

## American College of Radiology ACR Appropriateness Criteria®

### Imaging of Invasive Breast Cancer

**Variant 1: Newly diagnosed. Clinical stage I-IIA (early stage) breast cancer at presentation. Evaluation for locoregional disease (includes invasive ductal carcinoma [IDC], or invasive lobular carcinoma [ILC], or not otherwise specified [NOS]).**

| Procedure              | Appropriateness Category | SOE           | Adults RRL  | Peds RRL      | Rating | Median | Final Tabulations |   |   |   |   |   |   |   |    |
|------------------------|--------------------------|---------------|-------------|---------------|--------|--------|-------------------|---|---|---|---|---|---|---|----|
|                        |                          |               |             |               |        |        | 1                 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9  |
| Mammography diagnostic | Usually appropriate      | Strong        | ☼☼ 0.1-1mSv |               | 9      | 9      | 0                 | 2 | 0 | 0 | 0 | 0 | 0 | 3 | 11 |
|                        |                          | References    |             | Study Quality |        |        |                   |   |   |   |   |   |   |   |    |
|                        |                          | 37 (28130619) |             | 3             |        |        |                   |   |   |   |   |   |   |   |    |
|                        |                          | 36 (26711795) |             | 1             |        |        |                   |   |   |   |   |   |   |   |    |
|                        |                          | 34 (26492903) |             | 4             |        |        |                   |   |   |   |   |   |   |   |    |
|                        |                          | 33 (29927337) |             | 4             |        |        |                   |   |   |   |   |   |   |   |    |
|                        |                          | 32 (28516226) |             | Good          |        |        |                   |   |   |   |   |   |   |   |    |
|                        |                          | 31 (27920631) |             | 4             |        |        |                   |   |   |   |   |   |   |   |    |
|                        |                          | 30 (22941162) |             | 3             |        |        |                   |   |   |   |   |   |   |   |    |
|                        |                          | 29 (30466027) |             | 3             |        |        |                   |   |   |   |   |   |   |   |    |
|                        |                          | 28 (28055247) |             | 2             |        |        |                   |   |   |   |   |   |   |   |    |
|                        |                          | 27 (27411945) |             | 3             |        |        |                   |   |   |   |   |   |   |   |    |
|                        |                          | 26 (23826951) |             | 3             |        |        |                   |   |   |   |   |   |   |   |    |
|                        |                          | 25 (25086999) |             | 2             |        |        |                   |   |   |   |   |   |   |   |    |
|                        |                          | 24 (30964425) |             | 3             |        |        |                   |   |   |   |   |   |   |   |    |
|                        |                          | 23 (26376882) |             | 2             |        |        |                   |   |   |   |   |   |   |   |    |
|                        |                          | 22 (15486214) |             | 3             |        |        |                   |   |   |   |   |   |   |   |    |
| US breast              | Usually appropriate      | Strong        | 0 0 mSv     | 0 0 mSv [ped] | 9      | 9      | 0                 | 0 | 0 | 0 | 0 | 0 | 3 | 1 | 13 |

| References     | Study Quality |
|----------------|---------------|
| 22 (15486214)  | 3             |
| 25 (25086999)  | 2             |
| 114 (16500539) | 4             |
| 113 (30131246) | 3             |
| 112 (17574805) | 3             |
| 111 (16442946) | 3             |
| 110 (25119022) | Good          |
| 109 (28221238) | 4             |
| 108 (7602346)  | 4             |
| 107 (11015105) | 4             |
| 106 (24596363) | 2             |
| 105 (24780784) | 4             |
| 104 (29641226) | 3             |
| 26 (23826951)  | 3             |

|   |                     |        |             |  |   |   |   |   |   |   |   |   |   |   |   |
|---|---------------------|--------|-------------|--|---|---|---|---|---|---|---|---|---|---|---|
| Digital breast tomosynthesis diagnostic | Usually appropriate | Strong | ☼☼ 0.1-1mSv |  | 9 | 9 | 0 | 2 | 0 | 0 | 0 | 0 | 1 | 4 | 9 |
|---|---------------------|--------|-------------|--|---|---|---|---|---|---|---|---|---|---|---|

| References    | Study Quality |
|---------------|---------------|
| 37 (28130619) | 3             |
| 36 (26711795) | 1             |
| 34 (26492903) | 4             |
| 33 (29927337) | 4             |
| 32 (28516226) | Good          |
| 31 (27920631) | 4             |
| 30 (22941162) | 3             |
| 29 (30466027) | 3             |
| 28 (28055247) | 2             |
| 27 (27411945) | 3             |
| 26 (23826951) | 3             |
| 25 (25086999) | 2             |
| 24 (30964425) | 3             |

