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BEST PRACTICES IN MOLECULAR BREAST IMAGING: A GUIDE FOR TECHNOLOGISTS

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Abstract

Molecular breast imaging (MBI) technologists are required to possess a combination of nuclear medicine skills and mammographic positioning techniques. Currently, no formal programs offer this type of hybrid technologist training. The purpose of this perspective is to provide a best practices guide for technologists performing MBI. Familiarity with best practices may aid in obtaining high-quality MBI examinations by decreasing the likelihood of image artifacts, positioning problems and other factors that contribute to false negative or false positive findings.

Introduction

Molecular breast imaging, or MBI, is a promising nuclear medicine technique shown to have value in detecting cancer occult on conventional technologies of mammography and ultrasound. Interest in MBI is growing due to recent clinical trials showing that adding MBI to mammography increases cancer detection over mammography alone in women with dense breasts (*1,2*). Although MBI has been used as a general term to describe several types of nuclear medicine systems to image the breast (*3*), in this work we refer to MBI as a dedicated gamma camera for imaging single-photon emitters. As MBI is a relatively new technology, there is considerable variation in its use in clinical practice and literature provides little guidance for technologists performing this modality.

MBI is unique in that a combination of nuclear medicine skills and mammographic positioning techniques are essential to obtain a successful exam. Nuclear medicine training, which includes knowledge of gamma camera operations, proper injection technique, safe handling of radiopharmaceuticals, and radiation safety considerations, are typically required per state regulations for technologists performing nuclear medicine examinations. Training in proper mammographic positioning is also important, as poor positioning of the breast may result in non-visualization of cancers not included in the imaging field of view (*4,5*). Thus, knowledge of both modalities is required for high quality MBI examinations.

At present, there is an educational gap for hybrid imaging technologies across radiology, specifically with regard to PET/CT and PET/MR(*6*). MBI also falls into this hybrid category, and currently there are no formal education programs offering this training for MBI technologists. Our institution has been performing MBI since 2004, with over 6000 exams performed to date.

In this time, we have uncovered several key factors that impact image quality. The purpose of this perspective is to provide a best practices guide for technologists performing MBI.

Quality Control

Quality control of the imaging system should be performed daily to ensure the MBI equipment is operating properly. A daily uniformity flood should be conducted prior to patient use. Due to the inability to exchange collimators on the MBI systems, the daily uniformity flood is always acquired extrinsically. Per NEMA (National Electrical Manufacturers Association) specifications, integral uniformity should be less than or equal to 5%(*7*). Uniformity calibrations should be performed when integral uniformity is out of range, per manufacturer recommendations. Daily uniformity floods should be repeated following calibrations to ensure uniformity falls within range.

Pre-Exam Preparation

The first step to obtaining a high-quality MBI examination is adequate technologist preparation. Prior to imaging, the technologist can prepare by reviewing the patient's breast health history, including prior breast biopsy and surgical history. This should also include verification of the indication for imaging. Common indications for MBI include supplemental screening for women with dense breast tissue (95% of our practice), problem solving for indeterminate imaging findings, evaluation of response to neoadjuvant chemotherapy, and imaging in those who need but cannot undergo magnetic resonance imaging (MRI) due to contraindications such as a pacemaker, contrast allergy, renal failure, claustrophobia, or large

body habitus (*8-10*). The technologist should review the patient's prior mammogram and/or MBI if available for comparison.

It is important for the technologist to recognize special considerations that may adversely affect the MBI examination. MBI should not be scheduled adjacent to other nuclear medicine studies or therapies that may interfere with imaging (see Tables 1 and 2). Whenever possible, it is recommended that MBI be performed prior to biopsy to prevent post-procedure inflammatory uptake from confounding interpretation at the biopsy site (*10*). However, if MBI is performed after biopsy, the interpreting radiologist should be made aware of a recent procedure. The technologist should also be conscious of possible modifications required for breast positioning post-biopsy (described below).

The MBI detector has added dead space at the edge of the field of view in comparison to that of digital mammography (8 mm vs 4 mm, respectively). For this reason, chest wall lesions and those in the posterior axillary tail may be difficult to visualize with MBI. Taking care in positioning to include posterior tissue (described below) may help to bring a posterior lesion in the MBI camera's field of view (FOV). Additionally, certain patient conditions, such as Parkinson's disease, arm paralysis, dystonia, or other movement disorders, may make it difficult for the patient to remain comfortable and stationary, or otherwise fulfill the exam requirements. In these cases, MBI may still be performed, but the technologist should ensure that the patient and ordering provider are aware of the exam requirements. The technologist should be prepared to modify the exam (e.g. allow for extra time for additional views, request additional personnel or positioning aids such as pillows for added comfort) and communicate with both the patient and the interpreting radiologist regarding any necessary modifications.

Patient Preparation

The uptake of ^{99m}Tc sestamibi in the breast is low relative to other organs in the body, comprising less than 1% of the administered dose. The availability of uptake in the breast is dependent on blood flow to other organs such as the liver, heart, kidneys, and muscle tissue (*11*). We have previously found that fasting and warming of the upper torso to divert blood flow away from these other organs resulted in increased uptake in breast tissue (*12*). A fast of at least three hours prior to MBI is recommended, though it is not a requirement for the exam. If fasting is instructed, special considerations may need to be made for diabetic patients. Patients are encouraged to drink water to stay hydrated for injection, and may have diet soda, black coffee, and tea (with no creams or sugars). Fasting decreases the amount of hepatic blood flow, which increases the amount of Tc99m sestamibi available in the breast by approximately 25% (*12*). The patient should also be given a warm blanket to wrap around the shoulders for at least five minutes prior to injection to increase the peripheral blood flow to the upper torso which may further improve breast uptake (*12*). The patient should change into a gown, removing all clothing from the waist up, to better facilitate imaging. Deodorants, lotions, powders, and jewelry (such as necklaces) do not need to be removed for the MBI examination.

The technologist should thoroughly explain the procedure to the patient before starting the MBI exam. Patient education includes explaining the injection of ^{99m}Tc sestamibi, which rarely can have mild side effects (e.g. flushing, a rash, injection site inflammation, or a brief metallic taste (*13*)), explaining the imaging procedure, and informing the patient how they can expect to receive exam results. As with any nuclear medicine procedure, the technologist should verify two patient identifiers, such as name and date of birth, and that the patient is not pregnant or breast feeding. Patients who are breast feeding should discontinue breast feeding or discard

expressed milk according to institutional guidelines. Technologists should verify with the patient the indication for the exam, and ask the patient if there are any areas of breast concern.

