite requirements for application to the CBID

- Successful completion of CAMRT's [Breast Imaging 1](#) and [Breast Imaging 2](#) examinations. A mark of 75% or higher is required on each Breast Imaging (BI) final examination. "Mammography 1" and "Mammography 2" courses are no longer accepted in the CBI programs.
- Successful completion of CAMRT's [Bring Your Position Upfront: Breast Positioning virtual lecture](#). A mark of 75% or higher is required on the final post quiz.

## Registration

Registration for the Certificate in Breast Imaging - Diagnostic (CBID) program is done through [the CAMRT website](#), after you have completed the pre-requisite requirements. After registration, there is (1) didactic requirement and (1) clinical requirement that must be completed.

Required documentation for IEMRTs and/or their chosen clinical advisor not received within 30 days of program registration will result in a program cancellation/partial refund.

Upon confirmed registration into this program, the Summary of Clinical Competence (SCC) will be made available in the candidate's personal profile on the CAMRT website.

**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.

## Continuing Education Recommendation

Consistent with best practice and continuous learning principles, CAMRT encourages and advocates that those who earn the CBIS designation demonstrate continuing competence in their field.

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*The Canadian Association of Radiologist [Mammography Accreditation Program](#) (CAR-MAP) requires the technologist to achieve 15 credits / hours of continuing education every three years.*

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## CBID Program Overview

Registration into the CBID program is available once candidates have successfully completed: [Breast Imaging 1](#), [Breast Imaging 2](#), [Bring your Position Up Front: Breast Positioning \(Virtual Lecture\)](#).

<b>Certificate Components</b>	<p>Didactic (coursework) Requirement</p> <ul style="list-style-type: none"> <li>Imaging Breast Pathology (IBP), a full-length course. A minimum pass mark of 75% or higher on the final examination is required. (SEE <a href="#">APPENDIX C</a> FOR IBP EXAM BLUEPRINT).</li> </ul>
	<p>Clinical (competencies) Requirement</p> <ul style="list-style-type: none"> <li>A Summary of Clinical Competence (SCC), Experience Verification, and narrative(s).</li> </ul>
<b>Timelines</b>	<p>Candidates have 5 years from the date of completion of their first eligible Breast Imaging pre-requisite course to complete all remaining requirements of this certificate program.</p>
	<p>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.</p> <p>The candidate must practice Breast Imaging (diagnostic) for at least 16 weeks (or 80 full time shifts) within an 18-month block within the five-year timeframe of the certificate program. This clinical experience may only be acquired as a certified medical radiation technologist practicing in breast imaging.</p>
	<p>Once registered in the certificate program, the candidate may begin working on their SCC. The CBID requires the candidate to be practicing in mammography under the supervision of a clinical advisor The SCC must be completed within 3 years of the date of first clinical entry.</p>
	<p>Imaging Breast Pathology (IBP, a full-length course) is not a pre-requisite for entry into the CBID program but must but must be no more than 5 years old at the time of the Summary of Clinical Competence (SCC) submission.</p>

Upon confirmed registration into this program, the Summary of Clinical Competence (SCC) will be made available to the candidate in their personal profile on the CAMRT website.

**SCC SUBMISSION IS THE FINAL STEP OF YOUR CBID**

## Didactic Component

### Imaging Breast Pathology (full length course):

- Candidates registered into the CBID must complete this full-length course prior to their program end date, but this is not a prerequisite for registration.
- This didactic requirement must be no more than 5 years old at the time the Summary of Clinical Competence (SCC) is submitted for review.
- A mark of 75% or higher is required on the final examination.

## Clinical Component

The clinical component is a practicum in breast imaging that requires the candidate to be practicing in breast imaging under the supervision of an eligible clinical advisor. The candidate must

- Complete the competencies outlined in the Summary of Clinical Competence (SCC). The SCC is a list of procedures and associated competencies that must be assessed by the Clinical advisor/Delegated assessor.