|   |                     |               |               |               |   |   |   |   |   |   |   |   |   |   |   |  |  |  |
|---|---------------------|---------------|---------------|---------------|---|---|---|---|---|---|---|---|---|---|---|--|--|--|
|   |                     | 23 (26376882) |               |               | 2 |   |   |   |   |   |   |   |   |   |   |  |  |  |
|   |                     | 22 (15486214) |               |               | 3 |   |   |   |   |   |   |   |   |   |   |  |  |  |
| MRI breast without and with IV contrast | Usually appropriate | Strong        | 0 0 mSv       | 0 0 mSv [ped] | 7 | 7 | 0 | 0 | 0 | 0 | 2 | 1 | 7 | 7 | 0 |  |  |  |
|   |                     | References    | Study Quality |               |   |   |   |   |   |   |   |   |   |   |   |  |  |  |
|   |                     | 85 (24395846) | 4             |               |   |   |   |   |   |   |   |   |   |   |   |  |  |  |
|   |                     | 84 (28053631) | 4             |               |   |   |   |   |   |   |   |   |   |   |   |  |  |  |
|   |                     | 83 (30617471) | 4             |               |   |   |   |   |   |   |   |   |   |   |   |  |  |  |
|   |                     | 82 (32863709) | 4             |               |   |   |   |   |   |   |   |   |   |   |   |  |  |  |
|   |                     | 80 (30046588) | 4             |               |   |   |   |   |   |   |   |   |   |   |   |  |  |  |
|   |                     | 78 (24034548) | 4             |               |   |   |   |   |   |   |   |   |   |   |   |  |  |  |
|   |                     | 77 (21460377) | 4             |               |   |   |   |   |   |   |   |   |   |   |   |  |  |  |
|   |                     | 76 (29388904) | 4             |               |   |   |   |   |   |   |   |   |   |   |   |  |  |  |
|   |                     | 75 (26639066) | 4             |               |   |   |   |   |   |   |   |   |   |   |   |  |  |  |
|   |                     | 73 (26853509) | 2             |               |   |   |   |   |   |   |   |   |   |   |   |  |  |  |
|   |                     | 72 (32828998) | 4             |               |   |   |   |   |   |   |   |   |   |   |   |  |  |  |
|   |                     | 70 (20159292) | 1             |               |   |   |   |   |   |   |   |   |   |   |   |  |  |  |
|   |                     | 69 (34643778) | 3             |               |   |   |   |   |   |   |   |   |   |   |   |  |  |  |
|   |                     | 68 (24848838) | 4             |               |   |   |   |   |   |   |   |   |   |   |   |  |  |  |
|   |                     | 67 (28712698) | 4             |               |   |   |   |   |   |   |   |   |   |   |   |  |  |  |
|   |                     | 66 (26387498) | 3             |               |   |   |   |   |   |   |   |   |   |   |   |  |  |  |
|   |                     | 64 (24817517) | 3             |               |   |   |   |   |   |   |   |   |   |   |   |  |  |  |
|   |                     | 63 (31361209) | 4             |               |   |   |   |   |   |   |   |   |   |   |   |  |  |  |
|   |                     | 61 (22446897) | 4             |               |   |   |   |   |   |   |   |   |   |   |   |  |  |  |
|   |                     | 59 (27566960) | 4             |               |   |   |   |   |   |   |   |   |   |   |   |  |  |  |
|   |                     | 58 (19805685) | Inadequate    |               |   |   |   |   |   |   |   |   |   |   |   |  |  |  |
|   |                     | 56 (33120285) | 4             |               |   |   |   |   |   |   |   |   |   |   |   |  |  |  |
|   |                     | 55 (21751044) | 4             |               |   |   |   |   |   |   |   |   |   |   |   |  |  |  |
|   |                     | 23 (26376882) | 2             |               |   |   |   |   |   |   |   |   |   |   |   |  |  |  |
|   |                     | 16 (31660801) | 3             |               |   |   |   |   |   |   |   |   |   |   |   |  |  |  |
|   |                     | 86 (34611701) | 3             |               |   |   |   |   |   |   |   |   |   |   |   |  |  |  |

|           |                    |               |         |               |   |   |   |   |   |   |   |   |   |   |   |  |  |  |  |
|-----------|--------------------|---------------|---------|---------------|---|---|---|---|---|---|---|---|---|---|---|--|--|--|--|
|           |                    | 87 (35471109) |         | 3             |   |   |   |   |   |   |   |   |   |   |   |  |  |  |  |
| US axilla | May be appropriate | Strong        | 0 0 mSv | 0 0 mSv [ped] | 5 | 5 | 0 | 0 | 0 | 0 | 9 | 5 | 3 | 0 | 0 |  |  |  |  |

| References     | Study Quality |
|----------------|---------------|
| 103 (22227922) | 3             |
| 100 (21597359) | Good          |
| 99 (22972506)  | 2             |
| 98 (23436877)  | 2             |
| 97 (31562691)  | 2             |
| 96 (16632729)  | 4             |
| 95 (18955508)  | 3             |
| 94 (24859939)  | 2             |
| 93 (23664535)  | 3             |
| 92 (24455284)  | 3             |
| 91 (23515655)  | 3             |
| 89 (28898379)  | 1             |
| 88 (35550807)  | 4             |
| 36 (26711795)  | 1             |

|                              |                    |        |             |  |   |   |   |   |   |   |    |   |   |   |   |  |  |  |  |
|------------------------------|--------------------|--------|-------------|--|---|---|---|---|---|---|----|---|---|---|---|--|--|--|--|
| Mammography with IV contrast | May be appropriate | Strong | ☼☼ 0.1-1mSv |  | 5 | 5 | 0 | 0 | 1 | 0 | 10 | 6 | 0 | 0 | 0 |  |  |  |  |
|------------------------------|--------------------|--------|-------------|--|---|---|---|---|---|---|----|---|---|---|---|--|--|--|--|

| References    | Study Quality |
|---------------|---------------|
| 16 (31660801) | 3             |
| 54 (33178931) | 3             |
| 53 (28654337) | 2             |
| 52 (24986697) | 3             |
| 51 (32000448) | 3             |
| 49 (23220903) | 1             |
| 48 (24048724) | 1             |
| 47 (33650905) | 4             |
| 28 (28055247) | 2             |