If the patient reports an area of breast concern or if an area of concern is noted during the technologist's assessment of prior imaging history, the affected side should be imaged first. This yields the best likelihood that the breast of concern is imaged in the event the patient is unable to tolerate the entire exam. It is also important to identify the specific area of concern in the affected breast to confirm that it will be included in the imaging field of view. Occasionally, an additional or substitute view may be needed to include an area of concern.

Reporting of the patient's menopausal status, phase of menstrual cycle, and exogenous hormone use may aid the radiologist in image interpretation. These hormonal factors may influence background parenchymal uptake , or BPU, which describes the level of radiotracer uptake in normal fibroglandular tissue (*14,15*). In pre- and perimenopausal women, the menopausal status and last menstrual period should be reported to the radiologist interpreting the exam. Premenopausal women may benefit from scheduling imaging during days 7-14 of their menstrual cycle to decrease the likelihood that background parenchymal enhancement may impact interpretation, with the first day of the last menstrual period considered as day one. Postmenopausal status should also be reported, and can be defined as surgical sterilization (bilateral oophorectomy) or greater than one year since the last menstrual period. Recording patient use of medications that could influence background parenchymal enhancement, such as contraceptive medications, postmenopausal systemic hormone therapies (estrogens and progestogens), and anti-estrogen therapies (tamoxifen, raloxifene, and aromatase inhibitors), may also aid in interpretation.

Radiopharmaceutical Injection

The primary imaging agent used for MBI is ^{99m}Tc sestamibi. Although the exact mechanism of uptake is unknown, it is hypothesized that ^{99m}Tc sestamibi in breast tumors is relative to mitochondrial metabolism and/or the high negative membrane potential of tumor cells (*16*). For dual-head MBI systems that use semiconductor-based detectors, a prescribed activity of 300 MBq (8 mCi) has been validated in two clinical trials (*1*,*2*) and is considered to deliver a radiation dose acceptable for screening as it is below background radiation levels (*17*). Prescribed activity does not need to be adjusted based on patient weight or breast size (*18*).

^{99m}Tc sestamibi has properties that promote adhesion to the syringe surface, specifically the plunger of the syringe. For this reason, it is recommended that ^{99m}Tc sestamibi be supplied via a low-adhesion syringe to minimize residual syringe activity remaining after injection. In a previous evaluation, we compared residual activities obtained with various syringes and determined a brand that provided considerably less adhesion of sestamibi and resulted in lowest residual activity among those evaluated (DuoProSS [DPS] Meditech 3 cc, Farmingdale, NY) (*19*). For imaging practices that receive unit doses, low-adhesion syringes should be requested from the central pharmacy for all ^{99m}Tc sestamibi doses. Pre-injection activity and time of measurement, injection time, and residual activity (remaining in the syringe after injection) and time of residual measurement should be recorded to allow for calculation of the administered activity to the patient. According to previous work (*19*), the 10^{th} – 90^{th} percentile for residual activities using the recommended low adhesion brand syringe was 2.2% - 7.7%. Thus, it is suggested that if residual activities consistently exceed 7% of the dispensed activity, the prescribed activity may need to be increased to achieve the appropriate administered activity after accounting for residual losses.

The radiotracer is administered intravenously (IV) to the patient using a butterfly needle or indwelling IV catheter, followed by a 10-mL saline flush as illustrated in Figure 1. It is highly recommended to avoid using the "straight needle stick" technique for injections to both minimize risk of infiltration into the arm and allow for flushing of the syringe. Once the radiotracer is injected into the patient, the butterfly needle or indwelling catheter can be immediately removed, and the patient's injection site bandaged. All injection materials should be disposed of in a shielded radioactive sharps container with biohazard markings.

When selecting a site for venous access, the antecubital fossa is the most commonly used site. In patients with known breast cancer or those with a previous axillary lymph node dissection, the contralateral arm may be recommended. It is important to note that normal lymph nodes may have radiotracer uptake, even in the absence of infiltration. For this reason, our practice does not require the use of foot injections in cases of bilateral breast cancers, as uptake may be seen in benign lymph nodes in cases where no dose infiltration occurred.

Rarely, patients may show symptoms of a vasovagal response at the time of injection, such as vertigo, shakiness, or pale skin. If this occurs, the patient should be placed in a reclining position with their feet elevated and be given fluids. If hypoglycemia is suspected, patients may be given sugar (via juice, crackers, or other means); if possible to safely do so, sugars should be given after injection. Document any changes that fall outside of the normal patient preparation for the MBI exam.

MBI Contraindications Relative to Other Imaging Procedures

Tables 1 and 2 present guidelines for wait periods between PET, Nuclear Medicine, CT, or MRI procedures performed prior to a Molecular Breast Imaging study, and the corresponding

guidelines for wait periods between an MBI scan followed by various PET, Nuclear Medicine, CT or MRI procedures. The most common area of conflict is between an MBI study and a sentinel node study. Due to the low administered activity used for a sentinel node study (typically < 500 uCi ^{99m}Tc sulfur colloid), a time gap of at least 24 hours between the MBI and sentinel node study is recommended to ensure residual activity from the MBI study does not interfere with sentinel node localization.

While some patients have reported mild allergic reactions to some of the agents present in the sestamibi kit (*10*), there are no contraindications to the administration of sestamibi itself. Sestamibi is administered at a tracer dose level (maximal dose < 1 mg), not at a pharmacological dose level. Pharmacologic effects have been reported to occur at doses >600 times the maximal dose used in clinical studies (*10*).

Imaging

Because ^{99m}Tc sestamibi is rapidly cleared from the bloodstream [within 2-3 minutes (*11*)] and is largely taken up by first-pass extraction with minimal redistribution (*20*), breast imaging may begin within 5 minutes after injection. Minor delays between injection and imaging are not problematic as ^{99m}Tc sestamibi uptake stays relatively constant in the breast over the exam duration with minimal washout over 1 hour (*21*).

For the MBI exam, the patient is seated in an imaging chair. It is recommended to have a specialized mammography chair with wheels which lock in place and an adjustable back rest that can push forward or recline (JZ Imaging and Consulting, Willoughby, OH). The patient should be instructed to sit as far back in the chair as possible, and to sit up straight with relaxed

shoulders. The chair should be guided to the camera so the patient's breast is centered in the FOV.

