

Mammography Curriculum

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Core Content

The professional practice of mammography requires specific knowledge and skills generally not obtained in standard radiography programs. The core content section presents curriculum elements that are considered essential for technologists in the practice of mammography.

Objectives

- Recognize breast anatomy and development.
- Identify internal and external breast anatomy as well as its mammographic appearance.
- List tissue layers and cellular components of the breast.
- Describe the sequence of a mammographic examination procedure.
- Conduct a patient assessment.
- List types of mammographic procedures.
- Discuss the Breast Imaging Reporting and Data System (BI-RADS®)
- Recognize breast pathology and cancer classification systems.
- Explain breast cancer treatment options.
- List the components of a mammography machine.
- Describe the digital imaging workflow.
- Explain quality assurance and quality control procedures and regulations.
- Identify the indications and equipment used for breast sonography.
- Discuss the positioning and imaging factors associated with breast sonography.

Breast Anatomy and Mammographic Correlation

- I. The Breast**
 - A. Developmental stages
 - B. Life cycle
 - C. Female
 - D. Male
 - E. Hormonal and surgical changes
- II. External Anatomy and Mammographic Appearance**
 - A. Nipple and areola
 - B. Skin
 - C. Breast margins and axillary tail
 - D. Anatomical reference terminology
- III. Internal Anatomy and Mammographic Appearance**
 - A. Fascial layers
 - B. Retromammary fat space
 - C. Tissue types (i.e., supporting, fibrous, glandular and adipose)
 - D. Systems (i.e., lymphatic and vascular)
 - E. Pectoral muscle

- IV. Cellular Components (i.e., epithelial cells, myoepithelial cells and basement membrane)
- V. Breast Anomalies

Patient Examination

- I. Communication (e.g., patient education)
- II. Assessment
 - A. Documentation
 - 1. Medical history
 - 2. Clinical findings
 - 3. Radiopaque markings
 - B. Patient limitations
 - C. Clinical breast examination
- III. Positioning
 - A. Standard projections
 - B. Replacing or problem-solving projections
 - C. Modifications and technical adjustments
- IV. Breast Procedures
 - A. Screening
 - B. Diagnostic
 - C. Digital breast tomosynthesis (DBT)
 - D. Interventional
 - 1. Biopsy procedures
 - 2. Localization
 - 3. Pre- and post-procedure care
 - E. Other modalities
 - 1. Ultrasound (US)
 - 2. Magnetic resonance imaging (MRI)
 - 3. Contrast enhanced mammography (CEM)
 - 4. Cone beam breast computed tomography (CBBCT)
 - 5. Computerized tomographic laser mammography (CTLM)
 - 6. Nuclear medicine (i.e., BSGI, PEM and MBI)
- V. Image Evaluation and Quality Control

Breast Reporting, Pathology and Treatment

- I. Breast Imaging Reporting and Data System (BI-RADS®)
 - A. Imaging terminology
 - B. Report organization

- C. Assessment structure
- D. Classification system

II. Pathology

- A. Benign
- B. High risk
- C. Malignant
- D. Breast cancer classifications
 - 1. TNM staging and grading
 - 2. Multifocal or multicentric
 - 3. Receptors and HER2 +/-

III. Treatment Options

- A. Surgery
- B. Radiation therapy
- C. Systemic therapy (e.g., chemo, hormone, immuno therapy)
- D. Prophylaxis

Equipment and Technical Applications

I. Dedicated Mammography Equipment

- A. Components
 - 1. C-arm
 - 2. X-ray tube
 - 3. Image detector
 - 4. Compression devices
- B. Beam geometry effects (e.g., heel effect, magnification)
- C. Technical factors

II. Digital Workflow

- A. Acquisition workstation
- B. Radiologist workstation
- C. Computer-aided detection systems (CAD)
- D. Image management (PACS/MIMPS)
- E. Tele mammography

III. Quality Assurance and Quality Control

- A. Personnel requirements and responsibilities
 - 1. Interpreting physicians
 - 2. Mammographers
 - 3. Medical physicists
 - 4. Re-establishing qualifications for personnel
 - 5. Modality specific training (Mammography Quality Standards Act [MQSA])
- B. Facility quality control programs
 - 1. Technologist tests

2. Medical Physicist tests
 3. Lead interpreting physician (LIP) review
 4. Quality standards (Enhancing Quality Using the Inspection Program [EQUIP])
- C. Guidelines and standards
1. Certification
 2. Accreditation
 3. MQSA Inspection requirements

Breast Sonography

- I.** Indications
- II.** Equipment
 - A. Monitor
 - B. Transducers
- III.** Positioning (i.e., arm placement and degree of obliquity)
- IV.** Imaging
 - A. Appearance (i.e., normal, benign and malignant)
 - B. Labeling
 1. Laterality
 2. Clockface ordination
 3. Distance from nipple
 4. Region localization
 5. Scan planes and measurements
 - C. Mammographic correlation
- V.** Bioeffects and Safety

Resources

This list of resources is designed to help educators sample the pool of available references and study materials in medical imaging. The resources list should be viewed as a snapshot of available materials. Omission of any one title is not intentional. Because the body of literature and media related to the field is dynamic, educators are encouraged to find additional sources for recent updates, revisions, and additions to this collection.

2018 ACR Digital Mammography QC Manual Resources. American College of Radiology website. <https://www.acraccreditation.org/Resources/Digital-Mammography-QC-Manual-Resources>

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Appendix

Curriculum Revision Workgroup

We would like to extend special recognition to the outstanding professionals who volunteered their time as members of the curriculum revision project:

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