Positioning for the CC & MLOs

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Positioning Techniques

- See one – do one – teach one
- Watch one, botch one
- 1990's – ACR Manual
- "Free for all" with FFDM/DBT

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The Miller Method™

- Consistent
- Reproducible
- Efficient
- Proficient
- Ergonomically sound

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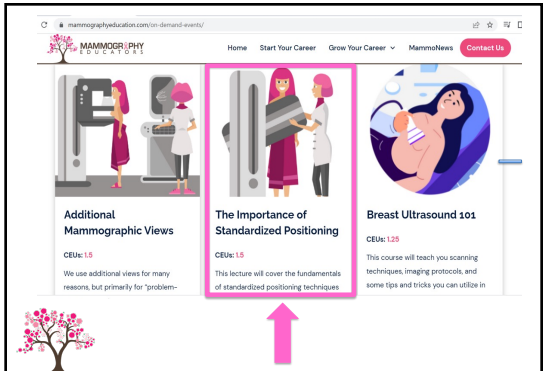

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Positioning for the Cranial Caudal (CC) View

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The CC

- Used as one of the two standard screening views
- Images the breast in the transverse/axial plane

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Criteria for the CC

- Retroglandular fat is visualized behind glandular breast tissue
- Nipple centered and in profile (if possible)
- Visualization of cleavage (deep medial and/or contralateral breast included)
- PNL measurement on the CC must be within 1cm of the PNL measurement on the MLO

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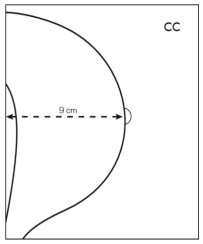
Measurement of the CC

- Measurement is made from the base of the nipple to the anterior margin of the pectoralis muscle (if visualized) OR
- The edge of the image
- Select the measurement that is the greatest



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Reasonable Expectations for the CC

	Positioning Criteria	FFDM	DBT	F/S
CC View	Pec Muscle Visualized	48%	50%	32%
	No Motion	100%	98%	-
	Lateral Glandular Tissue Included	73%	81%	37%
	Nipple in Profile	83%	85%	89%
	Skin or fat folds	39%	47%	10%
	Medial Location	16%	23%	-
	Lateral Location	29%	32%	-
	Visualization of Cleavage	41%	34%	-
	Requires More Than One View	5%	7%	-

(Huppe et al, 2017)

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The How-To

- Preparation
- Sequence
- Quick-steps

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The How-To

- **Preparation**
- Sequence
- Quick-steps

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Preparation

- **M**-achine
- **P**-atient
- **B**-reast

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Preparation

- **M**-aking
- **P**-ositioning
- **B**-etter

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Preparation

The following steps should be performed **before** starting to position the patient:

- Select the proper compression paddle size
- Machine is at 0-degree angulation
- The patient is facing the machine with feet, hips and shoulders forward and level.
- The patient should be standing back about 2" from the IR her nipple center to the IR (or as close as possible).
- **Stand on the <u>medial</u> side** of the breast to be imaged.

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Stand on the Medial Side of the Breast Being Imaged

- The technique described in this presentation and in a Society of Breast Imaging presentation (2017) is the recommended standard of care
- Allows the technologist to better visualize (be able to see and then subsequently visual on the image) the deep medial aspect of the breast

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Stand on the Medial Side of the Breast Being Imaged

- Allows you to utilize the lateral, mobile aspect of the breast
- Eliminates the need to move around the patient, thus facilitating the examination

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Stand on the Medial Side of the Breast Being Imaged

- Facilitates efficiency and proficiency
- Allows you to have better eye contact with the patient

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Stand Perpendicular to the Patient on the Medial Side of the Breast Being Imaged

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The How-To

- Preparation
- **Sequence**
- Quick-Steps

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Sequence

- LCC, RCC, RMLO, LMLO
- RCC, LCC, LMLO, RMLO

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Sequence

- Consistent
- Reproducible
- Ergonomically sound for the technologist
- Least amount of movement for the patient
- Least amount of tube adjustments