A standard MBI examination comprises bilateral craniocaudal (CC) and mediolateral oblique (MLO) views. In our practice, views are typically acquired for 10 minutes per view, although other practices have reported using shorter acquisition times (*22*). It is recommended that technologists have hands-on training in at least 25 mammography exams before performing MBI, as the landmarks for breast positioning remain the same as mammography (*23*). If training in mammography is not feasible, an alternative approach would be to perform at least 25 MBI exams with an experienced MBI technologist. If applicable, begin imaging on the side of the affected breast as previously suggested.

For the CC view, the camera is positioned at 0°. The patient should rest their arms comfortably in their lap to keep their shoulders relaxed. The breast is positioned on the camera as follows. Placing your hand under the breast at the level of the inframammary fold (IMF), lift the breast slightly until the nipple extends out at a level perpendicular to the chest wall. Raise or lower the camera height to meet the elevated IMF. Using both hands, pull the breast tissue onto the camera, while simultaneously having the patient lean towards the camera. The CC view should include the breast tissue from the medial cleavage to meet the axilla laterally, while keeping the nipple in profile. If the nipple is not in profile, adjust the machine height accordingly; the nipple will typically be positioned in the direction of any missing breast tissue (i.e. if the nipple is positioned underneath the breast, the inferior breast tissue is likely not fully included). If uncorrectable, as can be common in patients with prior breast surgery, report this anomaly to the radiologist prior to interpretation as it may create the appearance of a pseudolesion. While pulling the lateral aspect of the breast forward, slowly apply compression,

enough so that the breast remains immobilized but the patient can remain comfortable for the duration of the acquisition. Patients who have undergone a recent breast biopsy may tolerate less compression. Figure 2 illustrates proper breast positioning of the CC view, while Figure 3 illustrates improper breast positioning of the CC view.

For the MLO view, the camera will be at approximately 45° with the patient's arm resting on top of the camera. Typically, patients with a longer trunk and smaller breasts require a steeper angle while patients with a shorter trunk and larger breasts require a lesser angle. Positioning for the MLO view is done as follows. From behind the patient, match the detector angle with the angle of the pectoral muscle. Next, guide the pectoral muscle and shoulder into the camera so that the patient's axilla is flush with the detector, with no gaps between the detector and the chest. From the front of the patient, guide the breast tissue between the detectors while having the patient lean into the camera. Pull the breast up, so that the nipple again extends perpendicular to the chest wall, and out away from the chest to open the IMF. The camera height should be adjusted so that axillary tissue, the bottom of the breast, and IMF can be included in the FOV. While keeping the nipple in profile, slowly apply compression to immobilize the breast. If the compression hits the patient's shoulder before the IMF, remind the patient to relax their shoulder and if this attempt is not successful, increase the camera angle by a few degrees. Larger habitus patients may need to have the chair slightly pulled away from the camera and require further leaning by the patient to keep the abdominal tissue out of the FOV. Figure 4 illustrates proper breast positioning of the MLO view, while figure 5 illustrates improper breast positioning of the MLO view.

Breast positioning should be similar to mammography standards to ensure maximal breast visualization, with the exception of the compression force utilized (MBI recommended

maximum: 67 Newtons [15 lbs]; mammography recommended maximum: 51-158 Newtons [11-36 lbs]). The patient's most recent mammography images should be utilized to aid in proper breast positioning with recognition that the increased dead space and decreased compression force of MBI may make the breast appear slightly different. The CC view should demonstrate from cleavage to where the lateral breast meets the axilla, and the MLO view should include the pectoralis muscle with an open IMF (Figure 6). The pectoralis muscle does not always have avid ^{99m}Tc sestamibi uptake, which makes comparison imaging helpful for assessing positioning. Radioactive markers used to indicate laterality should be used to label each acquisition.

The patient's back should be supported with pillows to prevent motion artifacts (Figure 2E). Movement of the breast during the acquisition results in a blurred image. While small amounts of motion may not be detected, significant motion will show a blurred edge to the breast tissue (Figure 7). During imaging, the patient's torso should remain motionless, but the patient may move their head as needed and breathe normally. Images with visible motion should be repeated. Offering entertainment, such as a television show to watch, is a helpful distraction for patients to help pass the time during imaging.

Common Variants

The typical detector size of MBI gamma cameras is 20 x 16 cm or 24 x 16 cm, compared to 24 x 29 cm for mammography. This smaller size of MBI detectors may make it necessary to perform tiled MLO views if the breast size exceeds the FOV (Figure 8). In order to minimize exam duration, in our practice we acquire bilateral MLO images of the superior and inferior breast tissue in place of the standard bilateral CC and MLO views for patients who require tiled views (Figure 8). If an area of uptake is seen on the MLO views, an additional CC view of the

area of uptake is acquired to help the radiologist determine the location of the lesion. When performing tiled views, it is important to include the nipple in at least one view.

The MBI protocol for patients with breast implants does not change from the standard bilateral CC and MLO views. Unlike mammography, MBI does not require additional imaging with implant-displaced views. Implants typically appear photopenic on the MBI exam (Figure 8). Often, breast implants are better visualized on the lower detector views because the implants are positioned closer to the lower detector, whereas the implants are positioned further from the upper detector.

Patients with pacemakers can also undergo MBI. Similar to breast implants, the pacemaker appears photopenic and is often better visualized on one detector versus the other.

Some moles have increased vascularity and therefore take up more ^{99m}Tc sestamibi in comparison to the background breast tissue. If the technologist observes a large mole or skin lesion on the breast that correlates with uptake on an MBI view, the radiologist should be notified to prevent unnecessary diagnostic work-up. Additionally, moles may need to be covered with gauze to prevent any skin tears if the positioning seems to cause unnecessary pulling in that area.

As previously mentioned, additional or substitute views may be necessary to get known lesions or breast concerns into the field of view. For lesions in the axilla, an exaggerated CC view or axillary tail view, performed per mammography guidelines (*24*), may be beneficial in providing visualization of axillary tissue. For lesions near the chest wall, an ML (mediolateral) view or a CC view with minimal immobilization may aide in better visualization of the posterior breast tissue (*9,10*).

