





|               |                         |                  |              |  |   |   |    |   |   |   |   |   |   |   |   |   |   |
|---------------|-------------------------|------------------|--------------|--|---|---|----|---|---|---|---|---|---|---|---|---|---|
|               |                         |                  |              |  |   |   |    |   |   |   |   |   |   |   |   |   |   |
|               |                         |                  |              |  |   |   |    |   |   |   |   |   |   |   |   |   |   |
|               |                         |                  |              |  |   |   |    |   |   |   |   |   |   |   |   |   |   |
|               |                         |                  |              |  |   |   |    |   |   |   |   |   |   |   |   |   |   |
| Sestamibi MBI | Usually not appropriate | Expert Consensus | ☼☼☼ 1-10 mSv |  | 1 | 1 | 15 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

**Variant 2: Breast cancer screening during pregnancy. Age younger than 30 at high risk. Initial imaging.**

| Procedure             | Appropriateness Category | SOE     | Adults RRL  | Peds RRL | Rating | Median | Final Tabulations |   |   |   |   |   |   |   |   |  |  |
|-----------------------|--------------------------|---------|-------------|----------|--------|--------|-------------------|---|---|---|---|---|---|---|---|--|--|
|                       |                          |         |             |          |        |        | 1                 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |  |  |
| Mammography screening | Usually appropriate      | Limited | ☼☼ 0.1-1mSv |          | 7      | 7      | 0                 | 0 | 0 | 0 | 2 | 0 | 8 | 2 | 4 |  |  |

| References    | Study Quality |
|---------------|---------------|
| 28 (21343518) | 3             |
| 44 (-3112876) | 4             |
| 7 (24485752)  | 3             |
| 24 (21382187) | 4             |
| 25 (21782123) | 4             |
| 26 (12751860) | 3             |
| 27 (8134581)  | 3             |
| 43 (22403117) | 4             |
| 45 (9653462)  | 4             |

|  |                     |         |             |  |   |   |   |   |   |   |   |   |   |   |   |  |  |
|--|---------------------|---------|-------------|--|---|---|---|---|---|---|---|---|---|---|---|--|--|
| Digital breast tomosynthesis screening | Usually appropriate | Limited | ☼☼ 0.1-1mSv |  | 7 | 7 | 1 | 0 | 0 | 0 | 3 | 3 | 3 | 3 | 3 |  |  |
|--|---------------------|---------|-------------|--|---|---|---|---|---|---|---|---|---|---|---|--|--|

| References    | Study Quality |
|---------------|---------------|
| 28 (21343518) | 3             |
| 44 (-3112876) | 4             |
| 7 (24485752)  | 3             |
| 24 (21382187) | 4             |
| 25 (21782123) | 4             |
| 26 (12751860) | 3             |



|               |   |
|---------------|---|
| 25 (21782123) | 4 |
| 26 (12751860) | 3 |
| 27 (8134581)  | 3 |
| 43 (22403117) | 4 |
| 45 (9653462)  | 4 |

|  |                     |         |             |  |   |   |   |   |   |   |   |   |   |   |   |
|--|---------------------|---------|-------------|--|---|---|---|---|---|---|---|---|---|---|---|
| Digital breast tomosynthesis screening | Usually appropriate | Limited | ☼☼ 0.1-1mSv |  | 7 | 7 | 1 | 0 | 0 | 0 | 1 | 4 | 3 | 3 | 4 |
|--|---------------------|---------|-------------|--|---|---|---|---|---|---|---|---|---|---|---|

| References    | Study Quality |
|---------------|---------------|
| 28 (21343518) | 3             |
| 44 (-3112876) | 4             |
| 7 (24485752)  | 3             |
| 24 (21382187) | 4             |
| 25 (21782123) | 4             |
| 26 (12751860) | 3             |
| 27 (8134581)  | 3             |
| 43 (22403117) | 4             |
| 45 (9653462)  | 4             |

|           |                    |         |         |               |   |   |   |   |   |   |    |   |   |   |   |
|-----------|--------------------|---------|---------|---------------|---|---|---|---|---|---|----|---|---|---|---|
| US breast | May be appropriate | Limited | ○ 0 mSv | ○ 0 mSv [ped] | 5 | 5 | 0 | 1 | 1 | 2 | 10 | 2 | 0 | 0 | 0 |
|-----------|--------------------|---------|---------|---------------|---|---|---|---|---|---|----|---|---|---|---|

| References    | Study Quality |
|---------------|---------------|
| 10 (23345354) | 4             |
| 9 (18180221)  | 4             |