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The How-To

- Preparation
- Sequence
- **Quick-Steps**

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Quick Steps for the CC (Right)

___ 1. Elevate breast/IMF (until the PNL is perpendicular to the chest wall)
___ 2. Adjust IR height (so top edge is parallel with elevated IMF)
___ 3. Pull breast onto IR with both hands (right hand on top; left hand on bottom) At the same time ask the patient to step forward into the machine (not to lean in) and have her turn her face towards you.
___ 4. Switch hands so now left hand is on the top (palm down) and anchor the breast with the base of your left thumb.
___ 5. With your right hand lift the other breast onto IR with your right index finger in the IMF against the rib cage and your right thumb on the top of the breast. At the same time ask the patient to turn her left hip forward towards the IR.
___ 6. Guide the patient's head towards the left, forward and around the face shield if possible.
___ 7. Place your right elbow and forearm at the mid thoracic region (where her bra clasp would be) and gently push the patient forward.
___ 8. Relax her right shoulder with your right hand.
___ 9. Pull superior breast tissue forward (if possible) by "climbing" up the breast with the outer edge of your thumb and then apply compression while continuing to "push" the patient forward with your right elbow.

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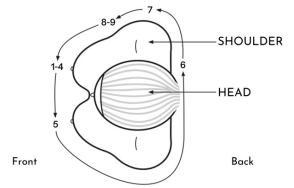
Quick Steps for the RCC

OVERHEAD VIEW



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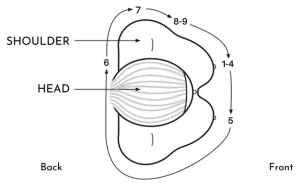
Quick Steps for the LCC

OVERHEAD VIEW



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RCC: Steps 1-9 (Front)

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Steps 1-9 (Front)

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Steps 1-9 (Back)

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Quick Steps for the CC (Right)

___ 1. Elevate breast/IMF (until the PNL is perpendicular to the chest wall)
___ 2. Adjust IR height (so top edge is parallel with elevated IMF)
___ 3. Pull breast onto IR with both hands (right hand on top; left hand on bottom) At the same time ask the patient to step forward into the machine (not to lean in) and have her turn her face towards you.

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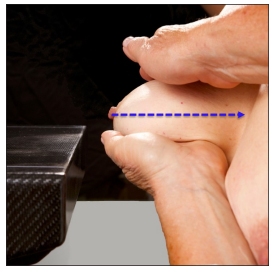
1. Elevate the breast/IMF



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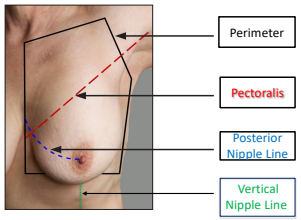
Anatomical Landmarks



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2. Adjust height of the IR

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3. Pull the breast onto the IR with both hands

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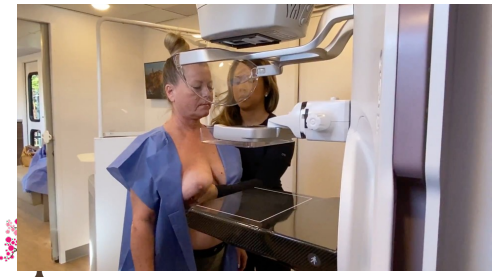
Steps 1-3 (Front)



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Steps 1-3 (Back)

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Quick Steps for the CC (Right)

___ 4. Switch hands so now left hand is on the top (palm down) and anchor the breast with the base of your left thumb.

___ 5. With your right hand lift the other breast onto IR with your right index finger in the IMF against her rib cage and your right thumb on the top of the breast. At the same time ask the patient to turn her left hip forward towards the IR.