Exam Interpretation

Image findings should be reported by a qualified physician using the standardized MBI lexicon (*25*). Some institutions may prefer the MBI exam be reviewed by a radiologist prior to patient dismissal, while this approach may not be practical for other institutional workflows such as those with large patient volumes. Our practice utilizes dedicated breast radiologists who batch read MBI along with screening mammography. Though technical recalls are uncommon for MBI exams, they may be indicated for patient motion and incomplete visualization of breast tissue (often resulting from poor positioning). Occasionally, additional views may be requested to better assess an area of uptake. Where possible, the patient should be recalled the same day to prevent the need for a second administration of ^{99m}Tc sestamibi.

Conclusion

Our experience with MBI over the past 13 years has uncovered several factors that impact the quality of MBI exams. Best practice considerations include: proper patient preparation including fasting and warming; consideration of menstrual cycle, with scheduling during days 7-14 when possible; proper dose administration with low adhesion syringe and saline flush; and training in mammography positioning techniques to ensure optimal breast positioning. The incidence of artifacts and false negative findings may be prevented if technologists receive proper training and are familiar with MBI best practices.

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Tables

Table 1. Guidelines for wait periods between PET, Nuclear Medicine, CT, MRI procedures performed prior to a Molecular Breast Imaging exam.

Modality	Procedure	Administered dose	Recommended Wait period
CT	with or w/o contrast		no wait period
MRI	with or w/o contrast		no wait period
PET	F-18 FDG	15 mCi (555 mBq)	> 12 hours
	C-11 choline	10-20 mCi (370-740 mBq)	> 2 hours
	N-13 ammonia	10-20 mCi (370-740 mBq)	> 1 hour
NM	99mTc sestamibi administration for parathyroid or cardiac studies	10-30 mCi (370-1110 mBq)	no wait period**
	99mTc radiopharmaceuticals	>20 mCi (740 mBq)	> 24 hours
	(i.v. administration)	>10 mCi (370 mBq)	> 18 hours
		>5 mCi (185 mBq)	> 12 hours
		< 5 mCi (185 mBq)	> 6 hours
	99mTc radiopharmaceuticals (oral administration)	< 5 mCi (185 mBq)	no wait period
	I-123 based radiopharmaceuticals	>10 mCi (370 mBq)	> 2 days
	In-111 and Ga-67 based	5-10 mCi (185-370 mBq)	> 3 days
	radiopharnaceuticals	< 1 mCi (37 mBq)	> 24 hours

Note: these are general guidelines and in some cases may overestimate the wait period, depending upon the biological distribution of the radiopharmaceutical.

** in cases of prior administration of ^{99m}Tc sestamibi for cardiac or parathyroid studies, a reduced (or no dose) of ^{99m}Tc sestamibi may be used, depending on residual activity from the prior study.

Table 2. Guidelines for wait periods between a MBI scan performed prior to PET, Nuclear Medicine, CT and MRI procedures.

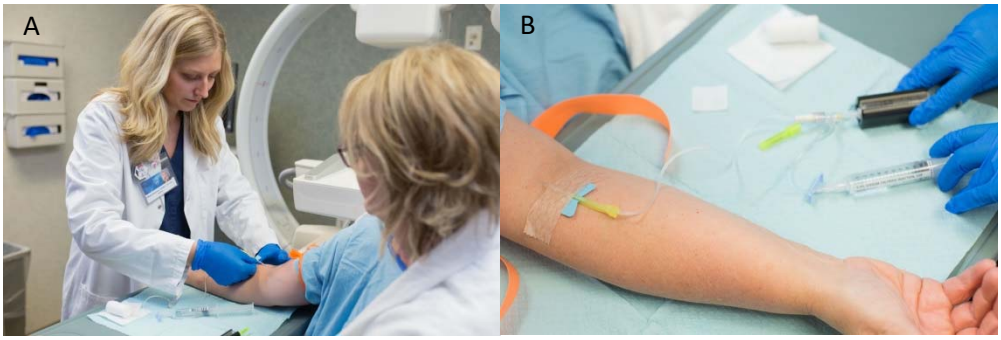
Modality	Procedure	Administered dose	Recommended Wait period
CT	with or w/o contrast		no wait period
MRI	with or w/o contrast		no wait period
PET	all radiopharmaceuticals		no wait period
NM	99mTc sestamibi administration for parathyroid or (cardiac rest only) studies	10-30 mCi (370-1110 mBq)	no wait period**
	99mTc radiopharmaceuticals	>20 mCi (740 mBq)	> 12 hours
	(i.v.and oral administration)	>10 mCi (370 mBq)	> 24 hours
		>5 mCi (185 mBq)	> 24 hours
		< 5 mCi (185 mBq)	> 36 hours
	99mTc sulfur colloid (sentinel node)	<500 uCi (19 mBq)	> 24 hours
	I-123 based radiopharmaceuticals	>10 mCi (370 mBq)	no wait period
		< 1 mCi (38 mBq)	> 24 hours
	In-111 and Ga-67 based Radiopharnaceuticals		no wait period

Note: these are general guidelines and in some cases may overestimate the wait period needed, depending upon the biological distribution of the radiopharmaceutical.

** May consider combining dose administration. In cases of prior administration of ^{99m}Tc sestamibi for cardiac or parathyroid studies, a reduced (or no dose) of ^{99m}Tc sestamibi may be used, depending on residual activity from the prior study.