|  |                         |                  |                |                       |   |   |    |   |   |   |   |   |   |   |   |
|--|-------------------------|------------------|----------------|-----------------------|---|---|----|---|---|---|---|---|---|---|---|
| CT chest abdomen pelvis with IV contrast             | Usually not appropriate | Limited          | ☼☼☼☼ 10-30 mSv | ☼☼☼☼ 3-10 mSv [ped]   | 2 | 2 | 8  | 5 | 3 | 0 | 0 | 0 | 0 | 0 | 0 |
|  |                         | References       | Study Quality  |                       |   |   |    |   |   |   |   |   |   |   |   |
|  |                         | 20 (22751517)    | 4              |                       |   |   |    |   |   |   |   |   |   |   |   |
| CT chest abdomen pelvis without and with IV contrast | Usually not appropriate | Limited          | ☼☼☼☼ 10-30 mSv | ☼☼☼☼☼ 10-30 mSv [ped] | 2 | 2 | 8  | 6 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
|  |                         | References       | Study Quality  |                       |   |   |    |   |   |   |   |   |   |   |   |
|  |                         | 21 (-3196411)    | 4              |                       |   |   |    |   |   |   |   |   |   |   |   |
| FDG-PET/CT skull base to mid-thigh                   | Usually not appropriate | Strong           | ☼☼☼☼ 10-30 mSv | ☼☼☼☼ 3-10 mSv [ped]   | 2 | 2 | 6  | 5 | 4 | 0 | 1 | 0 | 0 | 0 | 0 |
|  |                         | References       | Study Quality  |                       |   |   |    |   |   |   |   |   |   |   |   |
|  |                         | 45 (24866608)    | 3              |                       |   |   |    |   |   |   |   |   |   |   |   |
|  |                         | 44 (31339353)    | 4              |                       |   |   |    |   |   |   |   |   |   |   |   |
|  |                         | 43 (2910416)     | 4              |                       |   |   |    |   |   |   |   |   |   |   |   |
|  |                         | 42 (24108553)    | 4              |                       |   |   |    |   |   |   |   |   |   |   |   |
|  |                         | 41 (21935602)    | 4              |                       |   |   |    |   |   |   |   |   |   |   |   |
|  |                         | 40 (27058014)    | 3              |                       |   |   |    |   |   |   |   |   |   |   |   |
|  |                         | 39 (26115367)    | 1              |                       |   |   |    |   |   |   |   |   |   |   |   |
|  |                         | 38 (26477029)    | 2              |                       |   |   |    |   |   |   |   |   |   |   |   |
| CT chest abdomen pelvis without IV contrast          | Usually not appropriate | Expert Consensus | ☼☼☼☼ 10-30 mSv | ☼☼☼☼ 3-10 mSv [ped]   | 1 | 1 | 14 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MRI breast without IV contrast                       | Usually not appropriate | Expert Consensus | 0 0 mSv        | 0 0 mSv [ped]         | 1 | 1 | 14 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 |
| Bone scan whole body                                 | Usually not appropriate | Expert Consensus | ☼☼☼ 1-10 mSv   | ☼☼☼☼ 3-10 mSv [ped]   | 1 | 1 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

**Variant 2: Newly diagnosed. Clinical stage I-IIA (early stage) breast cancer at presentation. Evaluation for distant disease (includes IDC, or ILC, or NOS).**



|                |   |
|----------------|---|
| 137 (31063423) | 4 |
| 136 (23243198) | 3 |
| 135 (31907750) | 4 |
| 134 (32886897) | 4 |
| 133 (34416711) | 4 |
| 130 (31236598) | 4 |
| 129 (30443868) | 4 |
| 128 (-3195171) | 4 |
| 126 (-3195169) | 4 |

|   |                         |                  |                |                     |   |   |    |   |   |   |   |   |   |   |   |
|---|-------------------------|------------------|----------------|---------------------|---|---|----|---|---|---|---|---|---|---|---|
| CT chest abdomen pelvis without IV contrast | Usually not appropriate | Expert Consensus | ☼☼☼☼ 10-30 mSv | ☼☼☼☼ 3-10 mSv [ped] | 1 | 1 | 11 | 3 | 0 | 2 | 0 | 0 | 0 | 0 | 0 |
| Mammography diagnostic                      | Usually not appropriate | Expert Consensus | ☼☼ 0.1-1mSv    |                     | 1 | 1 | 14 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| MRI breast without IV contrast              | Usually not appropriate | Expert Consensus | ○ 0 mSv        | ○ 0 mSv [ped]       | 1 | 1 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MRI breast without and with IV contrast     | Usually not appropriate | Expert Consensus | ○ 0 mSv        | ○ 0 mSv [ped]       | 1 | 1 | 15 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| US breast                                   | Usually not appropriate | Expert Consensus | ○ 0 mSv        | ○ 0 mSv [ped]       | 1 | 1 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Digital breast tomosynthesis diagnostic     | Usually not appropriate | Expert Consensus | ☼☼ 0.1-1mSv    |                     | 1 | 1 | 15 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| US axilla                                   | Usually not appropriate | Expert Consensus | ○ 0 mSv        | ○ 0 mSv [ped]       | 1 | 1 | 15 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| Mammography with IV contrast                | Usually not appropriate | Expert Consensus | ☼☼ 0.1-1mSv    |                     | 1 | 1 | 15 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

**Variant 3: Newly diagnosed. Clinical stage IIB-III (late stage) breast cancer at presentation. Evaluation for locoregional disease (includes IDC, or ILC, or NOS).**

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

| References     | Study Quality |
|----------------|---------------|
| 126 (-3195169) | 4             |
| 46 (28861372)  | 3             |
| 36 (26711795)  | 1             |
| 34 (26492903)  | 4             |
| 33 (29927337)  | 4             |
| 32 (28516226)  | Good          |
| 31 (27920631)  | 4             |
| 30 (22941162)  | 3             |
| 29 (30466027)  | 3             |
| 28 (28055247)  | 2             |
| 27 (27411945)  | 3             |
| 26 (23826951)  | 3             |
| 25 (25086999)  | 2             |
| 24 (30964425)  | 3             |
| 23 (26376882)  | 2             |
| 22 (15486214)  | 3             |

|           |                     |        |         |               |   |   |   |   |   |   |   |   |   |   |   |
|-----------|---------------------|--------|---------|---------------|---|---|---|---|---|---|---|---|---|---|---|
| US breast | Usually appropriate | Strong | ○ 0 mSv | ○ 0 mSv [ped] | 9 | 9 | 0 | 2 | 0 | 0 | 0 | 0 | 2 | 3 | 9 |
|-----------|---------------------|--------|---------|---------------|---|---|---|---|---|---|---|---|---|---|---|

| References     | Study Quality |
|----------------|---------------|
| 22 (15486214)  | 3             |
| 25 (25086999)  | 2             |
| 114 (16500539) | 4             |
| 113 (30131246) | 3             |
| 112 (17574805) | 3             |
| 111 (16442946) | 3             |
| 110 (25119022) | Good          |



|                |   |
|----------------|---|
| 109 (28221238) | 4 |
| 108 (7602346)  | 4 |
| 107 (11015105) | 4 |
| 106 (24596363) | 2 |
| 105 (24780784) | 4 |
| 104 (29641226) | 3 |
| 26 (23826951)  | 3 |

|   |                     |        |         |               |   |   |   |   |   |   |   |   |   |    |   |
|---|---------------------|--------|---------|---------------|---|---|---|---|---|---|---|---|---|----|---|
| MRI breast without and with IV contrast | Usually appropriate | Strong | 0 0 mSv | 0 0 mSv [ped] | 8 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 12 | 2 |
|---|---------------------|--------|---------|---------------|---|---|---|---|---|---|---|---|---|----|---|