### **Candidates must be able to perform all breast imaging procedures as listed in this Handbook.**

Dates and signatures must be full (no initials) and in “ink” (digital signatures are not accepted at this time). Candidates must complete all sections of this SCC within three years of the first clinical entry and submit to the CAMRT for final review and approval by the CBI Committee.

The clinical component also requires that candidates complete an experience requirement:

- To ensure consistency in clinical experience, the candidate must practice Breast Imaging (screening) for at least 16 weeks (or 80 full time shifts) within an 18-month block within the five-year timeframe of the certificate program. This clinical experience may only be acquired as a certified medical radiation technologist practicing in breast imaging. 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 prerequisite to the program.

A Summary of Clinical Competence deemed incomplete by a reviewer will be subject to a resubmission fee. This includes any outstanding requirement for both didactic and clinical components (including required narratives).

**Audits will be conducted periodically at the discretion of the Committee to ensure the proper process has been followed.**



## Format of the Summary of Clinical Competence (SCC)

Note: Candidates must be able to perform ALL breast imaging procedures listed below. The CA must witness these studies to review the candidate's interaction with the patient, correct room preparation and cleanliness, and use of proper positioning skills. The following provides an overview of the requirements in the SCC:

- Demographic information
- Identification of Clinical Advisor and Delegated Assessors (DA)
- Verification of practice in diagnostic breast imaging
- Verification of Experience form
- Guidelines for performance of quality control procedures
- Professional Accountability form
- Declaration of Completion
- Log for documenting quality control (QC) procedures.
  - ACR / Accreditation Phantom test
  - Repeat analysis procedure
  - Compression test
  - Mechanical / visual inspection
  - Contrast-to-Noise Ratio / Signal-to-Noise Ratio (CNR / SNR)
  - Full (flat) field artifact test
  - Monitor QC for reading/review workstation
  - Monitor QC for acquisition workstation
  - Stereotactic biopsy QC
  - Digital breast tomosynthesis (DBT /tomo) QC (*if site does tomo*)
- Guidelines for the assessment of competency in the performance of breast imaging procedures and image evaluation.
- Log for documenting performance of breast imaging procedures for
  - Standard view mammography (CC & MLO) – 20 cases
  - Other breast imaging exams
    - Magnification views- 10
    - DBT &/or spot compression - 10
    - Exaggerated CC &/or Rolled view &/or Tangential &/or Cleavage view - 10 cases
    - True laterals - 10
    - Implants - 5
    - Surgically altered breast - 10
    - Stretcher / wheelchair patient - 2
    - Male patient - 2
  - Interventional procedures –
    - Needle, seed and/or radiofrequency localization - 2
    - Stereotactic biopsy – 8
    - Post-procedure mammogram – 10

**The Clinical Advisor and/or Delegated Assessor(s) must observe a minimum of 50 percent of each category logged procedures as outlined above.**

## Guidelines for observation of Breast Ultrasound procedures

The following are guidelines for observation of Ultrasound procedures to demonstrate understanding of the purpose, process and outcomes:

- Introduce yourself to the patient (NOD)
- Review the patient history and participate in the evaluation of requisition
- Review procedure set up
- Review exam protocol
- Observe procedure
- Participate in the evaluation of the images

Log for documenting observation of breast ultrasound procedures for

- Regular diagnostic ultrasound – total 10
- Interventional procedures (Core biopsy, VAB, Lymph node biopsy, needle or seed localization, FNA) – 10

## Narratives

There are two possible narratives required:

1. Breast MR
2. Digital Breast Tomosynthesis

A narrative is always required for Breast MR. If a site performs digital breast tomosynthesis (DBT), a narrative is not required for DBT. If DBT is not available, a narrative on DBT must also be submitted for review.

Narratives allow for the CBI Committee to review a candidate's knowledge of a procedure in-depth, and allow the candidate to learn about procedures that they may not have access to.

A "narrative" is a detailed description of the function/operation of equipment, dis/advantages of its use, and the indications of its use, including any personal learning or other important content to your narrative description, if you wish.