___ 6. Guide the patient's head towards the left, forward and around the face shield if possible.

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4. Switch Hands and Anchor the Breast

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5. Lift the opposite breast onto the IR

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a. Index finger of the right hand is adjacent to the rib cage (IMF)
b. Thumb is on superior breast
c. Ask the patient to turn *her left hip toward the machine*

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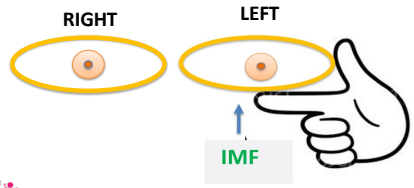
Positioning the RCC but lifting the **left** breast onto the IR



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6. Guide the patient's head forward and around the tube head

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Quick Steps for the CC (Right)

___ 7. Place your right elbow and forearm at the mid thoracic region (where\ her bra clasp would be) and gently push the patient forward.
___ 8. Relax her right shoulder with your right hand.
___ 9. Pull superior breast tissue forward (if possible) by "climbing" up the breast with the outer edge of your thumb and then apply compression while continuing to "push" the patient forward with you right elbow.

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7. Place your elbow and forearm at the mid-thoracic region of her spine and gently "push" her forward

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8. Relax patient's shoulder with your hand

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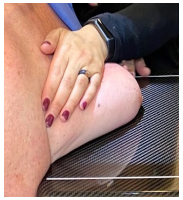
9. Use the edge of your thumb to "climb up" the chest wall to pull superior breast tissue forward and apply compression, while continuing to "push" the patient forward.

Before

After



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Steps 4-9 (Front)

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Steps 4-9 (Front Slo-Mo)

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Steps 4-9 (Back)

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What NOT to do!

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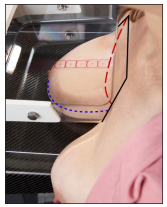
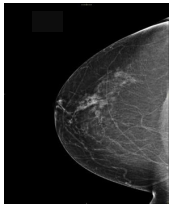
Proper Positioning of the CC





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Summary for the CC

- Proper positioning of the CC will ensure better visualization of the breast in a 2nd projection for all mammographic examinations.
- The addition of the CC view will detect approximately 16% more abnormalities than performing a single view screening exam (the MLO).

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Positioning for the Mediolateral Oblique (MLO) View

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The MLO

- Used as one of the two standard screening views.
- Images the breast in an oblique plane (vs sagittal or axial).

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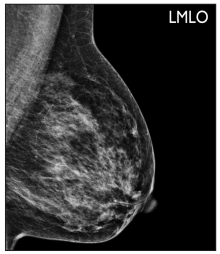
Criteria for the MLO

- Retromammary fat is visualized
- Inframammary fold is visualized and open
- Nipple is in profile (if possible)
- Visualization of the pectoralis muscle



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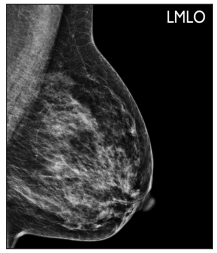
Visualization of the Pectoralis Muscle

- **Length**: From axilla down to the level of the PNL
- **Width**: Wide margin at the axilla
- **Shape**: Convex or straight in appearance
- **Exposure:** Radiolucent in appearance



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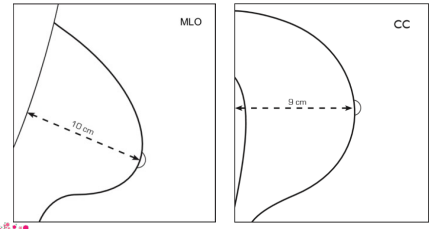
Length of the Pectoralis Muscle



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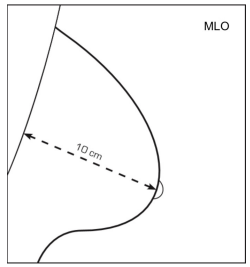
Measurement of the PNL on the MLO

- Measure from the base of the nipple to the anterior margin of the pectoralis muscle where the intersection can be measured as a 90 degree angle.



