06.01.22 Scintimammography / Breast Specific Gamma Imaging (BSGI) / Molecular Breast Imaging (MBI) / Positron Emission Mammography (PEM)

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Summary

Description

Scintimammography, also known as nuclear medicine breast imaging, refers to the use of radiotracers with nuclear medicine imaging as a diagnostic tool for abnormalities of the breast. Breast specific gamma imaging (BSGI) also known as molecular breast imaging (MBI) refers to specific types of imaging machines that are used in conjunction with scintimammography to improve diagnostic performance.

Note: The term molecular breast imaging (MBI) may be used in different ways, sometimes for any type of breast imaging involving molecular imaging, including positron emission mammography (PEM), and sometimes is limited to imaging with a type of breast specific gamma camera.

These modalities have been proposed primarily as adjuncts to mammography and physical examination in patients who have palpable masses or suspicious mammograms as a technique to improve patient selection for biopsy. It has been suggested scintimammography has the potential to reduce unnecessary invasive biopsies by differentiating benign from malignant lesions. Breast specific gamma imaging (BSGI) or molecular breast imaging (MBI) have been suggested for evaluating suspected recurrence in patients who are at high risk, for patients in whom breast MRI is indicated but who are not candidates due to contraindications, and among patients in whom breast imaging is technically difficult, such as those with radio dense breast tissue.

Summary of Evidence

Scintimammography, Breast-Specific Gamma Imaging (BSGI), Molecular Breast Imaging (MBI) including Positron Emission Mammography (PEM) for Diagnosis

For individuals who have dense breasts or high-risk for breast cancer who receive scintimammography, BSGI, MBI, and/or PEM as an adjunct to mammography, the evidence includes diagnostic accuracy studies. Relevant outcomes are overall survival (OS), disease-specific survival, test validity and treatment-related morbidity. Three prospective studies have assessed the incremental difference in diagnostic accuracy when BSGI or MBI is added to mammography in individuals at increased risk. Sensitivity was higher with combined BSGI or MBI and mammography, but specificity was lower. A retrospective study found improved diagnostic accuracy and specificity with BSGI compared to ultrasonography when added to mammography. Studies of individuals at increased risk of breast cancer and negative mammograms found that a small number of additional cancers were detected. Studies tended to include individuals at different risk levels (e.g., individuals with dense breasts and those with BRCA1). Moreover, any potential benefits need to be weighed against the potential risks of additional radiation exposure. The evidence is insufficient to determine that the technology results in an improvement in the net health outcomes.

For individuals who have indeterminate or suspicious breast lesions who receive scintimammography, BSGI, MBI and/or PEM, the evidence includes diagnostic accuracy studies. Relevant outcomes are OS, disease-specific survival, test validity, and treatment-related morbidity. In the available studies, compared with biopsy, the negative predictive value of BSGI (or MBI) varied from 83% to 94%. Given the relative ease and diagnostic accuracy of the criterion standard of biopsy, coupled with the adverse consequences of missing a breast cancer, the negative predictive value of BSGI (or MBI) would have to be extremely high to alter treatment decisions. The evidence to date does not demonstrate this level of negative predictive value. Moreover, the value of BSGI in evaluating indeterminate or suspicious lesions must be compared with other modalities that would be used, such as spot views for diagnostic mammography. The evidence is insufficient to determine that the technology results in an improvement in the net health outcomes.

For individuals who have breast cancer undergoing detection of residual tumor after neoadjuvant therapy who receive scintimammography and BSGI, the evidence includes diagnostic accuracy studies and a meta-analysis. Relevant outcomes are OS, disease-specific survival, test validity, and treatment-related morbidity. The meta-analysis of studies evaluating the accuracy of BSGI for detecting residual tumor after neoadjuvant therapy found a pooled sensitivity of 86% and a pooled specificity of 69%, compared with histopathologic analysis. No studies were identified that compared the diagnostic accuracy of BSGI with other imaging approaches, or that investigated the clinical utility of this potential application of BSGI. The evidence is insufficient to determine that the technology results in an improvement in the net health outcome.

For individuals who have breast cancer undergoing surgical planning for breast-conserving therapy who receive scintimammography and BSGI for disease detection, the evidence includes a retrospective observational study. Relevant outcomes are OS, disease-specific survival, test validity, and treatment-related morbidity. In the retrospective study, results suggested that magnetic resonance imaging identified more individuals than BSGI who were not appropriate candidates for breast-conserving therapy. Prospective comparative studies are needed. The evidence is insufficient to determine that the technology results in an improvement in the net health outcome.

Scintimammography and Breast-Specific Gamma Imaging for Treatment

For individuals who have breast cancer undergoing detection of axillary metastases who receive scintimammography and BSGI, the evidence includes diagnostic accuracy studies and systematic reviews of diagnostic accuracy studies. Relevant outcomes are OS, disease-specific survival, test validity, and treatment-related morbidity. A meta-analysis of the available diagnostic accuracy studies found that the sensitivity and specificity of BSGI are not high enough for this technology to replace the current standard practice, surgical nodal dissection. The evidence is insufficient to determine that the technology results in an improvement in the net health outcome.

Additional Information

Not applicable.

OBJECTIVE

The objective of this evidence review is to determine whether detection of tumors with scintimammography, breast-specific gamma imaging, molecular breast imaging, or positron emission mammography (PEM) improve the net health outcome in individuals.

PRIOR APPROVAL

Not applicable.

POLICY

Scintimammography, breast specific gamma imaging (BSGI), molecular breast imaging (MBI), and positron emission mammography (PEM) is considered **investigational** for all indications, because the evidence is insufficient to determine the technology results in an improvement in the net health outcomes.

POLICY GUIDELINES

Coding

See the Codes table for details.

BACKGROUND

Scintimammography

Scintimammography is a diagnostic modality using radiopharmaceuticals to detect breast tumors. After intravenous injection of a radiopharmaceutical, the breast is evaluated using planar imaging. Scintimammography is performed with the patient lying prone, and the camera positioned laterally, which increases the distance between the breast and the camera. Special camera positioning to include the axilla may be included when the area of interest is an evaluation for axillary metastases. Scintimammography using conventional imaging modalities has relatively poor sensitivity in detecting

smaller lesions (e.g., <15 mm), because of the relatively poor resolution of conventional gamma cameras in imaging the breast.