The narrative(s) should **fully cover the four topics below**. Submit the completed typed narrative(s) with the completed Summary of Clinical Competence for review by the CBI Committee. Please do not include any patient or personal information in your narrative(s).

1. Function / operation of equipment
  - a. High-level overview of how equipment operates,
  - b. how images are created and
  - c. how exams are performed
2. Advantages of the modality
3. Disadvantages of the modality
4. Application
  1. When / why is the modality indicated to be used

## 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, difficult to resolve and 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 however are not automatically granted. Please contact [specialtycertificates@camrt.ca](mailto:specialtycertificates@camrt.ca) **prior to the program end date** for information regarding an extension request.

There is a fee associated with extension requests.

## Submission of Summary of Clinical Competence

Candidates must submit the completed Summary of Clinical Competence to the CAMRT for review and approval by the CBI Committee. Electronic copies submitted as **one scan or one PDF file** will be accepted to < [specialtycertificates@camrt.ca](mailto:specialtycertificates@camrt.ca) >.

Candidates do not need to submit marks or completion letters for CAMRT courses.

**A Summary of Clinical Competence deemed incomplete will be subject to a resubmission fee. This includes any outstanding (or incomplete) program requirement – didactic or clinical.**

## Clinical Advisor (CA)

It is the candidate's responsibility to identify a clinical advisor at the clinical site and to ensure the clinical advisor is made aware of their role. Refer to **APPENDIX E** for *The Role of a Clinical Advisor*. When the candidate has one or more clinical sites, one Clinical Advisor must be identified per site.

The clinical advisor must:

- be a medical radiation technologist practicing in diagnostic **breast imaging**
- have a minimum of five years' experience in diagnostic **breast imaging**
- not be currently registered in either CBIS or CBID Certificate Programs
- perform the assessment on the candidate for performance of procedures/related competencies or delegate assessment to another breast imaging technologist
  - note if the CA is not a specific subject matter expert in Breast Ultrasound and Breast MRI, a Delegated Assessor(s) is required.
- verify that others identified to assess candidates are competent in their practice.
- A clinical advisor with a CBI (Screening or Diagnostic) is preferred but not mandatory.

The importance of an ongoing QC program is an integral part of a breast imaging center. However, we recognize that a radiologist acting as CA may not be familiar with the stringent QC procedures required for dedicated mammography. In this situation a department QC technologist, a supervisor or manager of the diagnostic imaging department must sign off. This person will have to be added to the DELEGATED ASSESSORS (DA) list in the SCC, along with their credentials. We trust that it is in the best interest of the breast imaging department to have mammography technologists competent in QC procedures.

The clinical advisor must attest to the competency of the candidate personally or by delegation to a competent individual(s) with the appropriate credential and expertise. The clinical advisor must attest to the competency of the candidate personally or by delegation to a competent individual(s) with the appropriate credential and expertise.

## Delegated Assessor (DA)

The Delegated Assessor (DA) must:

- be a medical radiation technologist practicing in diagnostic breast imaging and/or MRI, or a sonographer practicing breast ultrasound
- be technologist(s) or sonographer(s) certified in the discipline for the modality being used for breast imaging, with a minimum of three years' experience in that area.
- not be currently registered in either CBIS or CBID Certificate Programs
- perform the assessment on the candidate for procedures/related competencies when the CA is unable to do so.
- 

**All professionals signing in the SCC  
must be identified on the Delegated Assessors form.  
You may duplicate forms as needed.**

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## 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.

