

## Breast Sonography Examination Content Outline

### (Outline Summary)

| # | Domain                            | Subdomain                                                             | Percentage |
|---|-----------------------------------|-----------------------------------------------------------------------|------------|
| 1 | Anatomy and Physiology            | • Normal anatomy and physiology                                       | 15%        |
| 2 | Pathology                         | • Abnormal perfusion and function<br>• Benign vs. suspicious findings | 34%        |
| 3 | Integration of Data               | • Incorporation of outside data                                       | 19%        |
| 4 | Protocols                         | • Clinical standards and guidelines<br>• Measurement techniques       | 13%        |
| 5 | Ultrasound Physics                | • Artifacts<br>• Hemodynamics<br>• Imaging Instruments                | 12%        |
| 6 | Emerging Technology and Treatment | • New technologies<br>• Interventional procedures                     | 7%         |

### (Detailed Outline)

| 1     | Anatomy and Physiology 15%                                                                        | Knowledge and/or skill related to anatomy and physiology                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-------|---------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1.A   | Normal anatomy and physiology                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 1.A.1 | Distinguish lymph nodes related to the breast                                                     | <ul style="list-style-type: none"> <li>• Knowledge of lymph node anatomy and various locations</li> <li>• Ability to differentiate between normal and abnormal lymph nodes</li> <li>• Knowledge of age-related or hormonal sonographic changes of the breast</li> <li>• Knowledge of breast anatomy at various life cycles (e.g., tissue composition, layers, terminal duct lobular units (TDLU), lobes, lobules)</li> <li>• Knowledge of female breast anatomy</li> </ul> |
| 1.A.2 | Assess lymph node anatomy                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 1.A.3 | Identify age-related or hormonal sonographic changes of the breast tissue and its components      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 1.A.4 | Identify functional units of the breast (e.g., lobes, ducts)                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 1.A.5 | Identify the components comprising each tissue layer of the breast                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 1.A.6 | Identify the tissue layers within the breast                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 2     | Pathology 34%                                                                                     | Knowledge and/or skill related to pathology                                                                                                                                                                                                                                                                                                                                                                                                                                |
| 2.A   | Abnormal perfusion and function                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| 2.A.1 | Evaluate for vascularity related to a mass/lesion (e.g., using spectral, color, or power Doppler) | <ul style="list-style-type: none"> <li>• Knowledge of vascularity characteristics related to a mass/lesion (e.g., as shown using spectral, color, or power Doppler)</li> </ul>                                                                                                                                                                                                                                                                                             |

| <b>2.B Benign vs. suspicious findings</b>                                                                                                |                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2.B.1                                                                                                                                    | Evaluate characteristics of infectious processes                                                                      | <ul style="list-style-type: none"> <li>• Knowledge of benign, infectious, indeterminate, and suspicious characteristics of findings</li> <li>• Knowledge of terminology related to patient reports (e.g., BI-RADS classification, pathology, surgical notes)</li> <li>• Knowledge of surface characteristics of masses</li> <li>• Ability to identify breast tissue patterns surrounding benign and malignant tumors</li> <li>• Knowledge of malignant processes including breast-specific malignancies (e.g., ductal, lobular, medullary)</li> <li>• Knowledge of premalignant and atypical breast processes (e.g., atypical hyperplasia)</li> <li>• Ability to evaluate postoperative and post-interventional sites for complications (e.g., seroma, hematoma, fat necrosis)</li> <li>• Ability to evaluate postoperative breast tissue changes</li> <li>• Knowledge of implant types and related complications (e.g., silicone, saline, subpectoral)</li> <li>• Ability to differentiate between benign and malignant masses, calcifications, infectious processes, associated features, and various other findings</li> <li>• Ability to access pathology related to nipple discharge</li> <li>• Knowledge of male breast anatomy</li> </ul> |
| 2.B.2                                                                                                                                    | Evaluate lesions classified by Breast Imaging Reporting and Data System (BI-RADS )                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 2.B.3                                                                                                                                    | Assess masses by evaluating surface characteristics                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 2.B.4                                                                                                                                    | Evaluate patterns on breast tissues that surround malignant tumors or inflammatory reactions                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 2.B.5                                                                                                                                    | Evaluate malignant processes including breast-specific malignancies (e.g., ductal, lobular, medullary)                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 2.B.6                                                                                                                                    | Evaluate premalignant and atypical breast processes (e.g., atypical hyperplasia)                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 2.B.7                                                                                                                                    | Evaluate postoperative biopsy site for complications (e.g., seroma, hematoma, fat necrosis)                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 2.B.8                                                                                                                                    | Evaluate postoperative breast tissue changes                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 2.B.9                                                                                                                                    | Evaluate implant integrity (e.g., silicone, saline, subpectoral)                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 2.B.10                                                                                                                                   | Evaluate benign findings including benign pathologies (e.g., fibroadenomas, fibrocystic changes, hamartomas, lipomas) |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 2.B.11                                                                                                                                   | Assess nipple discharge                                                                                               |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 2.B.12                                                                                                                                   | Evaluate the male breast                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>3</b>                                                                                                                                 | <b>Integration of Data 19%</b>                                                                                        | <b>Knowledge and/or skill related to integration of data</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>3.A Incorporation of outside data (e.g., clinical assessment, history and physical (H&amp;P) examination information, lab values)</b> |                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 3.A.1                                                                                                                                    | Apply results/findings of the mammogram to guide scanning of the breast tissue                                        | <ul style="list-style-type: none"> <li>• Knowledge of mammographic findings to guide scanning of the breast tissue</li> <li>• Knowledge of mammographic terminology and findings</li> <li>• Ability to understand and apply information obtained from different modalities</li> <li>• Knowledge of factors for breast disease (e.g., clinical history, medications, treatments, other diseases)</li> <li>• Ability to recognize signs, symptoms, and locations of breast disease on visual assessment (e.g., skin changes, characteristics of nipple discharge)</li> <li>• Knowledge of pathological correlation</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 3.A.2                                                                                                                                    | Correlate ultrasound findings with mammography                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 3.A.3                                                                                                                                    | Correlate ultrasound findings with magnetic resonance imaging (MRI) results                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 3.A.4                                                                                                                                    | Obtain pertinent clinical history from the patient and/or the medical records (e.g., risk factors)                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 3.A.5                                                                                                                                    | Use the patient's signs and symptoms to help guide the ultrasound exam                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| 3.A.6                                                                                                                                    | Obtain pathology correlation                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |