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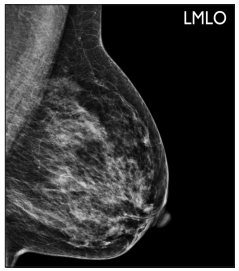
Criteria for the MLO

- Visualization of all breast tissue within the true anatomical landmarks of the breast margins, also referred to as the perimeter.
- The position of the breast is supported up and away from the thorax (not drooping) with the PNL as close to perpendicular to the chest wall as possible.



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Reasonable Expectations for the MLO

	Positioning Criteria	FFDM	DBT	F/S
MLO View	Visualization of Pec Muscle to PNL	86%	87%	81%
	Concave Pec	36%	28%	-
	Straight Pec	41%	46%	-
	Convex Pec	23%	26%	-
	Wide Margin at Top of Pec	95%	93%	-
	No Motion	98%	97%	99%
	Posterior Glandular Tissue Included	90%	94%	77%
	Nipple in Profile	89%	92%	88%
	Skin or fat folds	53%	62%	15%
	Upper Location	25%	27%	-
	Lower Location	35%	45%	-
	Visualization of Inframammary Fold	81%	85%	49%
	Requires More Than One View	13%	17%	-

(Huppe et al, 2017)

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The How-To

- Preparation
- Sequence
- Quick-steps

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The How-To

- **Preparation**
- Sequence
- Quick-steps

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Preparation

- **M**-achine
- **P**-atient
- **B**-reast

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Preparation for the MLO

The following steps should be performed **before** positioning the patient:

- The proper compression paddle size is chosen.
- The proper degree of angulation is chosen.
- The height of the IR is adjusted to the proper level.
- The patient is facing the machine with feet, hips and shoulders forward and level.
- Stand on the medial side of the breast to be imaged.

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Preparation for the MLO

The following steps should be performed **before** positioning the patient:

- **The proper compression paddle size is chosen.**
- The proper degree of angulation is chosen.
- The height of the IR is adjusted to the proper level.
- The patient is facing the machine with feet, hips and shoulders forward and level.
- Stand on the medial side of the breast to be imaged.

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Compression Paddle Size

- 18 x 24
- 24 x 30

If a 24x30 was used for the CC, if the patient has a short thorax, you may want to switch to the 18x24 for the MLO.

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Changing Compression Paddle Size

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Preparation for the MLO

The following steps should be performed **before** positioning the patient:

- The proper compression paddle size is chosen.
- **The proper degree of angulation is chosen.**
- The height of the IR is adjusted to the proper level.
- The patient is facing the machine with feet, hips and shoulders forward and level.
- Stand on the medial side of the breast to be imaged.

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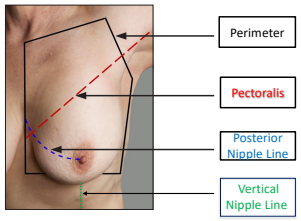
Anatomical Landmarks



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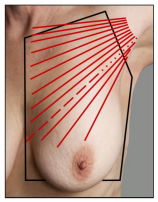
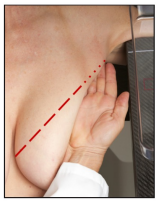
Degree of Angulation





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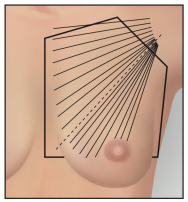
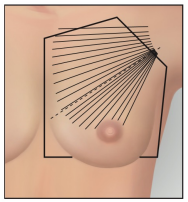
Length of the Thorax





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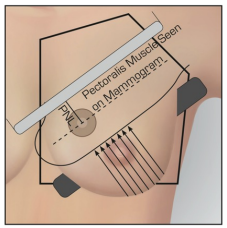
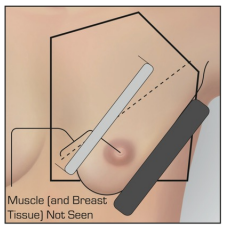
Proper degree of angulation