**Effective immediately, all internationally educated clinical advisors\*\* must submit a sealed 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 a CBI, CBIS or CBID 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](mailto:CPD@camrt.ca) or [specialtycertificates@camrt.ca](mailto:specialtycertificates@camrt.ca) .***

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

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## 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)

## **Course Objectives**

### ***Breast Imaging 1***

- Describe breast embryology
- Explain breast physiology and breast changes that occur in the lifetime of a woman
- Identify gross surface anatomy of the breast
- Identify surrounding structures
- Describe anatomical structures within the breast
- Describe histology of the female breast
- Describe the male breast
- Identify breast pathologies that occur in males
- Outline standard mammographic positions; the craniocaudal and mediolateral views
- Describe patient positioning of the craniocaudal and mediolateral views
- Identify positioning errors and corrective measures
- Specify supplemental views and when they are required
- Describe patient positioning of supplemental views
- Describe the technique when imaging breast implants
- Explain the rationale for breast compression and its effect on the image
- List alternate methods for obtaining high-quality images on difficult to position patients
- Describe how patient compliance affects positioning and images obtained
- Identify how variations in body habitus and breast shape can affect imaging
- Describe safe ergonomics and body mechanics for the technologist
- Identify breast anatomy seen on a mammogram
- Discuss patient care in the mammographic setting
- Explain the technical factors used in mammography and why they are specific to breast imaging
- Identify cultural considerations in terms of being sensitive to a patient's needs and beliefs
- Describe how optimal exposure factors affect the digital image
- Describe efforts being made to increase mammographic screening within the Indigenous community
- Identify the relationship between technical factors used and patient dose
- Explain mammographic imaging of the gender diverse community
- Describe radiation protection in mammography
- Summarize the organized approach to breast imaging
- State the function of the Canadian Task Force on Preventive Health Care
- Identify the guidelines for breast screening set out by the Canadian Task Force
- Identify the CAR recommendations for breast imaging

- Explain the difference between guidelines and recommendations
- Describe the technologist's role in obtaining high-quality and diagnostic mammography
- List educational requirements for technologists to perform mammography in Canada
- Identify the purpose of the Mammography Accreditation Program set out by the CAR
- Describe how participation in the Mammography Accreditation Program (MAP) benefits the technologist
- Compare screening and diagnostic protocols
- Identify differences when imaging symptomatic and asymptomatic mammography patients
- Explain the risks and benefits of screening for breast cancer
- Explain breast cancer screening and the rationale behind it
- Describe what a breast screening program is
- Identify participants eligible for provincial breast screening programs
- Identify outcomes from breast screening programs
- Identify the reason(s) screening for breast cancer is considered by some to be controversial
- Describe how the screening controversy can impact patients
- Identify the eight population-based breast screening trials that were instrumental in demonstrating the efficacy of mammography
- Describe the Digital Mammographic Imaging Screening Trial (DMIST) study and its results
- Identify breast cancer statistics in Canada
- Identify breast cancer risk factors:
  - Uncontrollable risk factors
  - Controllable risk factors
- Identify percentages of breast cancer occurrences by their location in the breast
- Describe different types of breast cancer:
  - DCIS
  - Invasive ductal carcinoma
  - Tubular carcinoma
  - Mucinous or colloid carcinoma
  - Papillary carcinoma
  - Medullary carcinoma
  - Cribriform carcinoma
  - LCIS
  - Invasive lobular carcinoma
  - Inflammatory breast cancer
  - Paget's disease of the nipple
- Describe how breast cancer can be diagnosed
- Describe breast cancer staging and grading



- Describe surgical interventions for breast cancer:
  - Lumpectomy
  - Mastectomy
  - Sentinel node biopsy
  - Axillary node dissection
  - Prophylactic mastectomy
- Outline breast cancer treatments:
  - Neoadjuvant therapy
  - Adjuvant Therapy
  - Chemotherapy
  - Endocrine Therapy
  - Targeted Therapy
- Describe types of breast reconstruction available to patients
- Describe the purpose of post-breast cancer screening including:
  - Benefits
  - Recommendations

## ***Breast Imaging 2***

### **Explain direct digital breast imaging equipment**

- Explain components of a full-field digital mammography (FFDM) system
  - X-ray tube
  - Target
  - Filtration
  - Collimators
  - C-arm gantry
  - Face plate
  - Compression paddle
  - Grids
  - Automatic exposure control
  - Detectors
  - Analog to digital converter
  - Control panel
  - Technologist workstation
  - Radiologist review station
- Explain features of a full-field digital mammography (FFDM) system
  - Workflow
  - Information Systems: RIS/MIS/HIS
  - Process
  - Pre-processing/algorithms
  - Post-processing
  - Picture Archiving and Communication System (PACS)
  - Health Level 7 (HL7)