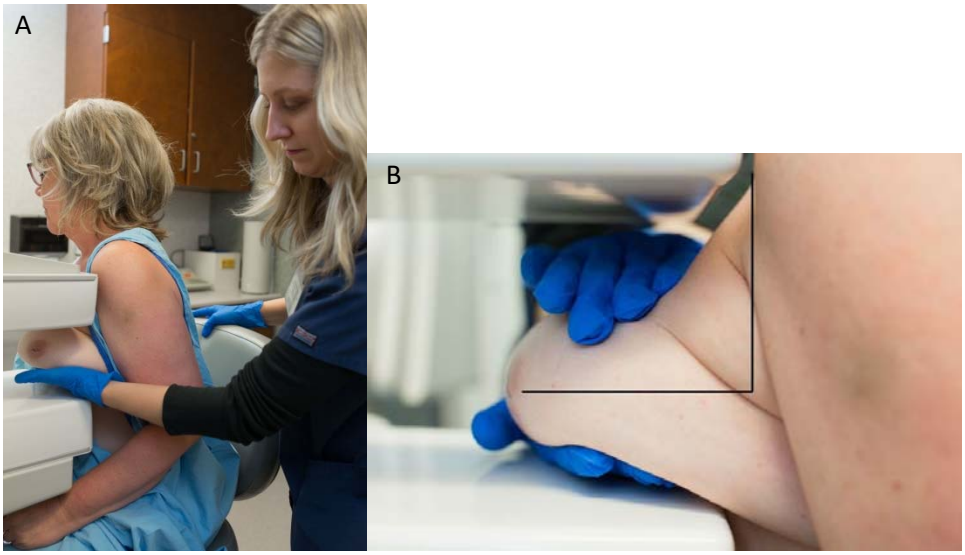
Figures

Figure 1. Injection of ^{99m}Tc sestamibi



^{99m}Tc sestamibi is administered intravenously via a butterfly needle (A). The radiotracer is supplied in a low-adhesion syringe (encased in a syringe shield) and connected to a 10cc saline flush for injection (B).

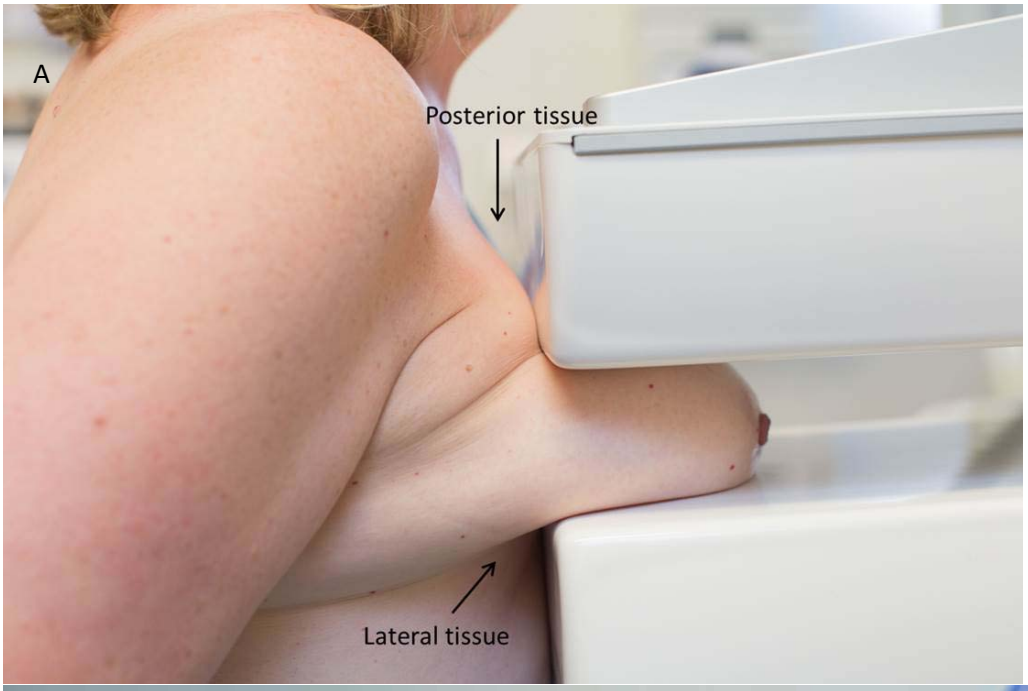
Figure 2. Proper breast positioning for the CC view

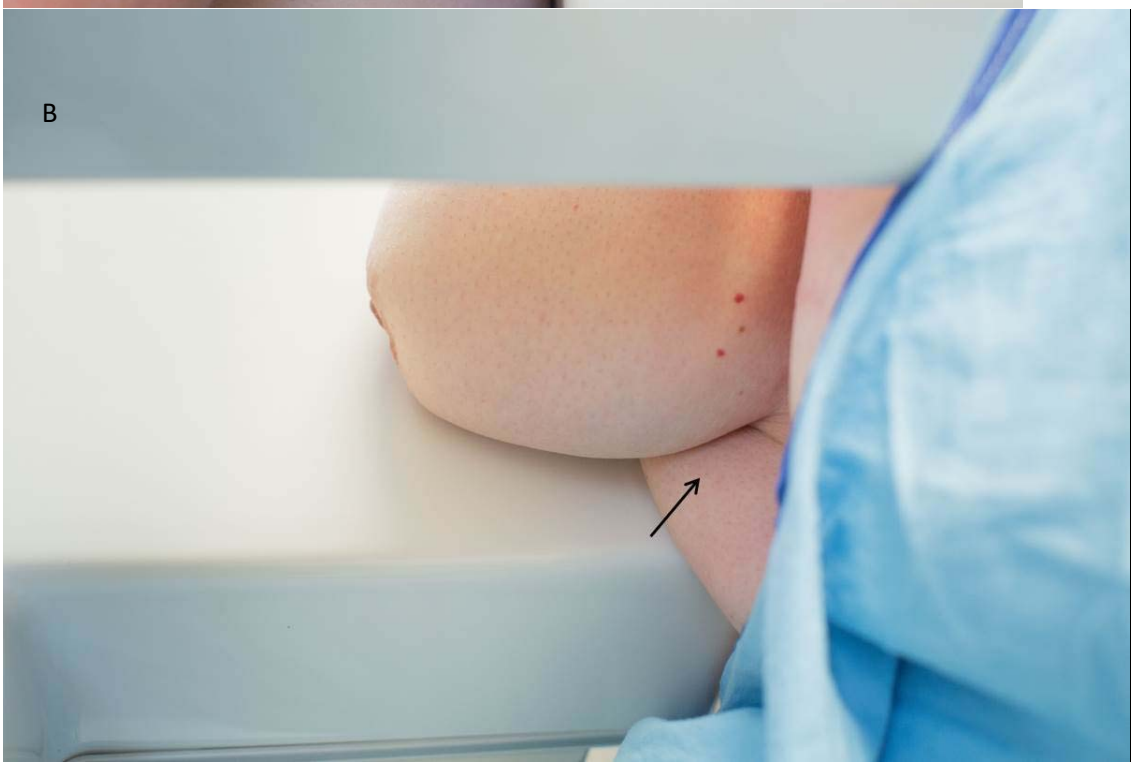


2A. Patient seated in chair with shoulder relaxed and arms resting in lap. While guiding the breast to the camera, the inframammary fold (IMF) is lifted until the nipple extends perpendicular to the chest wall. B. With the nipple extending perpendicular to the chest

wall, two hands are used to lift breast onto detector. C. The lateral aspect of the breast is pulled and anchored into the field of view while slowly applying compression. D. CC view with compression applied. E. The patient's back should be supported with pillows for added comfort and to prevent motion.