| References    | Study Quality |
|---------------|---------------|
| 85 (24395846) | 4             |
| 84 (28053631) | 4             |
| 83 (30617471) | 4             |
| 82 (32863709) | 4             |
| 80 (30046588) | 4             |
| 78 (24034548) | 4             |
| 77 (21460377) | 4             |
| 76 (29388904) | 4             |
| 75 (26639066) | 4             |
| 73 (26853509) | 2             |
| 72 (32828998) | 4             |
| 70 (20159292) | 1             |
| 69 (34643778) | 3             |
| 68 (24848838) | 4             |
| 67 (28712698) | 4             |
| 66 (26387498) | 3             |
| 64 (24817517) | 3             |
| 63 (31361209) | 4             |
| 61 (22446897) | 4             |
| 59 (27566960) | 4             |
| 58 (19805685) | Inadequate    |

|               |   |
|---------------|---|
| 56 (33120285) | 4 |
| 55 (21751044) | 4 |
| 23 (26376882) | 2 |
| 16 (31660801) | 3 |

|   |                     |        |             |  |   |   |   |   |   |   |   |   |   |   |   |
|---|---------------------|--------|-------------|--|---|---|---|---|---|---|---|---|---|---|---|
| Digital breast tomosynthesis diagnostic | Usually appropriate | Strong | ☼☼ 0.1-1mSv |  | 8 | 8 | 0 | 2 | 0 | 0 | 0 | 0 | 3 | 5 | 6 |
|---|---------------------|--------|-------------|--|---|---|---|---|---|---|---|---|---|---|---|

| References     | Study Quality |
|----------------|---------------|
| 24 (30964425)  | 3             |
| 29 (30466027)  | 3             |
| 23 (26376882)  | 2             |
| 28 (28055247)  | 2             |
| 46 (28861372)  | 3             |
| 36 (26711795)  | 1             |
| 34 (26492903)  | 4             |
| 33 (29927337)  | 4             |
| 32 (28516226)  | Good          |
| 31 (27920631)  | 4             |
| 30 (22941162)  | 3             |
| 27 (27411945)  | 3             |
| 26 (23826951)  | 3             |
| 25 (25086999)  | 2             |
| 22 (15486214)  | 3             |
| 126 (-3195169) | 4             |

|                                    |                     |          |                |                     |   |   |   |   |   |   |   |   |   |   |   |
|------------------------------------|---------------------|----------|----------------|---------------------|---|---|---|---|---|---|---|---|---|---|---|
| FDG-PET/CT skull base to mid-thigh | Usually appropriate | Moderate | ☼☼☼☼ 10-30 mSv | ☼☼☼☼ 3-10 mSv [ped] | 7 | 7 | 0 | 0 | 0 | 1 | 0 | 2 | 9 | 5 | 0 |
|------------------------------------|---------------------|----------|----------------|---------------------|---|---|---|---|---|---|---|---|---|---|---|

| References     | Study Quality |
|----------------|---------------|
| 15 (33894709)  | Good          |
| 14 (30292261)  | Inadequate    |
| 13 (33651022)  | Inadequate    |
| 126 (-3195169) | 4             |
| 139 (28456837) | 2             |





|                |   |
|----------------|---|
| 160 (20516453) | 3 |
| 159 (29313949) | 4 |
| 158 (17653852) | 4 |
| 157 (27129866) | 2 |
| 156 (21070439) | 4 |
| 155 (25214641) | 2 |
| 154 (18632831) | 3 |
| 153 (18436392) | 2 |
| 152 (18695254) | 3 |
| 151 (23640467) | 3 |
| 150 (19164229) | 4 |
| 149 (19645022) | 3 |
| 139 (28456837) | 2 |
| 138 (21880576) | 3 |
| 137 (31063423) | 4 |
| 136 (23243198) | 3 |
| 126 (-3195169) | 4 |

|  |                     |         |                |                     |   |   |   |   |   |   |   |   |   |   |   |
|--|---------------------|---------|----------------|---------------------|---|---|---|---|---|---|---|---|---|---|---|
| CT chest abdomen pelvis with IV contrast | Usually appropriate | Limited | ☼☼☼☼ 10-30 mSv | ☼☼☼☼ 3-10 mSv [ped] | 7 | 7 | 0 | 0 | 1 | 1 | 0 | 2 | 6 | 2 | 4 |
|--|---------------------|---------|----------------|---------------------|---|---|---|---|---|---|---|---|---|---|---|

| References     | Study Quality |
|----------------|---------------|
| 17 (22006539)  | 3             |
| 126 (-3195169) | 4             |
| 132 (30797241) | 3             |
| 145 (22342788) | 4             |
| 147 (27642105) | 4             |
| 148 (27551013) | 4             |

|                      |                     |         |              |                     |   |   |   |   |   |   |   |   |   |   |   |
|----------------------|---------------------|---------|--------------|---------------------|---|---|---|---|---|---|---|---|---|---|---|
| Bone scan whole body | Usually appropriate | Limited | ☼☼☼ 1-10 mSv | ☼☼☼☼ 3-10 mSv [ped] | 7 | 7 | 0 | 0 | 1 | 1 | 1 | 1 | 6 | 3 | 3 |
|----------------------|---------------------|---------|--------------|---------------------|---|---|---|---|---|---|---|---|---|---|---|

| References     | Study Quality |
|----------------|---------------|
| 146 (23287962) | 4             |

|                |   |
|----------------|---|
| 145 (22342788) | 4 |
| 144 (28786907) | 3 |
| 143 (15254062) | 4 |
| 124 (1174812)  | 4 |
| 123 (28194227) | 4 |
| 122 (27083181) | 4 |
| 117 (20498394) | 4 |

|   |                         |         |                |                     |   |   |    |   |   |   |   |   |   |   |   |
|---|-------------------------|---------|----------------|---------------------|---|---|----|---|---|---|---|---|---|---|---|
| CT chest abdomen pelvis without IV contrast | Usually not appropriate | Limited | ☼☼☼☼ 10-30 mSv | ☼☼☼☼ 3-10 mSv [ped] | 1 | 1 | 12 | 0 | 3 | 0 | 1 | 0 | 0 | 0 | 0 |
|---|-------------------------|---------|----------------|---------------------|---|---|----|---|---|---|---|---|---|---|---|