- Digital Imaging and Communications in Medicine (DICOM)
  - Image storage
- Explain computer aided detection (CAD)
- Explain factors that affect image quality
  - Spatial resolution (detail)
  - Contrast
  - Development of image artifacts
- Explain dose limits and dose reduction
- Explain exposure index values
- Explain digital breast tomosynthesis

**Explain the importance and process of quality control (QC) procedures for mammography**

- Daily QC procedures
  - Equipment warm-up, if recommended by manufacturer
  - Meter operation
  - Equipment condition
  - Cleanliness of electronic display devices and assessment of viewing conditions
  - Overall visual assessment of electronic display devices
- Weekly QC procedures
  - Visual inspection and cleanliness of imaging systems
  - Imaging quality evaluation with phantom for optical density and absence of artifacts
  - Digital image quality evaluation with phantom, looking for test objects embedded therein
  - Electronic display device performance
  - Compression centimetre test
- Monthly QC procedures
  - Mechanical, electrical and overall safety inspection
  - Extended full-field artifacts evaluation
- Quarterly QC procedures
  - Repeat analysis
  - Reject analysis
- Semi-annual QC procedures
  - Breast compression (force) device
- Annual QC procedures (physicist)
  - Accuracy of tube voltage
  - Reproducibility of tube voltage
  - Radiation output (air kerma) reproducibility and linearity
  - Normalized radiation output
  - X-ray beam filtration
  - Collimation/ beam limiting device
  - Light field and x-ray field alignment
  - Automatic exposure control (AEC)

- Response function
- Noise evaluation
- Image homogeneity and artifact assessment
- Ghosting
- Image quality for contrast, detail and artifacts
- Dosimetry
- Electronic display device performance
- General preventive maintenance

### **Explain QC procedures for Digital Breast Tomosynthesis**

- Digital image quality evaluation with phantom
- Geometry calibration

### **Explain quality assurance (QA) procedures**

- Purpose
- Process
- Audit

### **Explain the CAR Mammography Accreditation Program**

### **Discuss contrast-enhanced digital mammography (DM)**

### **Discuss ultrasound imaging**

- Colour Doppler
- Therapeutic ultrasound
- Elastography
- Automated breast ultrasound

### **Discuss MRI**

- Diffusion weighted imaging
- Spectroscopy

### **Discuss PET and PET/CT**

### **Discuss SPECT and SPECT/CT**

- Scintimammography
- Lymphoscintigraphy
- Bone scintigraphy

### **Discuss experimental techniques for breast imaging**

- Mammography-ultrasound fusion
- Cone beam CT
- Methods using light
  - Transillumination
  - Optical imaging/ optical spectroscopy/
  - CT laser mammography
  - Digital optical breast imaging (DOBI)
- Thermography
- Methods measuring electrical impulses
  - Electrical potential measurements
  - Electrical impedance imaging

### **Microwave imaging**

**Perform basic interpretation and critique of mammographic images for benign and malignant lesions**

- Breast asymmetry/architectural distortion
- Breast masses
- Breast calcifications
- Skin changes
- Nipple changes and discharge
- Lymphadenopathy
- Other changes

**Explain the BI-RADS system**

**Explain breast density classification**

- Automated breast density assessment software

**Explain where breast cancer comes from**

**Identify and explain basic pathology**

- Cyst
- Fibroadenoma
- Lactational or lactating adenoma
- Hamartoma
- Fat necrosis and oil cysts
- Abscess
- Duct ectasia
- Intraductal papilloma
- Sclerosing adenosis
- Radial scar
- Phyllodes tumour
- Paget's disease
- Pseudoangiomatous stromal hyperplasia
- Atypical ductal hyperplasia
- Ductal carcinoma in situ
- Invasive ductal carcinoma
- Atypical lobular hyperplasia
- Lobular carcinoma in situ
- Invasive lobular carcinoma
- Invasive mixed carcinoma
- Inflammatory breast cancer
- Metastatic breast cancer
- Juvenile breast carcinoma
- Lymph nodes
- Conditions of the male breast