Breast Specific Gamma Imaging (BSGI)/Molecular Breast Imaging (MBI)

Breast-specific gamma imaging (BSGI) and molecular breast imaging (MBI) were developed to address the poor resolution of conventional gamma cameras. Breast-specific gamma cameras acquire images while the patient is seated in a position similar to that in mammography and the breast is lightly compressed. Detector heads are immediately next to the breast, increasing resolution, and images can be compared with mammographic images. Breast-specific gamma imaging and MBI differ primarily in the number and type of detectors used (e.g., multicrystal arrays of cesium iodide or sodium iodide, or nonscintillating, semiconductor materials, such as cadmium zinc telluride). In some configurations, a detector is placed on each side of the breast and used to compress it lightly. The maximum distance between the detector and the breast is therefore from the surface to the midpoint of the breast. The radiotracer typically used is technetium 99m (Tc 99m) sestamibi, and MBI takes approximately 40 minutes.

Positron Emission Mammography (PEM)

Positron emission mammography (PEM) is an imaging modality that has higher resolution than PET-CT and can be performed on patients unable to have an MRI scan. PEM uses a pair of dedicated gamma radiation detectors placed above and below the breast and mild breast compression to detect coincident gamma rays after administration of fluorine-18 fluorodeoxyglucose (18F-FDG), the positron-emitting radionuclide used in whole-body PET studies for the detection of metastatic disease. Whereas PEM has high imaging sensitivity for breast lesions, its clinical utility requires further investigation. PEM cannot provide the anatomical detail that is provided by MRI. The radiation dose associated with PEM is larger than with mammography and is an important consideration when using this modality. Studies are ongoing to determine the effects on sensitivity and specificity of PET when the radiation dose is reduced and to find alternate radiopharmaceutical tracers.

Radiopharmaceuticals

The primary radiopharmaceutical used with BSGI or MBI is Tc 99m sestamibi. The product label states that Tc 99m sestamibi is "indicated for planar imaging as a second-line diagnostic drug after mammography to assist in the evaluation of breast lesions in patients with an abnormal mammogram or a palpable breast mass. Technetium Tc-99m sestamibi is not indicated for breast cancer screening, to confirm the presence or absence of malignancy, and it is not an alternative to biopsy."

Technetium TC-99m tetrofosmin (Myoview™), a gamma-emitter used in some BSGI studies, is approved by the U.S. Food and Drug Administration (FDA) only for cardiac imaging.

Radiation Exposure

Scintimammography, Breast-Specific Gamma Imaging, and Molecular Breast Imaging

The radiation dose associated with BSGI is substantial for diagnostic breast imaging modalities. According to Appropriateness Criteria from the American College of Radiology, the radiation dose from BSGI is 10 to 30 mSv, which is 15 to 30 times higher than the dose from a digital mammogram.11, According to the American College of Radiology, at these levels, BSGI is not indicated for breast cancer screening.

According to a study by Hruska and O'Connor (2015; who reported receiving royalties from licensed technologies by an agreement with Mayo Clinic and Gamma Medica), the effective dose from a lower "off-label" administered dose of 240 to 300 MBq (6.5-8 mCi) of Tc 99m sestamibi that is made feasible with

newer dual-head MBI systems, is 2.0 to 2.5 mSv. For comparison, the effective dose (i.e., mean glandular dose) of digital mammography is estimated to be about 0.5 mSv.12, However, it is important to note that the dose for MBI is given to the entire body. The authors compared this dose with the estimated annual background radiation, which varies worldwide between 2.5 mSv and 10 mSv, and asserted that the effective dose from MBI "is considered safe for use in routine screening."

Hendrick (2010) calculated mean glandular doses and lifetime attributable risks of cancer due to film mammography, digital mammography, BSGI, and positron emission mammography (PEM). The author, a consultant to GE Healthcare and a member of the medical advisory boards of Koning (manufacturer of dedicated breast computed tomography) and Bracco (magnetic resonance contrast agents), used group risk estimates from the Biological Effects of Ionizing Radiation VII report to assess the risk of radiation-induced cancer and mortality from breast imaging studies. For an individual with average-sized breasts (compressed thickness during mammography of 5.3 cm per breast), estimated lifetime attributable risks of cancer at age 40 were:

- 5 per 100000 for digital mammography (breast cancer only),
- 7 per 100000 for screen-film mammography (breast cancer only),
- 55 to 82 per 100000 for BSGI (depending on the dose of Tc 99m sestamibi), and
- 75 for 100000 for PEM.

Corresponding lifetime attributable risks of cancer mortality at age 40 were:

- 1.3 per 100000 for digital mammography (breast cancer only),
- 1.7 per 100000 for screen-film mammography (breast cancer only),
- 26 to 39 per 100000 for BSGI, and
- 31 for 100000 for PEM.

A major difference in the impact of radiation between mammography and BSGI or PEM is that, for mammography, the substantial radiation dose is limited to the breast. With BSGI and PEM, all organs are irradiated, increasing the risks associated with radiation exposure.

Although the use of BSGI (or MBI) has been proposed for individuals at high-risk of breast cancer, there is controversy and speculation over whether some individuals (e.g., those with BRCA variants) have a heightened radiosensitivity. If individuals with BRCA variants are more radiosensitive than the general population, studies may underestimate the risks of breast imaging with ionizing radiation (i.e., mammography, BSGI, MBI, positron emission mammography, single-photon emission computed tomography/computed tomography, breast-specific computed tomography, tomosynthesis) in these individuals. In contrast, ultrasonography and magnetic resonance imaging (MRI) do not use radiation. More research is needed to resolve this issue. Also, the risk associated with radiation exposure will be greater for individuals at high-risk of breast cancer, whether or not they are more radiosensitive because they start screening at a younger age when the risks associated with radiation exposure are greater. In addition, a large, high-quality, head-to-head comparison of BSGI (or MBI) and MRI would be needed, especially for individuals at high-risk of breast cancer, because MRI, alternated with mammography, is currently the recommended screening technique.

Notes: The term *molecular breast imaging* is used in different ways, sometimes for any type of breast imaging involving molecular imaging, including PEM, and sometimes it is used synonymously with the term *breast-specific gamma camera*, as used in this review.

Use of single-photon emission computed tomography and positron emission tomography of the breast are not addressed in this review.

Regulatory Status

Several scintillation (gamma) cameras have been cleared for marketing by the FDA through the 510(k) process for "measuring and imaging the distribution of radionuclides in the human body by means of photon detection." Examples of gamma cameras used in BSGI are the Dilon 6800® (Dilon Technologies) and single-head configurations of Discovery NM750b (GE Healthcare). Dual-head cameras used in MBI include LumaGEM™ (Gamma Medical) (FDA product code IYX) and Discovery NM750b (GE Healthcare).