|                                |                         |         |         |               |   |   |    |   |   |   |   |   |   |   |   |
|--------------------------------|-------------------------|---------|---------|---------------|---|---|----|---|---|---|---|---|---|---|---|
| MRI breast without IV contrast | Usually not appropriate | Limited | ○ 0 mSv | ○ 0 mSv [ped] | 1 | 1 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|--------------------------------|-------------------------|---------|---------|---------------|---|---|----|---|---|---|---|---|---|---|---|

| References    | Study Quality |
|---------------|---------------|
| 33 (-3132600) | 4             |

|   |                         |         |         |               |   |   |    |   |   |   |   |   |   |   |   |
|---|-------------------------|---------|---------|---------------|---|---|----|---|---|---|---|---|---|---|---|
| MRI breast without and with IV contrast | Usually not appropriate | Limited | ○ 0 mSv | ○ 0 mSv [ped] | 1 | 1 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|---|-------------------------|---------|---------|---------------|---|---|----|---|---|---|---|---|---|---|---|

| References    | Study Quality |
|---------------|---------------|
| 33 (-3132600) | 4             |

|               |                         |                  |              |  |   |   |    |   |   |   |   |   |   |   |   |
|---------------|-------------------------|------------------|--------------|--|---|---|----|---|---|---|---|---|---|---|---|
| Sestamibi MBI | Usually not appropriate | Expert Consensus | ☼☼☼ 1-10 mSv |  | 1 | 1 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|---------------|-------------------------|------------------|--------------|--|---|---|----|---|---|---|---|---|---|---|---|

**Variant 4: Breast cancer screening during pregnancy. Age 40 years or older, any risk level. Initial imaging.**

| Procedure             | Appropriateness Category | SOE     | Adults RRL  | Peds RRL | Rating | Median | Final Tabulations |   |   |   |   |   |   |   |    |
|-----------------------|--------------------------|---------|-------------|----------|--------|--------|-------------------|---|---|---|---|---|---|---|----|
|                       |                          |         |             |          |        |        | 1                 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9  |
| Mammography screening | Usually appropriate      | Limited | ☼☼ 0.1-1mSv |          | 9      | 9      | 0                 | 0 | 0 | 0 | 1 | 0 | 1 | 3 | 11 |

| References    | Study Quality |
|---------------|---------------|
| 28 (21343518) | 3             |
| 44 (-3112876) | 4             |
| 7 (24485752)  | 3             |
| 24 (21382187) | 4             |
| 25 (21782123) | 4             |
| 26 (12751860) | 3             |
| 27 (8134581)  | 3             |
| 43 (22403117) | 4             |
| 45 (9653462)  | 4             |

|  |                     |         |             |  |   |   |   |   |   |   |   |   |   |   |    |
|--|---------------------|---------|-------------|--|---|---|---|---|---|---|---|---|---|---|----|
| Digital breast tomosynthesis screening | Usually appropriate | Limited | ☼☼ 0.1-1mSv |  | 9 | 9 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 2 | 13 |
|--|---------------------|---------|-------------|--|---|---|---|---|---|---|---|---|---|---|----|

| References    | Study Quality |
|---------------|---------------|
| 28 (21343518) | 3             |
| 44 (-3112876) | 4             |
| 7 (24485752)  | 3             |
| 24 (21382187) | 4             |
| 25 (21782123) | 4             |
| 26 (12751860) | 3             |
| 27 (8134581)  | 3             |
| 43 (22403117) | 4             |



| Procedure | Appropriateness Category | SOE | Adults RRL | Peds RRL | Rating | Median | Final Tabulations |   |   |   |   |   |   |   |   |  |  |  |  |
|-----------|--------------------------|-----|------------|----------|--------|--------|-------------------|---|---|---|---|---|---|---|---|--|--|--|--|
|           |                          |     |            |          |        |        | 1                 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |  |  |  |  |
|           | appropriate              |     |            | [ped]    |        |        |                   |   |   |   |   |   |   |   |   |  |  |  |  |

| References    | Study Quality |
|---------------|---------------|
| 10 (23345354) | 4             |
| 9 (18180221)  | 4             |
| 44 (-3112876) | 4             |
| 7 (24485752)  | 3             |
| 23 (15969981) | 4             |
| 24 (21382187) | 4             |
| 25 (21782123) | 4             |
| 26 (12751860) | 3             |
| 46 (16311748) | 3             |
| 47 (16502483) | 4             |
| 36 (28473077) | 4             |

|                        |                    |         |             |  |   |   |   |   |   |   |    |   |   |   |   |
|------------------------|--------------------|---------|-------------|--|---|---|---|---|---|---|----|---|---|---|---|
| Mammography diagnostic | May be appropriate | Limited | ☢☢ 0.1-1mSv |  | 5 | 5 | 0 | 0 | 0 | 0 | 10 | 4 | 1 | 1 | 0 |
|------------------------|--------------------|---------|-------------|--|---|---|---|---|---|---|----|---|---|---|---|