Angle too steep





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Proper Degree of Angulation

- Chosen on the basis of body habitus/length of the thorax
- Average = 45 degrees
- 40 degrees for patients with shorter thoraxes and larger heavy breast
- 50 degrees for longer thinner patients with smaller breasts

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Proper Degree of Angulation

- Stay at 5 degree increments: 40, 45, 50
- No more 32, 38, 53, 49 etc.
- 35 degrees for patients who have had reduction mammoplasty or mastopexy (lift)

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Preparation for the MLO

The following steps should be performed **before** positioning the patient:

- The proper compression paddle size is chosen.
- The proper degree of angulation is chosen.
- **The height of the IR is adjusted to the proper level.**
- The patient is facing the machine with feet, hips and shoulders forward and level.
- The patient should be moved towards you so that the bottom corner of the IR is directly below the plane of the nipple on the side being imaged
- Stand on the medial side of the breast to be imaged.

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Height of the IR

- The top of the IR should be lowered (if performing after CCs are completed) so the top of the IR is level with the sternoclavicular joint
- Halfway between the top of the shoulder and the axillary crease.

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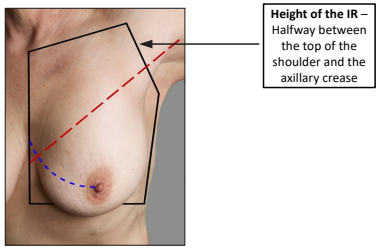
Height of the IR



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Preparation for the MLO

The following steps should be performed **before** positioning the patient:

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- **The patient is facing the machine with feet, hips and shoulders forward and level.**
- The patient should be moved towards you so that the bottom corner of the IR is directly below the plane of the nipple on the side being imaged.
- Stand on the medial side of the breast to be imaged.

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Preparation for the MLO

The following steps should be performed **before** positioning the patient:

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- The height of the IR is adjusted to the proper level.
- The patient is facing the machine with feet, hips and shoulders forward and level.
- **The patient should be moved towards you so that the bottom corner of the IR is directly below the plane of the nipple on the side being imaged**
- Stand on the medial side of the breast to be imaged.

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The patient should be moved towards you so that the bottom corner of the IR is directly below the plane of the nipple on the side being imaged.

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- This can be accomplished by having the patient step sideways (medially,) so that the bottom of the IR is directly below the plane of the nipple at the base of the ribs.
- This will be approximately halfway between the umbilicus and the lateral edge of the thorax.
- The corner of the IR should NOT be directly above the umbilicus.

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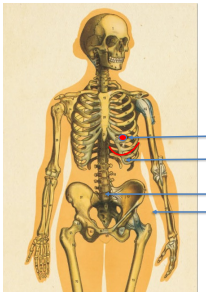
Palpate for the Base of the Ribs



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Preparation for MLO

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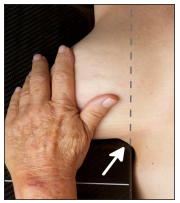
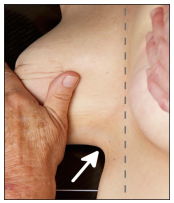
Proper Placement of the Patient/IR

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Preparation for the MLO

The following steps should be performed **before** positioning the patient:

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- The height of the IR is adjusted to the proper level.
- The patient is facing the machine with feet, hips and shoulders forward and level.
- The patient should be moved towards you so that the bottom corner of the IR is directly below the plane of the nipple on the side being imaged
- **Stand on the medial side of the breast to be imaged.**

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Stand Perpendicular to the Patient on the Medial Side of the Breast Being Imaged

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Preparation for MLO (Front Slo-Mo)

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Preparation for the MLO (Back Slo-Mo)

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The How-To

- Preparation
- **Sequence**
- Quick-Steps

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Sequence

- LCC, RCC, RMLO, LMLO
- RCC, LCC, LMLO, RMLO

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Sequence

- Consistent
- Reproducible
- Ergonomically sound for the technologist
- Least amount movement for the patient
- Least number of tube adjustments

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The How-To

- Preparation
- Sequence
- **Quick-Steps**

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Quick Steps for the MLO

The following steps should be performed after choosing the proper compression paddle is chosen and shifted (as needed) the proper degree of angulation is chosen and the IR lowered (as needed). The patient is facing the machine with both feet, hips and shoulders forward. The patient must move medially (towards you) so that the bottom of the IR is directly below the plane of the nipple (halfway between the ASIS and umbilicus). You should be standing on the medial side of the breast to be imaged. Steps below describe positioning for the RMLO.