Tc-99m sestamibi (Sun Pharmaceutical Industries, Lantheus Medical Imaging, Cardinal Health 414, AnazaoHealth, Curium US, Jubilant Draximage) has been approved by the FDA with the following labeling: "Breast Imaging: Technetium TC 99M Sestamibi is indicated for planar imaging as a second-line diagnostic drug after mammography to assist in the evaluation of breast lesions in patients with an abnormal mammogram or a palpable breast mass. Technetium TC 99M Sestamibi is not indicated for breast cancer screening, to confirm the presence or absence of malignancy, and it is not an alternative to biopsy."

Technetium-99m-sulfur colloid was approved by the FDA through the new drug application (NDA; GE Healthcare, NDA 017456; Mallinckrodt, NDA 017724) process although these products appear to be no longer marketed. In 2011, Technetium Tc 99m Sulfur Colloid Kit (Sun Pharmaceutical Industries) was approved by the FDA through the NDA process (NDA 017858) for use as an injection to localize lymph nodes in breast cancer patients.

In 2018, the FDA granted approval to Northstar Medical Radioisotopes for its RadioGenix™ System, which produces molybdenum 99, the material used to generate Tc 99m. Previously, molybdenum 99 was only produced from enriched uranium in facilities outside of the United States.

RATIONALE

This evidence review was created in August 2006 and has been updated regularly with searches of the PubMed database. The most recent literature update was performed through November 2025.

Evidence reviews assess whether a medical test is clinically useful. A useful test provides information to make a clinical management decision that improves the net health outcome. That is, the balance of benefits and harms is better when the test is used to manage the condition than when another test or no test is used to manage the condition.

The first step in assessing a medical test is to formulate the clinical context and purpose of the test. The test must be technically reliable, clinically valid, and clinically useful for that purpose. Evidence reviews assess the evidence on whether a test is clinically valid and clinically useful. Technical reliability is outside the scope of these reviews, and credible information on technical reliability is available from other sources.

Scintimammography, Breast-Specific Gamma Imaging (BSGI), Molecular Breast Imaging (MBI) and Positron Emission Mammography (PEM) for Diagnosis

Clinical Context and Test Purpose

The purpose of scintimammography, breast-specific gamma imaging (BSGI), molecular breast imaging (MBI) and positron emission mammography (PEM) to confirm a diagnosis of breast cancer for individuals with dense breasts or high-risk for breast cancer and in those with indeterminate breast lesions. These tests are also used in breast cancer to detect residual tumor in individuals who have undergone neoadjuvant therapy or individuals planning for breast-conserving therapy.

Dense Breasts or High-Risk for Breast Cancer

The following PICO was used to select literature to inform this review.

Populations

The relevant population of interest is individuals with dense breasts or those at high-risk for breast cancer, as part of routine screening.

Interventions

The imaging techniques being considered in this review are scintimammography, BSGI, MBI, and positron emission mammography (PEM).

These procedures use radiotracers, which are injected intravenously, followed by nuclear medicine imaging, to detect abnormalities of the breast. Scintimammography uses planar imaging with the individual lying prone and the camera positioned laterally. If the area of interest includes the axilla, the camera can be positioned to include the axilla. During BSGI and MBI, the individual is seated in a position similar to mammography and the breast is lightly compressed. The differences between these techniques are the number and type of detectors used in the camera.

Comparators

The following tests and practices are currently being used to make decisions about individuals with dense breasts or high-risk for breast cancer: mammography alone, ultrasonography, or MRI.

Outcomes

The general outcomes of interest are overall survival (OS), disease-specific survival, test validity, and treatment-related morbidity.

True-positives can inform decisions to initiate treatment among newly diagnosed individuals with breast cancer.

False-positives may lead to unnecessary biopsies in individuals in need of a definitive diagnosis.

True-negatives may reduce the number of biopsies in individuals in need of a definitive breast cancer diagnosis.

False-negatives may prevent individuals from pursuing the necessary evaluations to determine a breast cancer diagnosis.

The time frame of interest for calculating performance characteristics is time to biopsy result. Individuals who forgo biopsy based on test results could miss or delay the diagnosis of cancer. Years of follow-up would be necessary to determine the effects on OS.

Study Selection Criteria

For the evaluation of the clinical validity of gamma imaging in individuals with dense breasts or at high-risk for breast cancer, studies that met the following eligibility criteria were considered:

- Reported on the accuracy of the marketed version of the technology (including any algorithms used to calculate scores)
- Included a suitable reference standard (describe the reference standard)
- Patient/sample clinical characteristics were described

- Patient/sample selection criteria were described.

Clinically Valid
A test must detect the presence or absence of a condition, the risk of developing a condition in the future, or treatment response (beneficial or adverse).

Review of Evidence

Observational Studies
Several observational studies have assessed BSGI or MBI in individuals at high-risk for breast cancer (Tables 1 to 4). With advances in imaging technology, lower doses of Tc 99m sestamibi are feasible. Lower doses of Tc 99m sestamibi were specifically used in MBI procedures in studies by Rhodes et al (2015) and Shermis et al (2016). Higher doses of Tc 99m sestamibi were initially used for BSGI in the Brem et al (2016) study, but lower doses were allowed for 196 patients after a protocol change.

Table 1: Study Characteristics of Clinical Validity of BSGI or MBI in Individuals with Dense Breasts or at High-Risk for Breast Cancer

Author (Year)	Study Population	Design	Reference Standard	Threshold for Positive Index Test	Timing of Reference and Index Tests	Blinding of Assessors
Zhang (2020)	XX individuals with heterogeneously or extremely dense breasts who underwent mammography plus either BSGI or ultrasonography	Retrospective	Surgery or core needle biopsy records	BI-RADS 4 or 5		Assessors blinded to previous analysis of BSGI
Shermis (2016)	XX individuals with heterogeneously or extremely dense breasts and negative mammograms recommended for supplemental screening with MBI	Retrospective	Biopsy by sonographic guidance (stereotactic or MRI-guided biopsy when not visible by ultrasound)	BI-RADS 0, 3, 4, or 5		
Brem (2016)	XX individuals at increased breast cancer risk undergoing	Retrospective	Pathologic results of biopsy or follow-up	BI-RADS 0, 4, or 5		Assessors were not blind to patient history or

Author (Year)	Study Population	Design	Reference Standard	Threshold for Positive Index Test	Timing of Reference and Index Tests	Blinding of Assessors
	BSGI for supplemental screening after a negative or probably benign mammogram		imaging that did not demonstrate evidence of malignancy			adjunct imaging studies
Rhodes (2015)	XX individuals with heterogeneously or extremely dense breasts who underwent mammography, MBI, or mammography in combination with MBI	Prospective	Histopathologic diagnosis from surgical excision or core needle biopsy	BI-RADS 3 to 4	365 days	MBI assessors blind to mammographic and clinical information
Rhodes (2011)	XX individuals with heterogeneously or extremely dense breasts and at additional risk for breast cancer who underwent mammography, MBI, or mammography in combination with MBI	Prospective	Histopathologic diagnosis from surgical excision or core needle biopsy	BI-RADS 0, 4, or 5	365 days	Assessors blind to other radiographic and clinical information
Brem (2005)	XX individuals at high risk for breast cancer with normal mammographic findings undergoing BSGI	Prospective	Biopsy	BI-RADS 4 to 5		BSGI assessors blind to mammographic and clinical information

BI-RADS: Breast Imaging Reporting and Data System; BSGI: breast-specific gamma imaging; MBI: molecular breast imaging; MRI: magnetic resonance imaging.

