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# CONTENT SPECIFICATIONS FOR THE EXAMINATION IN MAMMOGRAPHY



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The purpose of the ARRT Examination in Mammography is to assess the knowledge and cognitive skills underlying the intelligent performance of the tasks typically required of technologists employed in this specialized area. These content specifications are based on the results of a nationwide practice analysis recently conducted by ARRT.<sup>1</sup>

The table below presents the five major content categories covered on the examination, and indicates the number of test questions in each major category. The remaining pages of this document list the specific topics addressed within each major category. The approximate number of test questions allocated to each topic appears in parentheses.

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<b>Content Category</b>	<b>Number of Questions<sup>2</sup></b>
A. Patient Education and Assessment	18
B. Instrumentation and Quality Assurance	25
C. Anatomy, Physiology, and Pathology	25
D. Mammographic Technique and Image Evaluation	20
E. Positioning and Interventional Procedures	<u>27</u>
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1. A special debt of gratitude is due to the hundreds of professionals participating in this project as committee members, survey respondents, and reviewers.
2. Each exam includes an additional 20 unscored (pilot) questions. On the pages that follow, the approximate number of test questions allocated to each content category appears in parentheses.

## A. Patient Education and Assessment (18)

### 1. Epidemiology of Breast Cancer (3)

- a. incidence
- b. known risk factors
  1. female gender
  2. advancing age
  3. personal history of breast cancer
  4. personal history of other cancers
  5. family history of breast cancer
  6. genetic predisposition
- c. other suggested risk factors
  1. early menarche
  2. late menopause
  3. nulliparity
  4. late age at primiparity
  5. obesity

### 2. Early Detection of Breast Cancer (5)

- a. ACS guidelines for mammography screening
- b. breast self-examination (BSE)
  1. frequency
  2. method
- c. clinical breast examination (CBE)
  1. frequency
  2. method
- d. signs and symptoms
  1. pain
  2. lump
  3. thickening
  4. nipple discharge
  5. skin changes
  6. nipple and areolar changes
  7. edema
  8. erythema
  9. dimpling
- e. documentation of medical history and clinical findings

### 3. Diagnostic Options<sup>1</sup> (6)

- a. mammography
- b. breast ultrasound
- c. ductography
- d. pneumocystography
- e. MRI
- f. sentinel node mapping
- g. biopsy procedures
  1. fine needle aspiration
  2. core biopsy
  3. needle localization

### 4. Treatment Options<sup>2</sup> (4)

- a. surgical options
  1. lumpectomy
  2. lumpectomy and radiation therapy
  3. lumpectomy with axillary dissection and radiation therapy
  4. simple mastectomy
  5. modified radical mastectomy
- b. nonsurgical options
  1. radiation therapy
  2. chemotherapy
  3. hormonal therapy (e.g., tamoxifen)
- c. reconstruction
  1. implant
  2. TRAM flap
  3. latissimus dorsi

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<sup>1</sup> The mammographer is expected to understand basic principles (indications, benefits, risks) to enable appropriate responses to questions from patients and family.

<sup>2</sup> The mammographer is expected to understand the definitions and basic descriptions of these treatment options.

## B. Instrumentation and Quality Assurance (25)

### 1. Design Characteristics of Mammography Units (6)

- a. kVp range
- b. mammography tube (anode, filtration, window, etc.)
- c. compression devices
- d. automatic exposure control (AEC)
- e. grids
- f. system geometry (SID, OID, magnification, etc.)
- g. density settings

### 2. Imaging Components (5)

- a. analog
  1. film
  2. screens and cassettes
  3. processor
- b. digital
  1. image receptor
  2. monitor
  3. laser printer

### 3. Quality Assurance (14)

- a. technologist tests<sup>3</sup>
  1. purpose
  2. frequency
  3. equipment and procedure
  4. performance criteria
  5. corrective action
- b. medical physicist tests<sup>4</sup>
  1. purpose
  2. frequency
- c. accreditation and certification
  1. agencies (ACR, FDA)
  2. purpose
  3. process
  4. frequency
- d. MQSA regulations
  1. personnel requirements for technologists
  2. consumer complaint mechanism
  3. record keeping (assessment categories; image ID and labeling; maintenance of film and reports, communication of results to patient)
  4. medical audit

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<sup>3</sup> The 12 technologist tests listed in the *ACR Mammography Quality Control Manual* (1999) are covered. The mammographer is expected to have a detailed understanding of these tests.