**Explain factors pertaining to diagnostic imaging**

- Breast changes/ signs and symptoms
- Breast exam
- Clinical history
- Diagnostic imaging

- Lateral
- Nipple views
- Extended or exaggerated CC
- Spot compression
- Magnification
- Rolled
- Tangential
- Cleavage
- Axillary tail
- Elevated craniocaudal
- From below caudocranial

**Explain procedures and issues with imaging the mastectomy site**

**Explain triangulation/localization methods**

**Explain interventional procedures of the breast**

- Galactography
- Cyst aspiration
- Abscess drainage
- Biopsies
  - Fine needle aspiration
  - Core biopsy
  - Vacuum assisted biopsy
  - Clip placement
  - Specimen radiography
- Preoperative localizations
  - Needle wire localizations
  - Radioactive seed localization
  - Other localization methods
- Sentinel node biopsy
- Excisional/incisional biopsy
- Ablation and other non-surgical tissue removal techniques

### ***Imaging Breast Pathology***

- Describe embryology of the breast
- Describe the breast and surrounding structures
- Describe the anatomy and histology of the female breast
- Describe the physiology of the female breast and the factors affecting breast development, function and mammographic appearances
- Describe the anatomy and physiology of the male breast
- Identify anatomical breast structures as seen on the mammogram
- Describe and identify mammographic anomalies of the breast
- Explain the concept of being breast aware and clinical breast exams
- Describe any physical signs and/or symptoms associated with breast cancer
- List non-modifiable and modifiable risk factors associated with the development of breast cancer

- List breast cancer statistics
- Explain the basic histological changes associated with breast cancer
- Explain the mechanisms involved in the proliferation of breast cancer
- Explain the diagnosis of breast cancer and the pathology report
- Describe the system of staging strategies associated with breast cancer
- Describe breast cancer treatment options
- Describe screening mammography
- Describe diagnostic mammography
- Describe the technologist's role in acquiring two-dimensional (2D) Digital Mammography (DM) and Digital Breast Tomosynthesis (DBT) in both screening and diagnostic settings with imaging strategies used to demonstrate various breast structures and disease processes
- Describe the radiologist's interpretation of screening and diagnostic mammography and the rationale for the various imaging techniques used to demonstrate breast structures and diseases
- Outline the systematic approach from the detection to diagnosis of breast cancer
- State the purpose of the Breast Imaging Reporting and Data System (BI-RADS) as it pertains to the mammography reporting system
- Describe Double Reading of Mammograms, Computer Assisted Detection (CAD) and Artificial Intelligence (AI)
- List and briefly describe adjunctive imaging modalities, such as Breast Ultrasound and MRI, used in diagnosing breast disease and emerging technologies
- State the general principles, indications and benefits of these adjunctive imaging modalities commonly used in Breast Imaging
- List and describe the various interventional procedures utilized in the diagnosis of breast diseases
- Describe the method used to select an appropriate interventional procedure
- State the importance of radiological/pathological correlation
- State how radiological/pathological correlation is attained
- Define a breast mass
- Describe the evaluation of breast masses using BI-RADS Breast Imaging Lexicon – Mammography
- Describe the evaluation of breast masses using BI-RADS Breast Imaging Lexicon – Ultrasound
- List the various benign breast masses
- Describe the terminology, clinical findings, mammographic findings and treatment plans of the various benign breast masses
- Identify benign breast masses on the mammogram
- List the various malignant breast masses
- Describe the terminology, clinical findings, mammographic findings and treatment plans of the various malignant breast masses
- Identify malignant breast masses on the mammogram