Table 2: Results of Clinical Validity Studies of BSGI or MBI in Individuals with Dense Breasts or at High-Risk for Breast Cancer

Author (Year)	Enrolled N	Final N	Clinical Validity			
			Sensitivity	Specificity	PPV	NPV
Zhang (2020)		364	Increased by 25.23% with BSGI vs. 22.02% with ultrasonography (mean difference 3.21%; p=.23) in women with false-negative mammograms	Increased by 30.82% with BSGI vs. 20.55% with ultrasonography (mean difference 10.27%; p=.003) in women with false-positive mammograms		
Shermis (2016)		1696			9.1% (95% CI, 5.4 to 15.0) as a result of 13 malignant lesions of 143 positive MBI findings	
Brem (2016)		849			6.7% as a result of 14 malignancies per 212 abnormal BSGI findings	
Rhodes (2015)	1608	1585	Mammography: 23.8% (95% CI, 10.6 to 45.1) MBI: 81.0% (95% CI, 60.0 to 92.3) MBI + mammography: 90.5% (95% CI, 71.1 to 97.3; p<.001 vs. mammography alone)	Mammography: 89.1% (95% CI, 87.5 to 90.6) MBI: 93.5% (95% CI, 92.1 to 94.6) MBI + mammography: 83.4% (95% CI, 81.4 to 85.1; p<.001 vs. mammography alone)	Mammography: 2.9% (95% CI, 1.2 to 6.5) MBI: 14.3% (95% CI, 9.1 to 21.7) MBI + mammography: 6.8% (95% CI, 4.4 to 10.4; p=.021 vs. mammography alone)	Mammography: 98.9% (95% CI, 98.2 to 99.3) MBI: 99.7% (95% CI, 99.3 to 99.9) MBI + mammography: 99.8% (95% CI, 99.4 to 100; p<.001 vs. mammography alone)

Author (Year)	Enrolled N	Final N	Clinical Validity			
			Sensitivity	Specificity	PPV	NPV
Rhodes (2011)	1007	936	Mammography: 27% (95% CI, 9.7 to 56.6) MBI: 82% (95% CI, 52.3 to 94.9) MBI + mammography: 91% (95% CI, 62.3 to 98.4; p<.016 vs. mammography alone)	Mammography: 91% (95% CI, 88.8 to 92.0) MBI: 93% (95% CI, 91.3 to 94.5) MBI + mammography: 85% (95% CI, 82.8 to 87.3; p<.001 vs. mammography alone)	Mammography: 3% (95% CI, 1.2 to 9.6) MBI: 12% (95% CI, 6.6 to 21.8) MBI + mammography: 8% (95% CI, 4.3 to 13.1; p=.158 vs. mammography alone)	
Brem (2005)	94	94	100% (95% CI, 22 to 100) based on 2 cancers in 16 positive BSGI findings	85% based on 78 negative BSGI findings in 92 patients without cancer	12.5% based on 2 cancers in 16 positive BSGI findings	100% based on 78 negative BSGI findings in 92 patients without cancer

BSGI: breast-specific gamma imaging; CI: confidence interval; MBI: molecular breast imaging; NPV: negative predictive value; PPV: positive predictive value.

Table 3: Study Relevance Limitations of Observational Studies of BSGI or MBI in Individuals with Dense Breasts or at High-Risk for Breast Cancer

Study	Population[a]	Intervention[b]	Comparator[c]	Outcomes[d]	Duration of Follow-Up[e]
Zhang (2020)	4. Race and ethnicity data not reported for study population	1. Tc 99m sestamibi dosing undefined		3. Predictive values not reported 5. Adverse events of the test not described	

Study	Population[a]	Intervention[b]	Comparator[c]	Outcomes[d]	Duration of Follow-Up[e]
Shermis (2016)	4. Race and ethnicity data not reported for study population			3. Sensitivity and specificity could not be calculated due to missing data 5. Adverse events of the test not described	
Brem (2016)	4. Race and ethnicity data not reported for study population			3. Sensitivity and specificity not reported 5. Adverse events of the test not described	
Rhodes (2015)	4. Race and ethnicity data not reported for study population			5. Adverse events of the test not described	
Rhodes (2011)	4. Race and ethnicity data not reported for study population			5. Adverse events of the test not described	
Brem (2005)	4. Race and ethnicity data not reported for study population			5. Adverse events of the test not described	

The study limitations stated in this table are those notable in the current review; this is not a comprehensive gaps assessment.
[a] Population key: 1. Intended use population unclear; 2. Study population is unclear; 3. Study population not representative of intended use; 4. Enrolled populations do not reflect relevant diversity; 5. Other.
[b] Intervention key: 1. Classification thresholds not defined; 2. Version used unclear; 3. Not version currently in clinical use.
[c] Comparator key: 1. Classification thresholds not defined; 2. Not compared to credible reference standard; 3. Not compared to other tests in use for same purpose.
[d] Outcomes key: 1. Study does not directly assess a key health outcome; 2. Evidence chain or decision model not explicated; 3. Key clinical validity outcomes not reported (sensitivity, specificity, predictive values); 4. Reclassification of diagnostic or risk categories not reported; 5. Adverse events of the test not described (excluding minor discomforts and inconvenience of venipuncture or noninvasive tests).
[e] Follow-Up key: 1. Follow-up duration not sufficient with respect to natural history of disease.