|                |               |
|----------------|---------------|
| References     | Study Quality |
| 17 (22006539)  | 3             |
| 132 (30797241) | 3             |
| 147 (27642105) | 4             |
| 148 (27551013) | 4             |

|  |                         |         |                |                        |   |   |    |   |   |   |   |   |   |   |   |
|--|-------------------------|---------|----------------|------------------------|---|---|----|---|---|---|---|---|---|---|---|
| CT chest abdomen pelvis without and with IV contrast | Usually not appropriate | Limited | ☼☼☼☼ 10-30 mSv | ☼☼☼☼☼☼ 10-30 mSv [ped] | 1 | 1 | 13 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 |
|--|-------------------------|---------|----------------|------------------------|---|---|----|---|---|---|---|---|---|---|---|

|               |               |
|---------------|---------------|
| References    | Study Quality |
| 21 (-3196411) | 4             |

|                        |                         |                  |             |  |   |   |    |   |   |   |   |   |   |   |   |
|------------------------|-------------------------|------------------|-------------|--|---|---|----|---|---|---|---|---|---|---|---|
| Mammography diagnostic | Usually not appropriate | Expert Consensus | ☼☼ 0.1-1mSv |  | 1 | 1 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|------------------------|-------------------------|------------------|-------------|--|---|---|----|---|---|---|---|---|---|---|---|

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

|   |                         |                  |         |               |   |   |    |   |   |   |   |   |   |   |   |
|---|-------------------------|------------------|---------|---------------|---|---|----|---|---|---|---|---|---|---|---|
| MRI breast without and with IV contrast | Usually not appropriate | Expert Consensus | ○ 0 mSv | ○ 0 mSv [ped] | 1 | 1 | 15 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
|---|-------------------------|------------------|---------|---------------|---|---|----|---|---|---|---|---|---|---|---|

|           |                         |                  |         |               |   |   |    |   |   |   |   |   |   |   |   |
|-----------|-------------------------|------------------|---------|---------------|---|---|----|---|---|---|---|---|---|---|---|
| US breast | Usually not appropriate | Expert Consensus | ○ 0 mSv | ○ 0 mSv [ped] | 1 | 1 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|-----------|-------------------------|------------------|---------|---------------|---|---|----|---|---|---|---|---|---|---|---|

|   |                         |                  |             |  |   |   |    |   |   |   |   |   |   |   |   |
|---|-------------------------|------------------|-------------|--|---|---|----|---|---|---|---|---|---|---|---|
| Digital breast tomosynthesis diagnostic | Usually not appropriate | Expert Consensus | ☼☼ 0.1-1mSv |  | 1 | 1 | 15 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|---|-------------------------|------------------|-------------|--|---|---|----|---|---|---|---|---|---|---|---|

|                              |                         |                  |             |               |   |   |    |   |   |   |   |   |   |   |   |
|------------------------------|-------------------------|------------------|-------------|---------------|---|---|----|---|---|---|---|---|---|---|---|
| US axilla                    | Usually not appropriate | Expert Consensus | ○ 0 mSv     | ○ 0 mSv [ped] | 1 | 1 | 15 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| Mammography with IV contrast | Usually not appropriate | Expert Consensus | ☼☼ 0.1-1mSv |               | 1 | 1 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

**Variant 5: Newly diagnosed. Clinical stage IIB-III (late stage) breast cancer at presentation. Evaluation for distant disease. IDC or ILC that is HER2 or triple negative (ER, PR, and HER2-).**

| Procedure                                | Appropriateness Category | SOE     | Adults RRL     | Peds RRL            | Rating | Median | Final Tabulations |   |   |   |   |   |   |   |   |
|--|--------------------------|---------|----------------|---------------------|--------|--------|-------------------|---|---|---|---|---|---|---|---|
|  |                          |         |                |                     |        |        | 1                 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| CT chest abdomen pelvis with IV contrast | Usually appropriate      | Limited | ☼☼☼☼ 10-30 mSv | ☼☼☼☼ 3-10 mSv [ped] | 8      | 8      | 0                 | 0 | 1 | 1 | 0 | 1 | 4 | 2 | 7 |

| References     | Study Quality |
|----------------|---------------|
| 148 (27551013) | 4             |
| 147 (27642105) | 4             |
| 145 (22342788) | 4             |
| 132 (30797241) | 3             |
| 126 (-3195169) | 4             |
| 17 (22006539)  | 3             |

|                                    |                     |        |                |                     |   |   |   |   |   |   |   |   |   |   |   |
|------------------------------------|---------------------|--------|----------------|---------------------|---|---|---|---|---|---|---|---|---|---|---|
| FDG-PET/CT skull base to mid-thigh | Usually appropriate | Strong | ☼☼☼☼ 10-30 mSv | ☼☼☼☼ 3-10 mSv [ped] | 8 | 8 | 0 | 0 | 1 | 1 | 0 | 1 | 3 | 4 | 6 |
|------------------------------------|---------------------|--------|----------------|---------------------|---|---|---|---|---|---|---|---|---|---|---|

| References     | Study Quality |
|----------------|---------------|
| 126 (-3195169) | 4             |
| 162 (-3111285) | 4             |
| 161 (21765193) | 4             |
| 160 (20516453) | 3             |
| 159 (29313949) | 4             |
| 158 (17653852) | 4             |
| 157 (27129866) | 2             |
| 156 (21070439) | 4             |

|                |   |
|----------------|---|
| 155 (25214641) | 2 |
| 154 (18632831) | 3 |
| 153 (18436392) | 2 |
| 152 (18695254) | 3 |
| 151 (23640467) | 3 |
| 150 (19164229) | 4 |
| 149 (19645022) | 3 |
| 139 (28456837) | 2 |
| 138 (21880576) | 3 |
| 137 (31063423) | 4 |
| 136 (23243198) | 3 |
| 41 (21935602)  | 4 |