| References    | Study Quality |
|---------------|---------------|
| 28 (21343518) | 3             |
| 44 (-3112876) | 4             |
| 7 (24485752)  | 3             |
| 24 (21382187) | 4             |
| 25 (21782123) | 4             |
| 26 (12751860) | 3             |
| 27 (8134581)  | 3             |
| 43 (22403117) | 4             |

|   |                    |         |             |  |   |   |   |   |   |   |   |   |   |   |   |
|---|--------------------|---------|-------------|--|---|---|---|---|---|---|---|---|---|---|---|
| Digital breast tomosynthesis diagnostic | May be appropriate | Limited | ☢☢ 0.1-1mSv |  | 5 | 5 | 0 | 0 | 0 | 0 | 9 | 5 | 2 | 0 | 0 |
|---|--------------------|---------|-------------|--|---|---|---|---|---|---|---|---|---|---|---|

| References    | Study Quality |
|---------------|---------------|
| 28 (21343518) | 3             |



|               |   |
|---------------|---|
| 44 (-3112876) | 4 |
| 7 (24485752)  | 3 |
| 24 (21382187) | 4 |
| 25 (21782123) | 4 |
| 26 (12751860) | 3 |
| 27 (8134581)  | 3 |
| 43 (22403117) | 4 |

|  |                         |                  |              |               |   |   |    |   |   |   |   |   |   |   |   |
|--|-------------------------|------------------|--------------|---------------|---|---|----|---|---|---|---|---|---|---|---|
| Image-guided core biopsy breast            | Usually not appropriate | Expert Consensus | Varies       | Varies        | 1 | 1 | 12 | 1 | 1 | 0 | 0 | 2 | 0 | 0 | 0 |
| Image-guided fine needle aspiration breast | Usually not appropriate | Expert Consensus | Varies       | Varies        | 1 | 1 | 12 | 1 | 2 | 1 | 0 | 0 | 0 | 0 | 0 |
| MRI breast without IV contrast             | Usually not appropriate | Limited          | 0 0 mSv      | 0 0 mSv [ped] | 1 | 1 | 15 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
|  |                         | References       |              | Study Quality |   |   |    |   |   |   |   |   |   |   |   |
|  |                         | 33 (-3132600)    |              | 4             |   |   |    |   |   |   |   |   |   |   |   |
| MRI breast without and with IV contrast    | Usually not appropriate | Limited          | 0 0 mSv      | 0 0 mSv [ped] | 1 | 1 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|  |                         | References       |              | Study Quality |   |   |    |   |   |   |   |   |   |   |   |
|  |                         | 33 (-3132600)    |              | 4             |   |   |    |   |   |   |   |   |   |   |   |
| Sestamibi MBI                              | Usually not appropriate | Expert Consensus | ⊕⊕⊕ 1-10 mSv |               | 1 | 1 | 15 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |

**Variant 6: Clinically suspicious nipple discharge during pregnancy. Initial imaging.**

| Procedure | Appropriateness Category | SOE           | Adults RRL | Peds RRL      | Rating | Median | Final Tabulations |   |   |   |   |   |   |   |    |
|-----------|--------------------------|---------------|------------|---------------|--------|--------|-------------------|---|---|---|---|---|---|---|----|
|           |                          |               |            |               |        |        | 1                 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9  |
| US breast | Usually appropriate      | Limited       | 0 0 mSv    | 0 0 mSv [ped] | 9      | 9      | 0                 | 0 | 0 | 0 | 0 | 1 | 0 | 3 | 12 |
|           |                          | References    |            | Study Quality |        |        |                   |   |   |   |   |   |   |   |    |
|           |                          | 48 (-3112883) |            | 4             |        |        |                   |   |   |   |   |   |   |   |    |