Table 4: Study Relevance Design and Conduct Limitations of Observational Studies of BSGI or MBI in Individuals with Dense Breasts or at High-Risk for Breast Cancer

Study	Selection[a]	Blinding[b]	Delivery of Test[c]	Selective Reporting[d]	Completeness of Follow-Up[e]	Statistical[f]
Zhang (2020)		1. Assessors only blind to prior BSGI	1. Timing of histopathology not described			
Shermis (2016)		1. Blinding not described	1. Timing of histopathology not described			2. No statistical tests to compare to alternatives
Brem (2016)		1. Not blinded	1. Timing of histopathology not described			1. Confidence intervals not reported 2. No statistical tests to compare to alternatives
Rhodes (2015)						
Rhodes (2011)						
Brem (2005)			1. Timing of histopathology not described			2. No statistical tests to compare to alternatives

The study limitations stated in this table are those notable in the current review; this is not a comprehensive gaps assessment.
[a] Selection: 1. Selection not described; 2. Selection not random nor consecutive (ie, convenience).
[b] Blinding: 1. Not blinded to results of reference or other comparator tests.
[c] Delivery of test: 1. Timing of delivery of index or reference test not described; 2. Timing of index and comparator tests not same; 3. Procedure for interpreting tests not described; 4. Expertise of evaluators not described.
[d] Selective reporting: 1. Not registered; 2. Evidence of selective reporting; 3. Evidence of selective publication.
[e] Completeness of follow up: 1. Inadequate description of indeterminate and missing samples; 2. High number of samples excluded; 3. High loss to follow-up or missing data.
[f] Statistical: 1. Confidence intervals and/or p values not reported; 2. No statistical test reported to compare to alternatives.

Section Summary: Dense Breasts or High-Risk for Breast Cancer

Three prospective studies have compared the incremental difference in diagnostic accuracy when BSGI or MBI is added to mammography in individuals at increased risk, and both MBI studies were conducted

by the same research group. Sensitivity was higher with combined BSGI (or MBI) and mammography, but specificity was lower. Studies of individuals at increased risk of breast cancer and negative mammograms found that a small number of additional cancers were detected. Studies tended to include individuals at different risk levels (e.g., individuals with dense breasts and those with *BRCA1*). Moreover, any potential benefits need to be weighed against potential risks of additional radiation exposure and risks from breast biopsy for false-negative findings. Even in studies that used a reduced dose of Tc 99m sestamibi, the effective dose (2.4 mSv) exceeded that of digital mammography (»0.5 mSv) by a factor of 4.8. A recent retrospective study in individuals with dense breasts compared the addition of ultrasonography or BSGI to mammography. The diagnostic accuracy was assessed by the area under the receiver operating characteristic curve revealing higher accuracy with mammography plus BSGI than mammography plus ultrasound or mammography alone (area under the receiver operating characteristic curve 0.90 vs. 0.83 [p=.0019] and 0.76, respectively).

Indeterminate or Suspicious Breast Lesions

The following PICO was used to select literature to inform this review.

Populations

The population of interest is individuals with indeterminate or suspicious breast lesions, to confirm a diagnosis.

Interventions

The imaging techniques being considered in this review are scintimammography, BSGI, and MBI (see explanation under the first indication).

Comparators

The following tests and practices are currently being used to make decisions about individuals with indeterminate or suspicious breast lesions: mammography spot compression views, ultrasonography, or MRI.

Outcomes

The general outcomes of interest are OS, disease-specific survival, test validity, and treatment-related morbidity.

True-positives can inform decisions to initiate treatment among newly diagnosed individuals with breast cancer.

False-positives may lead to unnecessary biopsies in individuals in need of a definitive diagnosis.

True-negatives may reduce the number of biopsies in individuals in need of a definitive breast cancer diagnosis.

False-negatives may prevent individuals from pursuing the necessary evaluations to determine a breast cancer diagnosis.

The time frame of interest for calculating performance characteristics is time to biopsy result. Individuals who forgo biopsy based on test results could miss or delay the diagnosis of cancer. Years of follow-up would be necessary to determine the effects on OS.

Study Selection Criteria

For the evaluation of the clinical validity of gamma imaging for indeterminate or suspicious breast lesions, studies that met the following eligibility criteria were considered:

- Reported on the accuracy of the marketed version of the technology (including any algorithms used to calculate scores)
- Included a suitable reference standard (describe the reference standard)
- Patient/sample clinical characteristics were described
- Patient/sample selection criteria were described.

Clinically Valid

A test must detect the presence or absence of a condition, the risk of developing a condition in the future, or treatment response (beneficial or adverse).

Review of Evidence

Cho et al (2016) retrospectively reviewed breast lesions in 162 women diagnosed with BI-RADS category 4 lesions (suspicious) on mammography or ultrasonography. Patients had subsequently undergone BSGI with Tc 99m sestamibi at 925 to 1110 MBq. Using biopsy-confirmed pathologic evaluation as the criterion standard, 66 (40.7%) of 162 lesions were found to be malignant. The sensitivity and specificity of BSGI were 90.9% (95% confidence interval [CI], 81.3% to 96.6%) and 78.1% (95% CI, 68.5% to 85.9%), respectively. The positive predictive value (PPV) was 74.1% (95% CI, 63.1% to 83.2%) and the negative predictive value (NPV) was 92.6% (95% CI, 84.6% to 97.2%). For lesions of 1 cm or smaller, the sensitivity of BSGI was 88.0% (95% CI, 68.6% to 97.5%) and the specificity was 86.8% (95% CI, 71.9% to 95.6%). For lesions larger than 1 cm, the sensitivity was higher (92.7%; 95% CI, 80.1% to 98.5%) and the specificity was lower (61.5%; 95% CI, 44.6% to 76.6%).

Meissnitzer et al (2015) in Austria evaluated BSGI in the diagnostic workup of 67 patients with 92 suspicious breast lesions identified on mammography and/or ultrasonography. Biopsy results were obtained as the reference standard in all patients, and 67 (73%) of 92 lesions were malignant. Breast-specific gamma images were interpreted visually and semiquantitatively. Overall BSGI sensitivity and specificity were 90% and 56%, respectively, compared with ultrasound sensitivity and specificity of 99% and 20%, respectively. For lesions smaller than 1 cm, the sensitivity of BSGI was 60%.

Tan et al (2014) assessed the diagnostic accuracy of dual-phase BSGI (at 10 to 15 minutes and at 90 to 120 minutes) in 76 women at a single institution in China who had suspicious breast masses. On pathologic review, 54 (59%) of 92 tumors were malignant, and 38 (41%) were benign. Using receiver operating characteristic-determined cut points for visual and semiquantitative interpretation, sensitivity and specificity were maximized when a combination of visual and early-phase semiquantitative interpretation was used (85% and 92%, respectively) compared with either analysis or delayed-phase semiquantitative analysis alone.