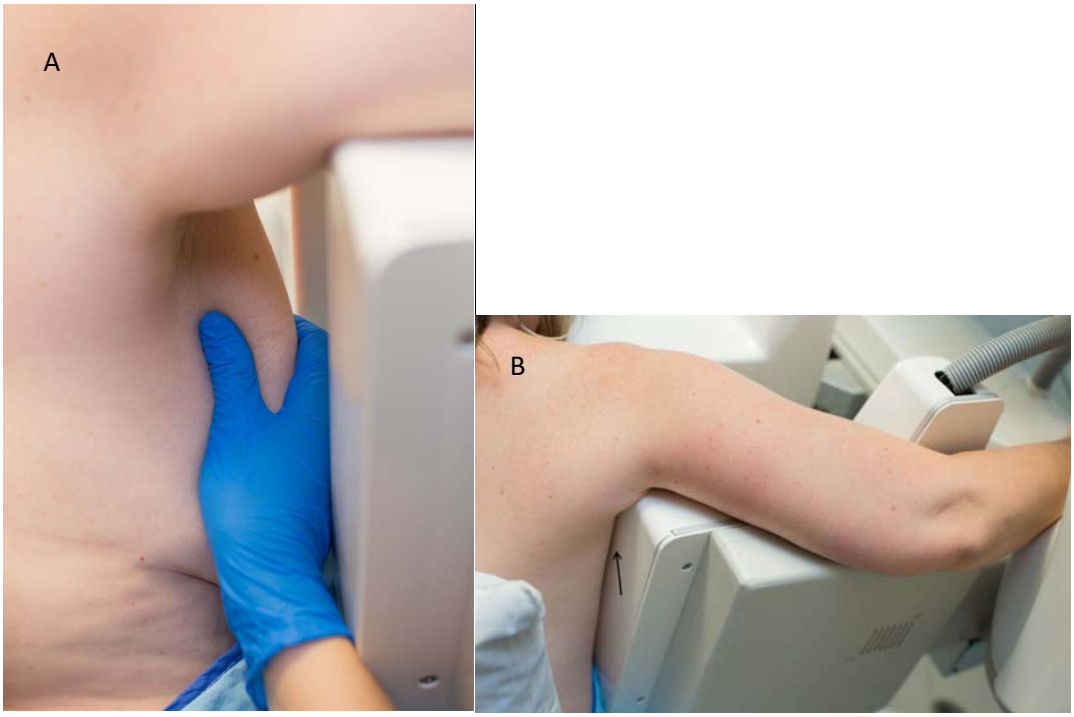
Figure 3. Improperly Positioned CC view

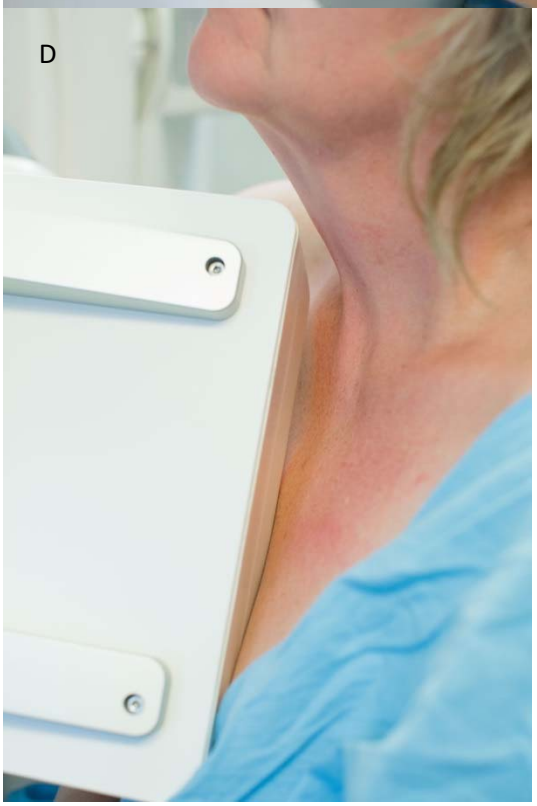




3A. The lateral breast tissue and posterior breast tissue is not fully included in the field of view on this CC view. 3B. The camera height is positioned lower than the IMF, creating a fold underneath the breast and causing the nipple to point inferiorly.

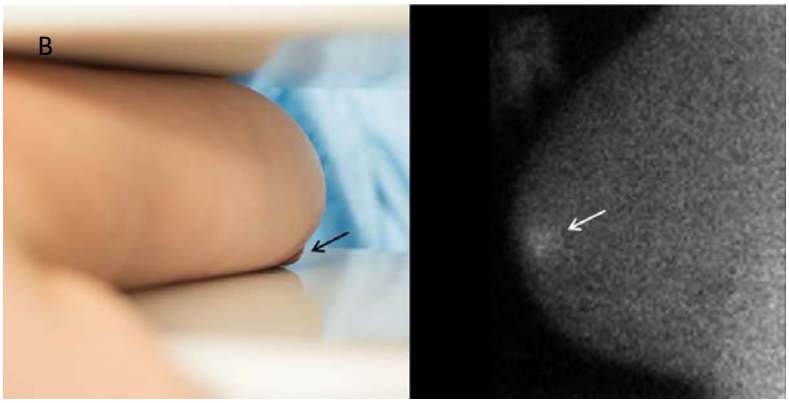
Figure 4. Proper breast positioning for the MLO view

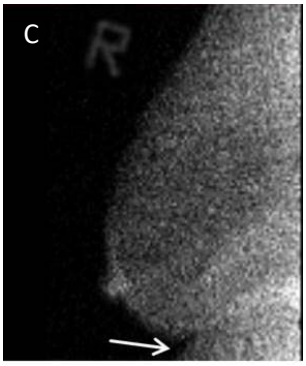




4A. The detector angle should be matched to the angle of the pectoral muscle. B. The patient's arm is positioned on top of the detector with no gaps between the detector and the chest. C. The IMF (arrow) is opened by lifting the breast up and away from the chest wall. D. Medial view of the MLO view with compression applied. There is no gap between the upper detector and the chest wall, and the corner of the detector rests below the clavicle.