|                      |                     |         |              |                     |   |   |   |   |   |   |   |   |   |   |   |
|----------------------|---------------------|---------|--------------|---------------------|---|---|---|---|---|---|---|---|---|---|---|
| Bone scan whole body | Usually appropriate | Limited | ☼☼☼ 1-10 mSv | ☼☼☼☼ 3-10 mSv [ped] | 7 | 7 | 0 | 0 | 1 | 1 | 2 | 2 | 3 | 3 | 4 |
|----------------------|---------------------|---------|--------------|---------------------|---|---|---|---|---|---|---|---|---|---|---|

| References     | Study Quality |
|----------------|---------------|
| 146 (23287962) | 4             |
| 145 (22342788) | 4             |
| 144 (28786907) | 3             |
| 143 (15254062) | 4             |
| 124 (1174812)  | 4             |
| 123 (28194227) | 4             |
| 122 (27083181) | 4             |
| 117 (20498394) | 4             |

|                                       |                         |         |         |               |   |   |   |   |   |   |   |   |   |   |   |
|---------------------------------------|-------------------------|---------|---------|---------------|---|---|---|---|---|---|---|---|---|---|---|
| MRI head without and with IV contrast | Usually not appropriate | Limited | ○ 0 mSv | ○ 0 mSv [ped] | 3 | 3 | 5 | 2 | 3 | 2 | 2 | 2 | 0 | 0 | 0 |
|---------------------------------------|-------------------------|---------|---------|---------------|---|---|---|---|---|---|---|---|---|---|---|

| References     | Study Quality |
|----------------|---------------|
| 126 (-3195169) | 4             |
| 165 (28301662) | 4             |
| 164 (17577662) | 4             |
| 163 (15254054) | 4             |











| Procedure                               | Appropriateness Category | SOE              | Adults RRL     | Peds RRL            | Rating | Median | Final Tabulations |   |   |   |   |   |   |   |   |
|---|--------------------------|------------------|----------------|---------------------|--------|--------|-------------------|---|---|---|---|---|---|---|---|
|   |                          |                  |                |                     |        |        | 1                 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| MRI breast without and with IV contrast | May be appropriate       | Expert Consensus | ○ 0 mSv        | ○ 0 mSv [ped]       | 5      | 5      | 1                 | 0 | 3 | 1 | 9 | 0 | 2 | 0 | 0 |
| Mammography diagnostic                  | Usually not appropriate  | Expert Consensus | ☼☼ 0.1-1mSv    |                     | 1      | 1      | 14                | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Mammography screening                   | Usually not appropriate  | Expert Consensus | ☼☼ 0.1-1mSv    |                     | 1      | 1      | 16                | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| MRI breast without IV contrast          | Usually not appropriate  | Expert Consensus | ○ 0 mSv        | ○ 0 mSv [ped]       | 1      | 1      | 15                | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| FDG-PET/CT skull base to mid-thigh      | Usually not appropriate  | Limited          | ☼☼☼☼ 10-30 mSv | ☼☼☼☼ 3-10 mSv [ped] | 1      | 1      | 11                | 0 | 4 | 0 | 0 | 1 | 0 | 0 | 0 |
|   |                          | References       | Study Quality  |                     |        |        |                   |   |   |   |   |   |   |   |   |
|   |                          | 172 (-3195173)   |                |                     |        |        |                   |   |   |   |   |   |   |   |   |
|   |                          | 173 (-3195175)   |                |                     |        |        |                   |   |   |   |   |   |   |   |   |
|   |                          | 200 (-3195384)   |                |                     |        |        |                   |   |   |   |   |   |   |   |   |
| US breast                               | Usually not appropriate  | Expert Consensus | ○ 0 mSv        | ○ 0 mSv [ped]       | 1      | 1      | 12                | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Digital breast tomosynthesis diagnostic | Usually not appropriate  | Expert Consensus | ☼☼ 0.1-1mSv    |                     | 1      | 1      | 14                | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Digital breast tomosynthesis screening  | Usually not appropriate  | Expert Consensus | ☼☼ 0.1-1mSv    |                     | 1      | 1      | 16                | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Mammography with IV contrast            | Usually not appropriate  | Expert Consensus | ☼☼ 0.1-1mSv    |                     | 1      | 1      | 15                | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

**Variant 8: Suspected local recurrence of breast cancer based on symptoms, physical examination, or laboratory value in patient with history of BCT. Regardless of clinical stage at time of original presentation.**

| Procedure                               | Appropriateness Category | SOE              | Adults RRL     | Peds RRL            | Rating | Median | Final Tabulations |   |   |   |    |   |   |   |    |  |
|---|--------------------------|------------------|----------------|---------------------|--------|--------|-------------------|---|---|---|----|---|---|---|----|--|
|   |                          |                  |                |                     |        |        | 1                 | 2 | 3 | 4 | 5  | 6 | 7 | 8 | 9  |  |
| Mammography diagnostic                  | Usually appropriate      | Limited          | ⊕⊕ 0.1-1mSv    |                     | 9      | 9      | 1                 | 0 | 0 | 0 | 0  | 0 | 3 | 2 | 10 |  |
|   |                          | References       | Study Quality  |                     |        |        |                   |   |   |   |    |   |   |   |    |  |
|   |                          | 202 (23345348)   | 2              |                     |        |        |                   |   |   |   |    |   |   |   |    |  |
| Digital breast tomosynthesis diagnostic | Usually appropriate      | Limited          | ⊕⊕ 0.1-1mSv    |                     | 9      | 9      | 1                 | 0 | 0 | 0 | 0  | 0 | 2 | 4 | 9  |  |
|   |                          | References       | Study Quality  |                     |        |        |                   |   |   |   |    |   |   |   |    |  |
|   |                          | 202 (23345348)   | 2              |                     |        |        |                   |   |   |   |    |   |   |   |    |  |
| US breast                               | Usually appropriate      | Limited          | ○ 0 mSv        | ○ 0 mSv [ped]       | 8      | 8      | 0                 | 0 | 1 | 1 | 0  | 1 | 4 | 2 | 7  |  |
|   |                          | References       | Study Quality  |                     |        |        |                   |   |   |   |    |   |   |   |    |  |
|   |                          | 207 (28473077)   | 4              |                     |        |        |                   |   |   |   |    |   |   |   |    |  |
|   |                          | 208 (30392596)   | 4              |                     |        |        |                   |   |   |   |    |   |   |   |    |  |
| MRI breast without and with IV contrast | May be appropriate       | Limited          | ○ 0 mSv        | ○ 0 mSv [ped]       | 5      | 5      | 1                 | 3 | 1 | 1 | 9  | 2 | 0 | 0 | 0  |  |
|   |                          | References       | Study Quality  |                     |        |        |                   |   |   |   |    |   |   |   |    |  |
|   |                          | 204 (23046046)   | 3              |                     |        |        |                   |   |   |   |    |   |   |   |    |  |
|   |                          | 205 (28754486)   | 3              |                     |        |        |                   |   |   |   |    |   |   |   |    |  |
|   |                          | 206 (32108973)   | 4              |                     |        |        |                   |   |   |   |    |   |   |   |    |  |
| Mammography with IV contrast            | May be appropriate       | Limited          | ⊕⊕ 0.1-1mSv    |                     | 5      | 5      | 0                 | 1 | 0 | 1 | 12 | 2 | 1 | 0 | 0  |  |
|   |                          | References       | Study Quality  |                     |        |        |                   |   |   |   |    |   |   |   |    |  |
|   |                          | 203 (30240292)   | 2              |                     |        |        |                   |   |   |   |    |   |   |   |    |  |
| MRI breast without IV contrast          | Usually not appropriate  | Expert Consensus | ○ 0 mSv        | ○ 0 mSv [ped]       | 1      | 1      | 15                | 0 | 1 | 0 | 0  | 0 | 0 | 0 | 0  |  |
| FDG-PET/CT skull base to mid-thigh      | Usually not appropriate  | Expert Consensus | ⊕⊕⊕⊕ 10-30 mSv | ⊕⊕⊕⊕ 3-10 mSv [ped] | 1      | 1      | 13                | 0 | 1 | 2 | 0  | 0 | 0 | 0 | 0  |  |