Spanu et al (2012) assessed the clinical impact of BSGI (using Tc 99m tetrofosmin) in a prospective study of 467 women who had suspicious lesions on physical examination, MRI, ultrasound, or mammogram. Histopathology reports were obtained in all cases. Breast-specific gamma imaging results were true-positives in 408 of 420 breast cancer patients (sensitivity, 97%), including the detection of multifocal, multicentric and bilateral disease, and were false-negatives in 12 breast cancer patients. Breast-specific gamma imaging results were true-negatives in 40 of 47 patients with benign lesions (specificity, 85%). The authors calculated that BSGI provided additional value compared with mammography in 141 (30%) of 467 patients, 108 with breast cancer and 33 with benign lesions.

Hruska et al (2008) evaluated 150 patients with BI-RADS classification 4 or 5 lesions less than 2 cm identified on mammography or ultrasound who were scheduled for a biopsy. The patients underwent MBI

using a dual-head, breast-specific gamma camera.[29,] Results from 3 blinded readers were averaged. In 88 patients, 128 cancer tumors were found. The per-lesion sensitivity with the dual-head camera was 90% (115/128) for all lesions and 82% (50/61) for lesions of 1 centimeter or less. Overall, MBI specificity (across patients) was 69%. The proportion of patients with cancer in this study was higher than might have been expected in a screening population with suspicious lesions on mammography. This was the case because preference was given to those who had a high suspicion of cancer or were likely to have a multifocal or multicentric disease.

Spanu et al (2008) evaluated 145 consecutive patients scheduled for biopsy with MBI (using Tc 99m tetrofosmin) of suspected breast lesions. With an 86% prevalence of the disease, the sensitivity of MBI was 98% per patient (100% for tumors > 10 mm, 91% for tumors ≤10 mm). Per-lesion specificity was 86%. Four cancers were missed, 3 of which were detected by mammography. The authors suggested using MBI for surgical planning or avoiding biopsy, but the NPV (83%) was not high enough to forgo biopsy.

Brem et al (2007) compared BSGI with MRI in 23 women who had 33 indeterminate lesions.[31,] Eight patients had 9 pathologically confirmed cancers. Breast-specific gamma imaging demonstrated a significantly greater specificity (71%; 95% CI, 49% to 87%) than MRI (25%; 95% CI, 11% to 47%; p<.05) and comparable sensitivity (BSGI, 89% [95% CI, 51% to 99%] vs. MRI, 100% [95% CI, 63% to 100%]), PPV (BSGI, 53% [95% CI, 27% to 78%] vs. MRI, 33% [95% CI, 17% to 54%]), and NPV (BSGI, 94% [95% CI, 71% to 100%] vs. MRI, 100% [95% CI, 52% to 100%]). The authors noted that the 100% sensitivity and 25% specificity of MRI was likely due to the small number of cancers in the study.

Clinically Useful

A test is clinically useful if the use of the results informs management decisions that improve the net health outcome of care. The net health outcome can be improved if patients receive correct therapy, more effective therapy, or avoid unnecessary therapy or testing.

Direct Evidence

Direct evidence of clinical utility is provided by studies that have compared health outcomes for patients managed with and without the test. Because these are intervention studies, the preferred evidence would be from RCTs. No direct evidence was identified.

Chain of Evidence

Indirect evidence on clinical utility rests on clinical validity. If the evidence is insufficient to demonstrate test performance, no inferences can be made about clinical utility.

Section Summary: Indeterminate or Suspicious Breast Lesions

A number of studies have evaluated the diagnostic accuracy of BSGI (or MBI) of suspicious lesions. Compared with biopsy, the NPV in studies that reported this outcome varied from 83% to 94%. The utility of BSGI in evaluating indeterminate or suspicious lesions must be compared with other modalities that would be used (e.g., spot views ultrasound, MRI) for diagnostic mammography. Given the relative ease and diagnostic accuracy of the criterion standard (biopsy), coupled with the adverse consequences of missing a breast cancer, the NPV of BSGI would have to be extremely high to alter treatment decisions. Because NPV is partially determined by disease prevalence, NPV will be lower in a population of individuals with mammographic abnormalities highly suggestive of breast cancer than in a population of individuals with mammographic abnormalities not suggestive of breast cancer. Therefore, any clinical utility of BSGI as an adjunct to mammography would vary by type of mammographic abnormalities included in the studies.

Detection of Residual Tumor After Neoadjuvant Therapy

The following PICO was used to select literature to inform this review.

Populations

The relevant population of interest is individuals with breast cancer undergoing an evaluation to detect any residual tumor tissue following neoadjuvant therapy.

Interventions

The imaging techniques being considered in this review are scintimammography and BSGI.

These procedures use radiotracers, which are injected intravenously, followed by nuclear imaging, to detect abnormalities of the breast. Scintimammography uses planar imaging with the individual lying prone and the camera positioned laterally. If the area of interest includes the axilla, the camera can be positioned to include the axilla. During BSGI, the individual is seated in a position similar to mammography, and the breast is lightly compressed. The differences between these techniques are the number and type of detectors used in the camera.

Comparators

The following tests and practices are currently being used by indication to make decisions about individuals with breast cancer undergoing screening to detect any residual tumor tissue following neoadjuvant therapy: MRI, fluorine 18 fluorodeoxyglucose positron emission tomography, or ultrasonography.

Outcomes

The general outcomes of interest are OS, disease-specific survival, test validity, and treatment-related morbidity.

True-positives can inform surgical and other management decisions.

False-positives may lead to unnecessary treatment.

True-negatives can inform surgical and other management decisions.

False-negatives may result in incorrect treatment decisions.

For individuals already diagnosed with breast cancer who are using the tests to guide treatment decisions, years of follow-up are necessary to capture recurrence rates and survival rates.

Study Selection Criteria

For the evaluation of the clinical validity of gamma imaging for detection of residual tumor after neoadjuvant therapy, studies that met the following eligibility criteria were considered:

- Reported on the accuracy of the marketed version of the technology (including any algorithms used to calculate scores)
- Included a suitable reference standard (describe the reference standard)
- Patient/sample clinical characteristics were described
- Patient/sample selection criteria were described.

Review of Evidence

Systematic Reviews

A systematic review and meta-analysis by Guo et al (2016) identified 14 studies investigating the performance of BSGI with Tc 99m for evaluating the response to neoadjuvant therapy in patients with breast cancer. In all studies, histopathologic results were obtained after surgery and used as the criterion standard. Study sizes ranged from 14 to 122 patients (N=503 patients). Most studies had fewer than 30 patients. Thirteen studies were prospective and 1 was retrospective. Only 3 studies conducted BSGI both before and after treatment. The sensitivity of BSGI for identifying residual disease ranged from 33% to 100%, with a pooled sensitivity of 86% (95% CI, 78% to 92%). The specificity ranged from 17% to 95%, and the pooled specificity was 69% (95% CI, 64% to 74%).