- Describe and identify architectural distortion of the breast on the mammogram
- Describe and identify asymmetries of the breast on the mammogram
- Describe mammographic imaging of calcifications  
Describe mammographic evaluation of calcifications
- List, describe and identify typically benign calcifications as they appear on a mammogram
- List, describe and identify suspicious morphology of calcifications as they appear on a mammogram
- List, describe and identify the distribution of calcifications as they appear on a mammogram
- List and describe the various processes of calcifications, how they appear on a mammogram and their treatment plan if necessary.
- List the various interventional/surgical procedures performed on the breast.
- State the reason tissue core biopsy is performed and describe the mammographic findings seen after this interventional procedure.
- State the reason open surgical biopsy is performed and describe the mammographic findings seen after this interventional procedure.
- State the reason lumpectomy is performed and describe the mammographic findings seen after this surgical procedure.
- State the reason mastectomy is performed and describe the mammographic findings seen after this surgical procedure.
- State the reason sentinel node biopsy or axillary dissection is performed and describe the mammographic findings seen after this surgical procedure.
- State the reason reduction mammoplasty is performed and describe the mammographic findings seen after this surgical procedure.
- State the reason augmentation mammoplasty is performed, describe the mammographic findings seen after this surgical procedure and possible complications.
- State the reason breast reconstruction is performed and describe the mammographic findings seen after this surgical procedure.
- State the reason mastopexy is performed and describe the mammographic findings seen after this surgical procedure.
- Define and describe the findings of associated features using BI-RADS Breast Imaging Lexicon – Mammography
- Describe the terminology, clinical findings, mammographic findings and treatment plans of the various benign associated features
- Describe the terminology, clinical findings, mammographic findings and treatment plans of the various malignant associated features
- Describe the terminology, clinical findings, mammographic findings and treatment plans of the various special topics
- Describe the terminology, clinical findings, mammographic findings and treatment plans of the various special conditions

## Exam Blueprints

### CAMRT Breast Imaging 1 Exam blueprint

Item presentation - % of question types	
Multiple Choice: 100%	
Exam structure	
Exam length: 2:0 hours Number of questions: 100	
Exam delivery format	
On-line	
Course Content and question weighting	
Chapters	Percentage weighting of number of questions/chapters
1 – Breast Anatomy	16-20%
2 – Mammographic Positioning	24-28%
3 – Patient Care in Mammography	11-14%
4 – Organized Approach to Breast Imaging	4-8%
5 – Breast Cancer Screening	11-15%
6 – Breast Cancer	24-28%



## CAMRT Breast Imaging 2 Exam blueprint

Item presentation - % of question types	
Multiple Choice: 100%	
Exam structure	
Exam length: 2:0 hours Number of questions: 100	
Exam delivery format	
On-line	
Course Content and question weighting	
Chapters	Percentage weighting of number of questions/chapters
1 – Mammographic and Digital Breast Tomosynthesis Equipment	12-15%
2 – Quality Control / Quality Assurance with Mammographic and Digital Breast Tomosynthesis Equipment	12-15%
3 – Adjunctive Breast Imaging Modalities	12-15%
4 – Differentiation of Benign and Malignant Breast Abnormalities	17-21%
5 – Basic Breast Pathology	17-21%
6 – Diagnostic Imaging and Interventional Procedures of the Breast	17-21%

## CAMRT Imaging Breast Pathology Exam blueprint

Item presentation - % of question types	
Multiple Choice	70%
True or False:	30%
Exam structure	
Exam length:	2.5 hours
Number of questions:	100
Exam delivery format	
On-line	
Course Content and question weighting	
Chapters	Percentage weighting of number of questions/chapters
1 – Anatomy & Physiology and Development & Treatment of Breast Cancer	12%
2 – Mammographic Interpretation, Adjunctive Modalities & Interventional Procedures	22%
3 – Masses, Architectural Distortion & Asymmetries	28%
4 – Calcifications	14%
5 – The Surgically Altered Breast	14%
6 – Associated Features & Special Topics and Conditions	10%

### RESOURCES

*Following is a list of texts and other resource material that may be of benefit to practicing mammographers.*

#### Textbooks

Andolina, Valeria F., Lille, S.L., Willison. K. M.