<sup>4</sup> The 13 medical physicist tests listed in the *ACR Mammography Quality Control Manual* (1999) are covered. The mammographer is expected to have a basic understanding of these tests.

## C. Anatomy, Physiology, and Pathology (25)

### 1. Localization Terminology (2)

- a. clock position
- b. quadrants

### 2. External Anatomy (3)

- a. breast margins
- b. nipple
- c. areola
- d. Montgomery's glands
- e. Morgagni's tubercles
- f. skin
  1. sebaceous glands
  2. sweat glands
  3. hair follicles
- g. axillary tail
- h. inframammary fold
- i. margin of pectoralis major

### 3. Internal Anatomy (6)

- a. fascial layers
- b. retromammary space
- c. fibrous tissues
- d. glandular tissues
  1. lobules
  2. terminal ductal lobular unit (TDLU)
- e. adipose tissues
- f. Cooper's ligaments
- g. pectoral muscle
- h. vascular system
- i. lymphatic system

### 4. Histology (4)

- a. terminal ductal lobular unit (TDLU)
  1. extralobular terminal duct
  2. intralobular terminal duct
  3. acinus (ductal sinus)
- b. cellular components
  1. epithelial cells
  2. myoepithelial cells
  3. basement membrane

### 5. Pathology (10)

- a. benign conditions and mammographic appearances
  1. cyst
  2. galactocele
  3. fibroadenoma
  4. lipoma
  5. hamartoma
  6. papilloma
  7. ductal ectasia
  8. hematoma
  9. abscess and inflammation
  10. fat necrosis
  11. radial scar
  12. calcification
  13. lymph nodes
- b. malignant conditions and mammographic appearance
  1. ductal carcinoma in situ
  2. invasive ductal carcinoma
  3. invasive lobular carcinoma
  4. inflammatory carcinoma
  5. Paget's disease
  6. sarcoma
  7. lymphoma
  8. calcification
  9. stellate mass

## D. Mammographic Technique and Image Evaluation (20)

### 1. Technical Factors (5)

- a. kVp
- b. mAs
- c. density setting
- d. photocell positioning
- e. cm of compression

### 2. Breast Compression (2)

### 3. Magnification Techniques (3)

### 4. Evaluation of Image Quality (10)

- a. positioning
- b. compression
- c. exposure
- d. contrast
- e. sharpness
- f. noise
- g. artifacts
- h. collimation
- i. labeling

## E. Positioning<sup>5</sup> and Interventional Procedures (27)

### 1. Standard Views (5)

- a. craniocaudal (CC)
- b. mediolateral oblique (MLO)

### 2. Additional Views (6)

- a. mediolateral (ML)
- b. lateromedial (LM)
- c. spot compression
- d. magnification
- e. exaggerated craniocaudal (XCCL)
- f. cleavage (CV)
- g. axillary tail (AT)
- h. tangential (TAN)
- i. rolled (RL, RM, RS, RI)
- j. triangulation technique

### 3. Special Circumstances (5)

- a. caudocranial (FB)
- b. lateromedial oblique (LMO)
- c. superolateral-to-inferomedial oblique (SIO)
- d. implant displaced (ID)

### 4. Special Patient Situations (6)

- a. chest wall deformities
- b. irradiated breast
- c. reduction mammoplasty
- d. post-surgical breast
- e. males
- f. kyphotic patients
- g. protruding abdomens
- h. pacemaker
- i. infusa-port (port-a-cath)
- j. implants

### 5. Interventional Procedures<sup>6</sup> (5)

- a. fine needle aspiration
- b. core biopsy
- c. breast specimen imaging
- d. needle localization
- e. ductography
- f. pneumocystography

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<sup>5</sup> The mammographer is expected to know positioning as presented in the ACR *Mammography Quality Control Manual* (1999).

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<sup>6</sup> The mammographer is expected to have the basic knowledge required to assist with these procedures.