Retrospective Studies

The largest study included in the Guo et al (2016) systematic review is the retrospective and single-center study by Lee et al. (2014). It evaluated BSGI detection of residual tumor after neoadjuvant chemotherapy (primarily anthracycline and taxane-based) in 122 women who had pathologically confirmed invasive breast cancer. All patients underwent BSGI and dynamic contrast-enhanced breast MRI after completing neoadjuvant therapy. Surgeons consulted BSGI and MRI for surgical planning (i.e., either breast-conserving therapy [64%] or mastectomy [36%]). Of 122 patients, 104 (85%) had residual disease by pathologic review. Breast-specific gamma imaging sensitivity was 74%, specificity was 72%, NPV was 33%, and PPV was 94%. The sensitivity of BSGI varied by cellularity and size of residual tumor (greater sensitivity with greater cellularity and greater tumor size).

No studies were identified that compared imaging methods (e.g., BSGI vs. MRI or fluorine 18 fluorodeoxyglucose positron emission tomography) for detection of residual tumor after neoadjuvant therapy. In addition, no studies were identified on the clinical utility of BSGI (i.e., changes in patient management strategies, such as the extent of surgery) or in health outcomes (e.g., disease-specific survival).

Section Summary: Detection of Residual Tumor After Neoadjuvant Therapy

A systematic review of studies evaluating BSGI for detecting residual tumor after neoadjuvant therapy found a pooled sensitivity of 86% and a pooled specificity of 69%, compared with histopathologic analysis. No studies were identified that compared the diagnostic accuracy of BSGI with other imaging approaches, or that investigated the impact of BSGI on individual management decisions or health outcomes.

Disease Detection During Preoperative Planning for Breast-Conserving Surgery

The following PICO was used to select literature to inform this review.

Populations

The population of interest is individuals with breast cancer undergoing preoperative planning to determine eligibility for breast-conserving surgery.

Interventions

The imaging techniques being considered in this review are scintimammography and BSGI (see explanation under the previous indication). These interventions assess breast tumor characteristics to determine whether breast-conserving surgery is appropriate or whether a mastectomy is required to obtain adequate margins.

Comparators
The following tests and practices are currently being used by indication to make decisions about individuals with breast cancer undergoing planning for breast-conserving surgery: MRI.

Outcomes
The general outcomes of interest are OS, disease-specific survival, test validity, and treatment-related morbidity.

True-positives can inform surgical and other management decisions.

False-positives may lead to unnecessary treatment.

True-negatives can inform surgical and other management decisions.

False-negatives may result in incorrect treatment decisions.

For individuals already diagnosed with breast cancer who are using the tests to guide treatment decisions, years of follow-up are necessary to capture recurrence rates and survival rates.

Study Selection Criteria
For the evaluation of clinical validity of the gamma imaging for disease detection during preoperative planning for breast-conserving surgery, studies that meet the following eligibility criteria were considered:

- Reported on the accuracy of the marketed version of the technology (including any algorithms used to calculate scores)
- Included a suitable reference standard
- Patient/sample clinical characteristics were described
- Patient/sample selection criteria were described.

Clinically Valid
A test must detect the presence or absence of a condition, the risk of developing a condition in the future, or treatment response (beneficial or adverse).

No studies were identified evaluating the clinical validity of gamma imaging for disease detection during preoperative planning for breast-conserving surgery.

Clinically Useful
A test is clinically useful if the use of the results informs management decisions that improve the net health outcome of care. The net health outcome can be improved if patients receive correct therapy, more effective therapy, or avoid unnecessary therapy or testing.

Direct Evidence
Direct evidence of clinical utility is provided by studies that have compared health outcomes for patients managed with and without the test. Because these are intervention studies, the preferred evidence would be from RCTs.

Edwards et al (2013) retrospectively assessed changes in the surgical management of 218 women who had breast cancer and were eligible for breast-conserving therapy. All patients had undergone preoperative BSGI or MRI. Twelve percent of patients who had BSGI and 29% of those who had MRI changed to mastectomy. On pathologic review, no patient who underwent a mastectomy was eligible for breast-conserving therapy. Of patients who received breast-conserving therapy, 15% of those who had

BSGI and 19% of those who had MRI required a single re-excision because of positive surgical margins, and 14% and 6%, respectively, required a mastectomy. Based on this retrospective study, the clinical utility of BSGI for guiding surgical decision making in breast cancer patients would appear limited.

Chain of Evidence

Indirect evidence on clinical utility rests on clinical validity. If the evidence is insufficient to demonstrate test performance, no inferences can be made about clinical utility.

Section Summary: Preoperative Planning for Breast-Conserving Surgery

One retrospective study is insufficient to determine the clinical utility of BSGI for guiding surgical decision making in breast cancer individuals. In this study, results suggested that MRI identified more individuals who were not appropriate candidates for breast-conserving therapy than BSGI. Prospective comparative studies are needed.

Scintimammography, Breast-Specific Gamma Imaging (BSGI), and Radiopharmaceutical or Gamma Detection to Inform Treatment

Clinical Context and Test Purpose

One purpose of scintimammography, BSGI, and radiopharmaceutical or gamma detection is to inform a treatment plan for individuals diagnosed with breast cancer. This review evaluates the use of these procedures among individuals with breast cancer undergoing screening to detect axillary metastases including those undergoing SLN biopsy.

The following PICO was used to select literature to inform this review.

Detection of Axillary Metastases

The following PICO was used to select literature to inform this review.

Populations

The population of interest is individuals with breast cancer undergoing evaluation to detect axillary metastases.

Interventions

The imaging techniques being considered in this review are scintimammography and BSGI (see explanation under the third indication).

Comparators

The following tests and practices are currently being used by indication to make decisions about individuals with breast cancer undergoing evaluation to detect any axillary metastases: surgical node dissection.

Outcomes

The general outcomes of interest are OS, disease-specific survival, test validity, and treatment-related morbidity.

True-positives can inform surgical and other management decisions.

False-positives may lead to unnecessary treatment.

True-negatives can inform surgical and other management decisions.

False-negatives may result in incorrect treatment decisions.

For individuals already diagnosed with breast cancer who are using the tests to guide treatment decisions, years of follow-up are necessary to capture recurrence rates and survival rates.

Study Selection Criteria

For the evaluation of gamma imaging for the detection of axillary metastases, studies that met the following eligibility criteria were considered:

- Reported on the accuracy of the marketed version of the technology (including any algorithms used to calculate scores)
- Included a suitable reference standard (describe the reference standard)
- Patient/sample clinical characteristics were described
- Patient/sample selection criteria were described.