**Variant 9: Suspected local recurrence of breast cancer based on symptoms, physical examination, or laboratory value in patient with history of mastectomy. Regardless of clinical stage at time of original presentation.**

| 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 mSv        | ○ 0 mSv [ped]       | 9             | 9      | 0                 | 0 | 0 | 0 | 0 | 0 | 6 | 2 | 9 |  |
|   |                          | References       |                |                     | Study Quality |        |                   |   |   |   |   |   |   |   |   |  |
|   |                          | 207 (28473077)   |                |                     | 4             |        |                   |   |   |   |   |   |   |   |   |  |
|   |                          | 208 (30392596)   |                |                     | 4             |        |                   |   |   |   |   |   |   |   |   |  |
| MRI breast without and with IV contrast | Usually not appropriate  | Expert Consensus | ○ 0 mSv        | ○ 0 mSv [ped]       | 3             | 3      | 5                 | 2 | 3 | 4 | 0 | 1 | 1 | 0 | 0 |  |
| Mammography diagnostic                  | Usually not appropriate  | Expert Consensus | ⊗⊗ 0.1-1mSv    |                     | 1             | 1      | 11                | 0 | 2 | 0 | 2 | 1 | 0 | 0 | 0 |  |
| MRI breast without IV contrast          | Usually not appropriate  | Expert Consensus | ○ 0 mSv        | ○ 0 mSv [ped]       | 1             | 1      | 15                | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |  |
| FDG-PET/CT skull base to mid-thigh      | Usually not appropriate  | Expert Consensus | ⊗⊗⊗⊗ 10-30 mSv | ⊗⊗⊗⊗ 3-10 mSv [ped] | 1             | 1      | 14                | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |  |
| Digital breast tomosynthesis diagnostic | Usually not appropriate  | Expert Consensus | ⊗⊗ 0.1-1mSv    |                     | 1             | 1      | 12                | 0 | 1 | 0 | 2 | 1 | 0 | 0 | 0 |  |
| Mammography with IV contrast            | Usually not appropriate  | Expert Consensus | ⊗⊗ 0.1-1mSv    |                     | 1             | 1      | 12                | 0 | 1 | 1 | 2 | 0 | 0 | 0 | 0 |  |

**Variant 10: Surveillance. Regardless of clinical stage of breast cancer at time of original presentation. Evaluation for distant metastatic disease.**

| Procedure                       | Appropriateness Category | SOE     | Adults RRL | Peds RRL | Rating | Median | Final Tabulations |   |   |   |   |   |   |   |   |
|---------------------------------|--------------------------|---------|------------|----------|--------|--------|-------------------|---|---|---|---|---|---|---|---|
|                                 |                          |         |            |          |        |        | 1                 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| CT chest abdomen pelvis with IV | Usually not              | Limited | ⊗⊗⊗⊗ 10-30 | ⊗⊗⊗⊗ 3-  | 1      | 1      | 11                | 0 | 4 | 0 | 0 | 1 | 0 | 0 | 0 |





|   |                         |                  |                |                     |   |   |    |   |   |   |   |   |   |   |   |   |   |   |
|---|-------------------------|------------------|----------------|---------------------|---|---|----|---|---|---|---|---|---|---|---|---|---|---|
|   |                         |                  | References     | Study Quality       |   |   |    |   |   |   |   |   |   |   |   |   |   |   |
|   |                         |                  | 126 (-3195169) | 4                   |   |   |    |   |   |   |   |   |   |   |   |   |   |   |
|   |                         |                  | 128 (-3195171) | 4                   |   |   |    |   |   |   |   |   |   |   |   |   |   |   |
|   |                         |                  | 209 (23601761) | 4                   |   |   |    |   |   |   |   |   |   |   |   |   |   |   |
|   |                         |                  | 210 (26314782) | 4                   |   |   |    |   |   |   |   |   |   |   |   |   |   |   |
| Bone scan whole body                    | Usually not appropriate | Limited          | ⊕⊕⊕ 1-10 mSv   | ⊕⊕⊕⊕ 3-10 mSv [ped] | 1 | 1 | 11 | 1 | 3 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
|   |                         |                  | References     | Study Quality       |   |   |    |   |   |   |   |   |   |   |   |   |   |   |
|   |                         |                  | 126 (-3195169) | 4                   |   |   |    |   |   |   |   |   |   |   |   |   |   |   |
|   |                         |                  | 128 (-3195171) | 4                   |   |   |    |   |   |   |   |   |   |   |   |   |   |   |
|   |                         |                  | 209 (23601761) | 4                   |   |   |    |   |   |   |   |   |   |   |   |   |   |   |
|   |                         |                  | 210 (26314782) | 4                   |   |   |    |   |   |   |   |   |   |   |   |   |   |   |
| FDG-PET/CT skull base to mid-thigh      | Usually not appropriate | Limited          | ⊕⊕⊕⊕ 10-30 mSv | ⊕⊕⊕⊕ 3-10 mSv [ped] | 1 | 1 | 11 | 0 | 4 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
|   |                         |                  | References     | Study Quality       |   |   |    |   |   |   |   |   |   |   |   |   |   |   |
|   |                         |                  | 126 (-3195169) | 4                   |   |   |    |   |   |   |   |   |   |   |   |   |   |   |
|   |                         |                  | 128 (-3195171) | 4                   |   |   |    |   |   |   |   |   |   |   |   |   |   |   |
|   |                         |                  | 209 (23601761) | 4                   |   |   |    |   |   |   |   |   |   |   |   |   |   |   |
|   |                         |                  | 210 (26314782) | 4                   |   |   |    |   |   |   |   |   |   |   |   |   |   |   |
| Digital breast tomosynthesis diagnostic | Usually not appropriate | Expert Consensus | ⊕⊕ 0.1-1mSv    |                     | 1 | 1 | 15 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| US axilla                               | Usually not appropriate | Expert Consensus | ○ 0 mSv        | ○ 0 mSv [ped]       | 1 | 1 | 15 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