| 4          | Protocols 13%                                                                                                    | Knowledge and/or skill related to protocols                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|------------|------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>4.A</b> | <b>Clinical standards and guidelines</b>                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 4.A.1      | Evaluate the breast using various scan planes (e.g., longitudinal/transverse, radial/antiradial)                 | <ul style="list-style-type: none"> <li>• Ability to analyze the breast using various scan planes (e.g., longitudinal/transverse, radial/antiradial)</li> <li>• Ability to analyze the breast using various scan techniques (e.g., palpation, standoff pad, transducer pressure, fremitus)</li> <li>• Knowledge of optimal patient positions for the exam being performed (e.g., oblique, supine, upright)</li> <li>• Ability to document standard imaging protocols (e.g., quadrants, clockface, distance from the nipple)</li> </ul> |
| 4.A.2      | Evaluate the breast using various scan techniques (e.g., palpation, standoff pad, transducer pressure, fremitus) |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 4.A.3      | Evaluate the breast with the patient in various positions (e.g., oblique, supine, upright)                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 4.A.4      | Document the breast exam using standard imaging protocols (e.g., quadrants, clockface, distance from nipple)     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>4.B</b> | <b>Measurement techniques</b>                                                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 4.B.1      | Perform various measurements to assess breast anatomy and pathology                                              | <ul style="list-style-type: none"> <li>• Knowledge of caliper placement to achieve desired measurement</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>5</b>   | <b>Ultrasound physics 12%</b>                                                                                    | <b>Knowledge and/or skill related to ultrasound physics</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>5.A</b> | <b>Artifacts</b>                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 5.A.1      | Identify common artifacts seen on breast ultrasound                                                              | <ul style="list-style-type: none"> <li>• Ability to identify artifacts and modify the exam as appropriate</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>5.B</b> | <b>Hemodynamics</b>                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 5.B.1      | Adjust transducer pressure when using Doppler                                                                    | <ul style="list-style-type: none"> <li>• Knowledge of appropriate transducer pressure when using Doppler</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                   |
| <b>5.C</b> | <b>Imaging instruments</b>                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 5.C.1      | Adjust console settings to optimize the image                                                                    | <ul style="list-style-type: none"> <li>• Knowledge of knobology, physics and instrumentation</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                               |
| 5.C.2      | Select the appropriate transducer                                                                                | <ul style="list-style-type: none"> <li>• Ability to select the appropriate transducer and frequency for a given examination and body habitus</li> </ul>                                                                                                                                                                                                                                                                                                                                                                               |
| <b>6</b>   | <b>Emerging Technology and Treatment 7%</b>                                                                      | <b>Knowledge and/or skill related to emerging technology and treatment</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| <b>6.A</b> | <b>New technologies</b>                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 6.A.1      | Understand various breast cancer treatments (e.g., brachytherapies, adjuvant therapies)                          | <ul style="list-style-type: none"> <li>• Knowledge of brachytherapies and adjuvant therapies</li> <li>• Knowledge of three-dimensional imaging when evaluating the breast</li> <li>• Knowledge of elastography when evaluating the breast</li> <li>• Knowledge of automated whole-breast ultrasound when evaluating the breast</li> </ul>                                                                                                                                                                                             |
| 6.A.2      | Use three-dimensional imaging when evaluating the breast                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 6.A.3      | Use elastography when evaluating the breast                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 6.A.4      | Use automated whole-breast ultrasound when evaluating the breast                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>6.B</b> | <b>Interventional procedures</b>                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 6.B.1      | Obtain images during interventional procedures, including specimen imaging and sentinel lymph node procedures    | <ul style="list-style-type: none"> <li>• Knowledge of sentinel lymph node and related procedures</li> <li>• Knowledge of image acquisition during ultrasound-guided interventional procedures</li> </ul>                                                                                                                                                                                                                                                                                                                              |