|   |                         |                  |               |               |   |   |    |   |   |   |   |   |   |   |   |  |
|---|-------------------------|------------------|---------------|---------------|---|---|----|---|---|---|---|---|---|---|---|--|
| Mammography diagnostic                  | Usually appropriate     | Limited          | ☼☼ 0.1-1mSv   |               | 7 | 7 | 0  | 0 | 0 | 0 | 3 | 4 | 3 | 4 | 2 |  |
|   |                         | References       | Study Quality |               |   |   |    |   |   |   |   |   |   |   |   |  |
|   |                         | 28 (21343518)    | 3             |               |   |   |    |   |   |   |   |   |   |   |   |  |
|   |                         | 44 (-3112876)    | 4             |               |   |   |    |   |   |   |   |   |   |   |   |  |
|   |                         | 7 (24485752)     | 3             |               |   |   |    |   |   |   |   |   |   |   |   |  |
|   |                         | 24 (21382187)    | 4             |               |   |   |    |   |   |   |   |   |   |   |   |  |
|   |                         | 25 (21782123)    | 4             |               |   |   |    |   |   |   |   |   |   |   |   |  |
|   |                         | 43 (22403117)    | 4             |               |   |   |    |   |   |   |   |   |   |   |   |  |
| Digital breast tomosynthesis diagnostic | Usually appropriate     | Limited          | ☼☼ 0.1-1mSv   |               | 7 | 7 | 0  | 0 | 0 | 0 | 3 | 4 | 4 | 3 | 2 |  |
|   |                         | References       | Study Quality |               |   |   |    |   |   |   |   |   |   |   |   |  |
|   |                         | 28 (21343518)    | 3             |               |   |   |    |   |   |   |   |   |   |   |   |  |
|   |                         | 44 (-3112876)    | 4             |               |   |   |    |   |   |   |   |   |   |   |   |  |
|   |                         | 7 (24485752)     | 3             |               |   |   |    |   |   |   |   |   |   |   |   |  |
|   |                         | 24 (21382187)    | 4             |               |   |   |    |   |   |   |   |   |   |   |   |  |
|   |                         | 25 (21782123)    | 4             |               |   |   |    |   |   |   |   |   |   |   |   |  |
|   |                         | 43 (22403117)    | 4             |               |   |   |    |   |   |   |   |   |   |   |   |  |
| MRI breast without IV contrast          | Usually not appropriate | Limited          | ○ 0 mSv       | ○ 0 mSv [ped] | 1 | 1 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  |
|   |                         | References       | Study Quality |               |   |   |    |   |   |   |   |   |   |   |   |  |
|   |                         | 33 (-3132600)    | 4             |               |   |   |    |   |   |   |   |   |   |   |   |  |
| MRI breast without and with IV contrast | Usually not appropriate | Limited          | ○ 0 mSv       | ○ 0 mSv [ped] | 1 | 1 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  |
|   |                         | References       | Study Quality |               |   |   |    |   |   |   |   |   |   |   |   |  |
|   |                         | 33 (-3132600)    | 4             |               |   |   |    |   |   |   |   |   |   |   |   |  |
| Sestamibi MBI                           | Usually not appropriate | Expert Consensus | ☼☼☼ 1-10 mSv  |               | 1 | 1 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |  |

**Variant 7: Locoregional staging of newly diagnosed breast cancer during pregnancy. Initial imaging.**



|   |                         |                  |              |               |   |   |    |   |   |   |   |   |   |   |   |
|---|-------------------------|------------------|--------------|---------------|---|---|----|---|---|---|---|---|---|---|---|
| MRI breast without and with IV contrast | Usually not appropriate | Limited          | 0 mSv        | 0 mSv [ped]   | 1 | 1 | 15 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
|   |                         | References       |              | Study Quality |   |   |    |   |   |   |   |   |   |   |   |
|   |                         | 33 (-3132600)    |              | 4             |   |   |    |   |   |   |   |   |   |   |   |
|   |                         | 19 (28609163)    |              | 2             |   |   |    |   |   |   |   |   |   |   |   |
| Sestamibi MBI                           | Usually not appropriate | Expert Consensus | ⊕⊕⊕ 1-10 mSv |               | 1 | 1 | 15 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |

## **Appendix Key**

A more complete discussion of the items presented below can be found by accessing the supporting documents at the designated hyperlinks.

**Appropriateness Category:** The panel's recommendation for a procedure based on the assessment of the risks and benefits of performing the procedure for the specified clinical scenario.

**SOE:** Strength of Evidence. The assessment of the amount and quality of evidence found in the peer reviewed medical literature for an appropriateness recommendation.

- **References:** The citation number and PMID for the reference(s) associated with the recommendation.
- **Study Quality:** The assessment of the quality of an individual reference based on the number of study quality elements described in the reference.

**RRL:** Relative Radiation Level. A population based assessment of the amount of radiation a typical patient may be exposed to during the specified procedure.

**Rating:** The final rating (1-9 scale) for the procedure as determined by the panel during rating rounds.

**Median:** The median rating (1-9 scale) for the procedure as determined by the panel during rating rounds.

**Final tabulations:** A histogram showing the number of panel members who rated the procedure as noted in the column heading (ie, 1, 2, 3, etc.).

Additional supporting documents about the AC methodology and processes can be found at [www.acr.org/ac](http://www.acr.org/ac).