**Variant 11: Suspected distant recurrence of breast cancer based on symptoms, physical examination, or laboratory value. Regardless of clinical stage at time of original presentation.**

| Procedure                       | Appropriateness Category | SOE     | Adults RRL | Peds RRL | Rating | Median | Final Tabulations |   |   |   |   |   |   |   |   |  |  |  |  |
|---------------------------------|--------------------------|---------|------------|----------|--------|--------|-------------------|---|---|---|---|---|---|---|---|--|--|--|--|
|                                 |                          |         |            |          |        |        | 1                 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |  |  |  |  |
| CT chest abdomen pelvis with IV | Usually                  | Limited | ⊕⊕⊕⊕ 10-30 | ⊕⊕⊕⊕ 3-  | 9      | 9      | 0                 | 0 | 1 | 0 | 1 | 2 | 2 | 1 | 9 |  |  |  |  |

| Procedure  | Appropriateness Category | SOE              | Adults RRL     | Peds RRL             | Rating | Median | Final Tabulations |   |   |   |   |   |   |   |   |  |  |  |  |  |
|--|--------------------------|------------------|----------------|----------------------|--------|--------|-------------------|---|---|---|---|---|---|---|---|--|--|--|--|--|
|  |                          |                  |                |                      |        |        | 1                 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |  |  |  |  |  |
| contrast   | appropriate              |                  | mSv            | 10 mSv [ped]         |        |        |                   |   |   |   |   |   |   |   |   |  |  |  |  |  |
|  |                          | References       |                | Study Quality        |        |        |                   |   |   |   |   |   |   |   |   |  |  |  |  |  |
|  |                          | 172 (-3195173)   |                | 4                    |        |        |                   |   |   |   |   |   |   |   |   |  |  |  |  |  |
| Bone scan whole body                                 | Usually appropriate      | Limited          | ⊕⊕⊕ 1-10 mSv   | ⊕⊕⊕⊕ 3-10 mSv [ped]  | 9      | 9      | 0                 | 0 | 1 | 1 | 0 | 2 | 2 | 1 | 9 |  |  |  |  |  |
|  |                          | References       |                | Study Quality        |        |        |                   |   |   |   |   |   |   |   |   |  |  |  |  |  |
|  |                          | 126 (-3195169)   |                | 4                    |        |        |                   |   |   |   |   |   |   |   |   |  |  |  |  |  |
| FDG-PET/CT skull base to mid-high                    | Usually appropriate      | Limited          | ⊕⊕⊕⊕ 10-30 mSv | ⊕⊕⊕⊕ 3-10 mSv [ped]  | 8      | 8      | 0                 | 0 | 1 | 1 | 0 | 2 | 3 | 3 | 6 |  |  |  |  |  |
|  |                          | References       |                | Study Quality        |        |        |                   |   |   |   |   |   |   |   |   |  |  |  |  |  |
|  |                          | 126 (-3195169)   |                | 4                    |        |        |                   |   |   |   |   |   |   |   |   |  |  |  |  |  |
| MRI head without and with IV contrast                | Usually appropriate      | Limited          | ○ 0 mSv        | ○ 0 mSv [ped]        | 7      | 7      | 0                 | 0 | 0 | 0 | 0 | 2 | 7 | 4 | 4 |  |  |  |  |  |
|  |                          | References       |                | Study Quality        |        |        |                   |   |   |   |   |   |   |   |   |  |  |  |  |  |
|  |                          | 164 (17577662)   |                | 4                    |        |        |                   |   |   |   |   |   |   |   |   |  |  |  |  |  |
|  |                          | 165 (28301662)   |                | 4                    |        |        |                   |   |   |   |   |   |   |   |   |  |  |  |  |  |
| CT chest abdomen pelvis without IV contrast          | Usually not appropriate  | Expert Consensus | ⊕⊕⊕⊕ 10-30 mSv | ⊕⊕⊕⊕ 3-10 mSv [ped]  | 1      | 1      | 15                | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |  |  |  |  |  |
| CT chest abdomen pelvis without and with IV contrast | Usually not appropriate  | Limited          | ⊕⊕⊕⊕ 10-30 mSv | ⊕⊕⊕⊕ 10-30 mSv [ped] | 1      | 1      | 15                | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |  |  |  |  |  |
|  |                          | References       |                | Study Quality        |        |        |                   |   |   |   |   |   |   |   |   |  |  |  |  |  |
|  |                          | 21 (-3196411)    |                | 4                    |        |        |                   |   |   |   |   |   |   |   |   |  |  |  |  |  |
| MRI head without IV contrast                         | Usually not appropriate  | Expert Consensus | ○ 0 mSv        | ○ 0 mSv [ped]        | 1      | 1      | 15                | 0 | 0 | 0 | 1 | 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).