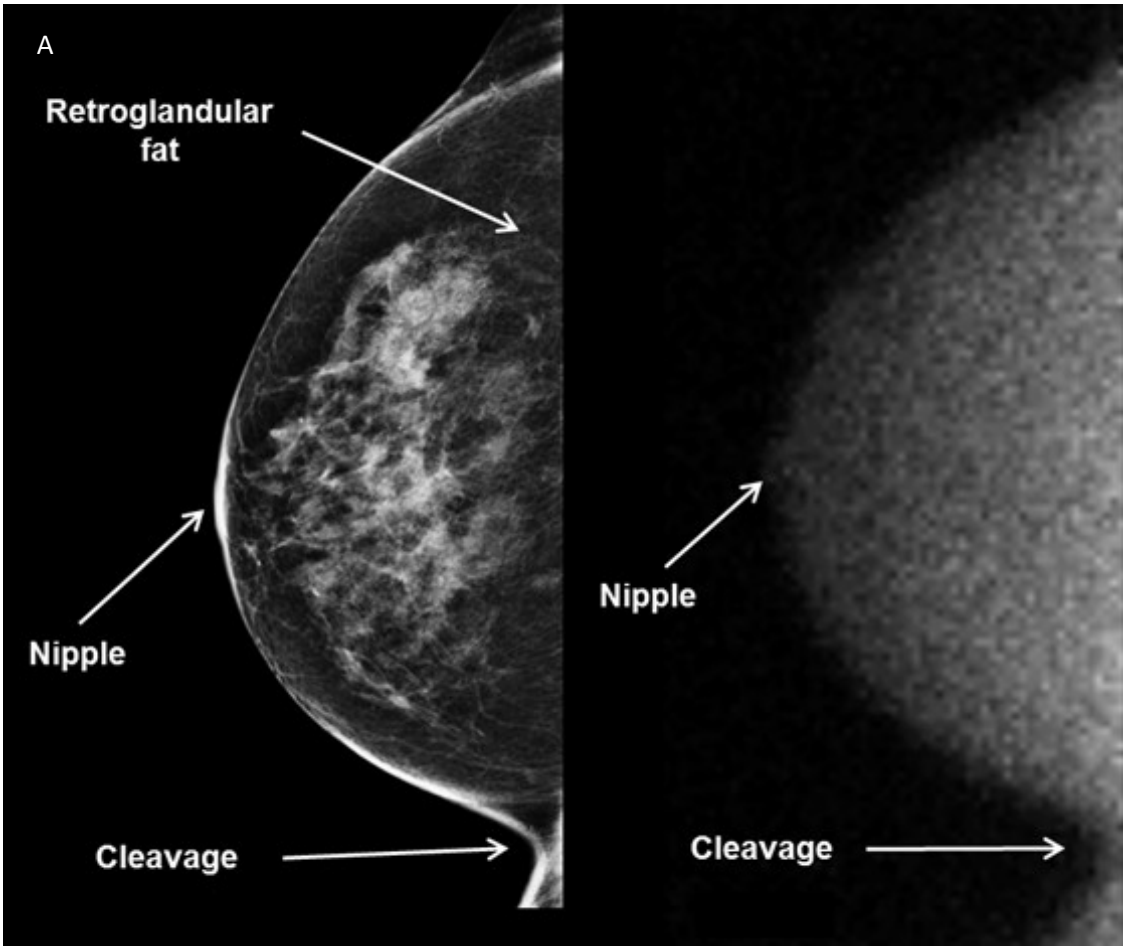
Figure 5. Improperly Positioned MLO

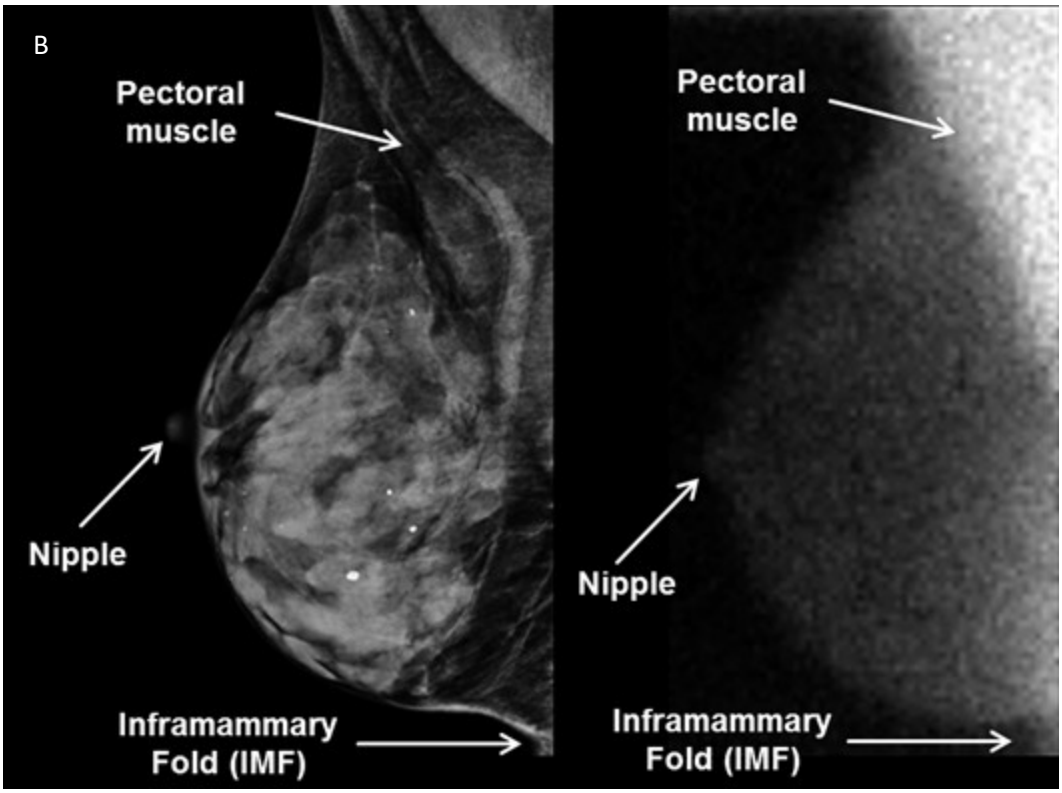




5A. Gap between the detector and the chest (arrow) indicates an improperly positioned MLO view. B. MLO view of the breast with the nipple not positioned in profile (black arrow) creates the appearance of a pseudolesion (white arrow) on the resultant image. Note the radioactive “R” marker indicating laterality. C. Patient with larger body habitus where the IMF is not open, and the abdominal tissue is included in the field of view.