Review of Evidence

Systematic Reviews

Regarding the use of scintimammography to detect axillary metastases, a meta-analysis reviewed 45 studies of scintimammography and also reported summary estimates of 83% (95% CI, 82% to 84%) for sensitivity and 85% (95% CI, 83% to 86%) for specificity. In a review of studies published between 1994 and 1998, Taillefer (1999) showed a sensitivity of 77% and a specificity of 89%.

Case Series

Several case series using different radiopharmaceuticals have shown sensitivities in the high 80% to 90% range.

Section Summary: Detection of Axillary Metastases

Current evidence on BSGI for detection of axillary metastases includes small studies and systematic reviews of these studies. A meta-analysis of 45 small studies found that pooled sensitivity was 93% and pooled specificity was 85%. The test is not accurate enough to replace surgical nodal dissection. No studies have examined patient outcomes comparing the use of scintimammography to aid in decision making regarding nodal dissection with going directly to nodal dissection.

SUPPLEMENTAL INFORMATION

The purpose of the following information is to provide reference material. Inclusion does not imply endorsement or alignment with the evidence review conclusions.

Practice Guidelines and Position Statements

Guidelines or position statements will be considered for inclusion in ‘Supplemental Information' if they were issued by, or jointly by, a US professional society, an international society with US representation, or National Institute for Health and Care Excellence (NICE). Priority will be given to guidelines that are informed by a systematic review, include strength of evidence ratings, and include a description of management of conflict of interest.

American College of Obstetricians and Gynecologists (ACOG)

In 2021, the American College of Obstetricians and Gynecologists reaffirmed its 2011 practice bulletin on Breast Cancer Assessment and Screening in Average-Risk Women. There was no discussion or recommendation for scintimammography or any other gamma imaging techniques for routine screening.

American College of Radiology (ACR)

Appropriateness Criteria from the American College of Radiology rated molecular breast imaging (MBI) a 3 (indicating "usually not appropriate" for breast cancer screening), in patients with high or intermediate breast cancer risk (last reviewed in 2025), palpable breast masses (last reviewed in 2022), and workup of breast pain (last reviewed in 2018). Guidelines on screening for breast cancer in above average-risk patients (last reviewed in 2018) do not recommend the use of molecular breast imaging (MBI) for breast cancer screening in any higher-risk population. The guidelines state, “further advances in detector technology to allow lower dosing, more widespread penetration of MBI-guided biopsy capabilities, and additional large prospective trials (to include incidence screening results) will be needed before MBI can be embraced as a screening tool, even in women at elevated risk.” In a 2024 guideline for supplemental breast cancer screening based on breast density, MBI is categorized as "usually not appropriate" regardless of breast density and breast cancer risk.

National Comprehensive Cancer Network (NCCN)

The National Comprehensive Cancer Network's guidelines (v.4.2025) on breast cancer treatment screening and diagnosis include the following relevant recommendations: “There is emerging evidence that contrast-enhanced mammography (CEM) and molecular breast imaging (MBI) may improve detection of early breast cancers among females with mammographically dense breasts but may increase recalls and benign breast biopsies. CEM carries a risk of iodinated contrast reactions, though a systematic review revealed a pooled rate of adverse events of only 0.82%. CEM also has a higher breast radiation exposure per exam than standard mammography, though the radiation dose remains below the dose limits set by the FDA for standard mammography. Additionally, MBI has a whole-body effective radiation dose higher than that of mammography."

"Consider contrast-enhanced mammography (CEM) or molecular breast imaging (MBI) whole breast ultrasound for those who qualify for but cannot undergo MRI. Whole breast ultrasound may be done if contrast-enhanced imaging or functional imaging is not available/accessible."

Supplemental Screening Modalities (BSCR-A, page 2)

- "For individuals at high-risk for breast cancer, based on current evidence and considering the FDA safety announcement (gadolinium-based contrast agents), the panel continues to recommend annual MRI in combination with annual screening mammography with tomosynthesis after shared decision-making.
- Supplemental screening with breast MRI with and without contrast, abbreviated MRI with and without contrast, ultrasound, MBI, or CEM can increase cancer detection rates but may increase recalls and benign breast biopsies.
- CEM and MBI are also options for higher risk breast cancer screening. CEM has the risk of iodinated contrast reactions and has a higher breast radiation exposure per exam than standard mammography. MBI has a whole-body effective radiation dose substantially higher than that of mammography.
- In individuals with dense breasts, supplemental screening MBI has similar sensitivity but improved specificity and recall rate compared to ultrasound. However, MBI has a whole-body effective radiation dose higher than standard mammography.

Ongoing and Unpublished Clinical Trials

Some currently ongoing and unpublished trials that might influence this review can be located at clinicaltrials.gov.

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CODES

To report provider services, use appropriate CPT codes, HCPCS codes, Revenue codes, and/or ICD diagnosis codes.

Codes	Number	Description
CPT		
	78800	Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); planar, single area (e.g., head, neck, chest, pelvis), single day imaging
	78801	Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); planar, 2 or more areas (eg, abdomen and pelvis, head and chest), 1 or more days imaging or single area imaging over 2 or more days
	78999	Unlisted miscellaneous procedure, diagnostic nuclear medicine
HCPCS		
	A9500	Technetium tc-99m sestamibi, diagnostic, per study dose
	S8080	Scintimammography (radioimmunoscintigraphy of the breast), unilateral, including supply of radiopharmaceutical
Type of Service		
	Radiology	
Place of Service		
	Outpatient/ Inpatient	

POLICY HISTORY

Date	Reason	Action
November 2025	Annual Review	Policy Renewed
November 2024	Annual Review	Policy Renewed
November 2023	Annual Review	Policy Renewed
July 2023	Annual Review	Policy Revised
July 2022	Annual Review	Policy Revised
July 2021	Annual Review	Policy Revised
July 2020	Annual Review	Policy Renewed
July 2019	Annual Review	Policy Renewed
July 2018	Annual Review	Policy Renewed
July 2017	Annual Review	Policy Revised
July 2016	Annual Review	Policy Revised
August 2015	Annual Review	Policy Revised
October 2014	Annual Review	Policy Revised
October 2013	Annual Review	Policy Renewed
June 2013	Interim Review	Policy Revised
December 2012	Annual Review	Policy Renewed
December 2011	Annual Review	Policy Renewed
June 2010	Annual Review	Policy Renewed

New information or technology that would be relevant for Wellmark to consider when this policy is next reviewed may be submitted to:

Wellmark Blue Cross and Blue Shield
Medical Policy Analyst
PO Box 9232
Des Moines, IA 50306-9232

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