**Mammographic Imaging A Practical Guide 4th ed**

Lippincott Williams & Wilkins 2018 ISBN 9781496352026

Cardenosa, Gilda

**Breast Imaging Companion, 3<sup>rd</sup> and 4<sup>th</sup> editions**

Lippincott, Williams & Wilkins, 2007/2017, ISBN 9780781764919 / 9781496314963

Dutton A.G., Linn-Watson, T. Torres, Lillian S.,

**Basic Medical Techniques and Patient Care for Radiologic Technologists, 8<sup>th</sup> ed**

Lippincott Williams & Wilkins, 2012, ISBN 978 1451115659

DeParades, Ellen Shaw

**Atlas of Mammography, 3<sup>rd</sup> ed**

Lippincott Williams & Wilkins, 2007, ISBN 9780781764339

Olivotto, Ivo ... (et al.).

**The Intelligent Patient Guide to Breast Cancer, 2017, 6th edition,**

Intelligent Patient Guide Ltd., ISBN: 978-0981159935

## Websites

### **Canadian Association of Radiologists**

#### **CAR Practice Guidelines and Technical Standards for Breast Imaging and Intervention**

<https://car.ca/wp-content/uploads/Breast-Imaging-and-Intervention-2016.pdf>

### **Canadian Breast Cancer Foundation**

<http://www.cbcf.org/ontario/AboutBreastCancerMain/FactsStats/Pages/default.aspx>

### **Decision for Breast Screening in Canada**

<https://canadiantaskforce.ca/?s=breast+screening&search-type=default>

### **Imaginis Mammography – A Directory of Mammography Articles**

<http://www.imaginis.com/mammography>

### **Safety Code 36**

#### **Radiation Protection and Quality Standards in Mammography – Safety Procedures for the Installation, Use and Control of Mammographic X-ray Equipment**

[http://www.hc-sc.gc.ca/ewh-semt/pubs/radiation/safety-code\\_36-securite/index-eng.php](http://www.hc-sc.gc.ca/ewh-semt/pubs/radiation/safety-code_36-securite/index-eng.php)

### 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 first hand 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.

## **Internationally Educated Medical Radiation Technologist Clinical Advisor Verification of Experience**

**Hospital/Organization:** \_\_\_\_\_

**Name of Supervisor:** \_\_\_\_\_

**Supervisor Credential(s):** \_\_\_\_\_

**Supervisor Email:** \_\_\_\_\_

**NAME OF CBID 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 diagnostic breast Imaging
- Currently practicing in diagnostic breast imaging

**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 Certificate in Breast Imaging - Diagnostic (CBID) program.**

**The affixed hospital seal confirms the authenticity of this submission.**

\_\_\_\_\_  
Signature of Clinical Advisor Supervisor/Employer

\_\_\_\_\_  
Date

### 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.

	<p>I am a medical radiation technologist* with a CAMRT CBI credential <b>OR**</b> a medical radiation technologist having a minimum of five years' experience in the practice of diagnostic breast imaging</p> <p><i>*or other:</i> _____</p>
	I am <b>currently practicing</b> in diagnostic breast imaging.
	I am not currently registered in any of the CAMRT Breast Imaging Certificate programs.
	<p>I have no conflicts of interest* with the CBID candidate.</p> <p><b>*Conflicts of interest may include:</b></p> <ul style="list-style-type: none"> <li>• Close personal relationships that could threaten independence or objectivity during assessments <ul style="list-style-type: none"> <li>• Spouse or family member</li> </ul> </li> <li>• A direct report (i.e. the assessor reports to the candidate)</li> </ul>

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 CBID designation.

\_\_\_\_\_  
Clinical Advisor Signature

\_\_\_\_\_  
Date