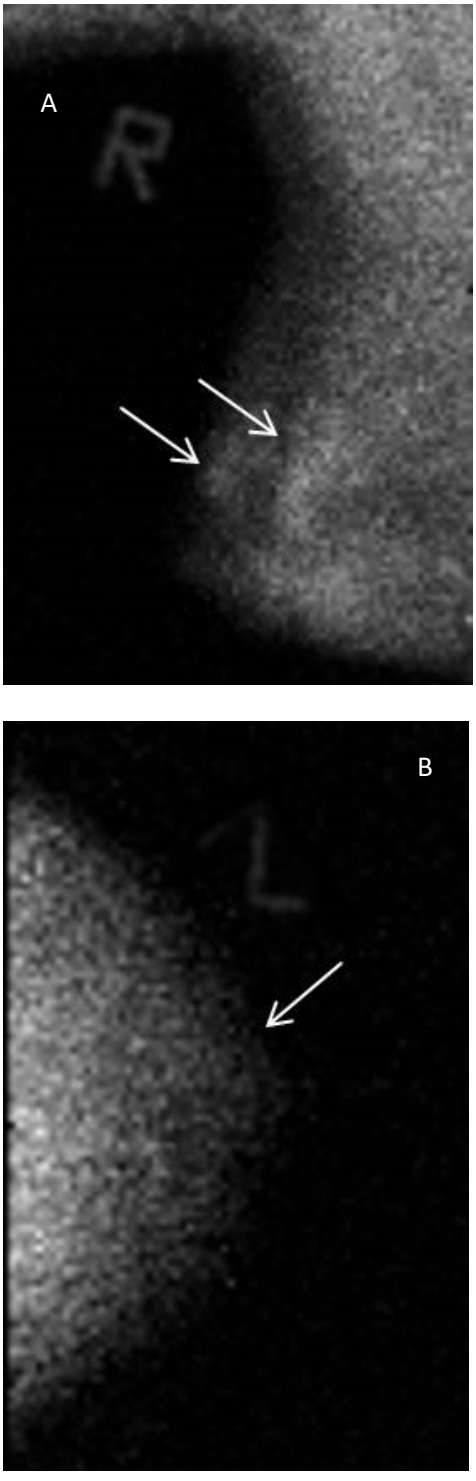
Figure 6. CC and MLO views of the breast





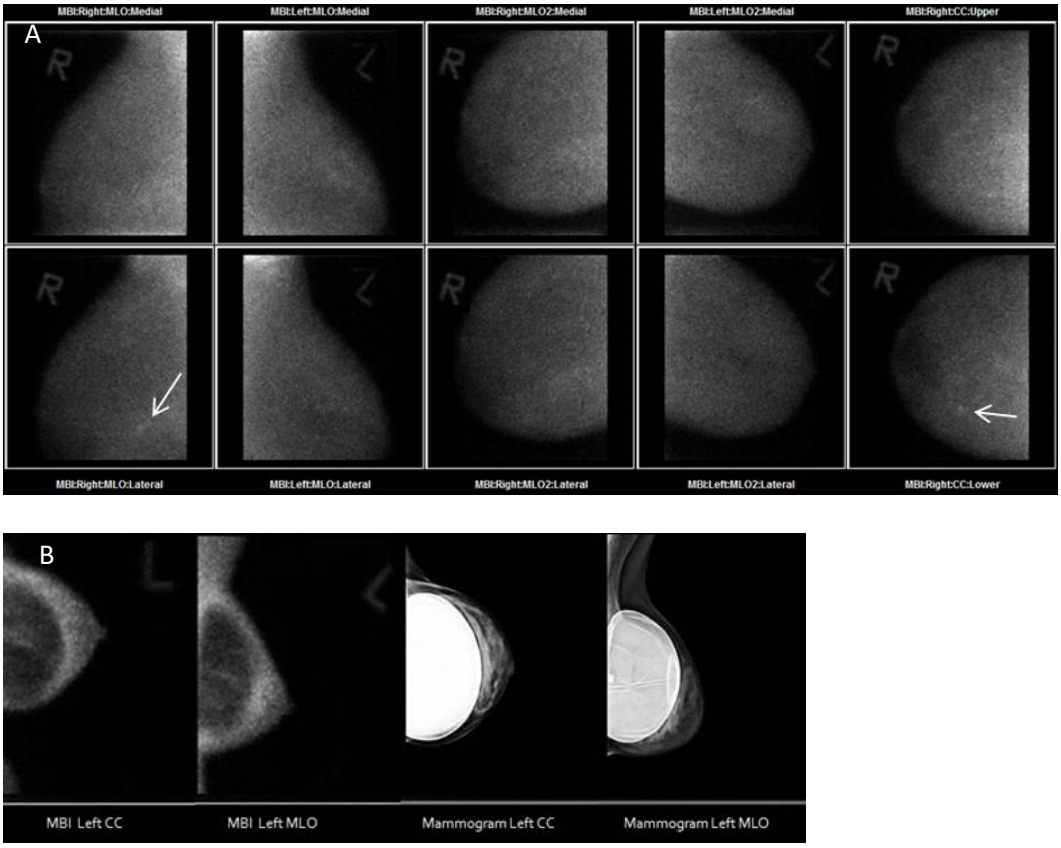
6A. Including the cleavage and all lateral breast tissue while keeping the nipple in profile indicates a properly positioned CC view on mammography and MBI. B. Pectoral muscle, nipple in profile, and open IMF indicate a properly positioned MLO view on mammography and MBI.

Figure 7. Motion on MBI views



7A. Motion on this MLO view created the appearance of two outlines of the breast. B. Movement of the breast during the acquisition will appear as a blurred edge to the breast tissue

Figure 8. Common imaging variants



8A. Tiled MLO views performed in a patient whose breast size exceeded the MBI field of view. An additional CC view was acquired to assess an area of uptake. B. Breast implants appear photopenic on MBI views.