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Quick Steps for the RMLO

___ 1. Stand perpendicular to the patient
___ 2. Lift patient's right shoulder/arm up over the corner of the IR with your right hand in the patient's axilla. At the same time, your left hand should "meet" your left hand in the axilla and help to lift the patient's right shoulder up and over the IR
___ 3. IR is placed in back of axilla (just interior to latissimus dorsi)
___ 4. Your left hand slides down lateral side of breast to pull on lateral breast tissue and smooth out any skin folds
___ 4. Patient's right hand should be resting on bar, with their elbow bent behind the IR
___ 5. Place your right hand on patient's left shoulder
___ 7. Once your left hand is at the bottom of the breast, turn your hand over so that your hand is now palm down on the breast with the base of your thumb just anterior to the IMF
___ 8. Push the breast up and out with the base of your thumb
___ 9. At the same, ask the patient to lift and flatten their other breast. Caution: Do not ask the patient to pull their breast back
___ 10. Continue to hold the breast in the up and out position until compression is complete

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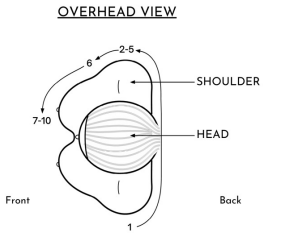
Quick Steps for the RMLO



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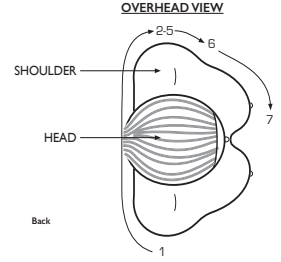
Quick Steps for the LMLO



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RMLO: Steps 1-10 (Front)

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MLO – Steps 1-10 (Front Slo-Mo)

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MLO – Steps 1-10 (Back)

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Quick Steps for the RMLO

___ 1. Stand perpendicular to the patient

___ 2. Lift patient's right shoulder/arm up over the corner of the IR with your right hand in the patient's axilla. At the same time, your left hand should "meet" your left hand in the axilla and help to lift the patient's right shoulder up and over the IR

___ 3. IR is placed in back of axilla (just interior to latissimus dorsi)

___ 4. Your left hand slides down lateral side of breast to pull on lateral breast tissue and smooth out any skin folds

___ 5. Patient's right hand should be resting on bar, with their elbow bent behind the IR

___ 6. Place your right hand on patient's left shoulder

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1. Stand Perpendicular to the Patient

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2. Lift the Patient's Arm Up & Over the IR

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3. IR is Placed in the Back of the Axilla

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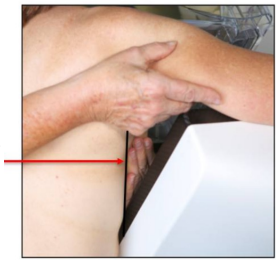
4. Left Hand Slides Down the Lateral Side of the Breast



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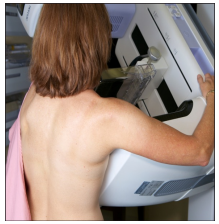
5. Patient's Elbow Should be Bent and Behind the IR with her Hand Resting on the Machine



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6. Right Hand is placed on the Right Shoulder to Relax it and "Push" her in

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Steps 1-6 MLO (Front/Side)

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Steps 1-6 (Back)

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Quick Steps for the RMLO

___ 7. Once your left hand is at the bottom of the breast, turn your hand over so that your hand is now palm down on the breast with the base of your thumb just anterior to the IMF

___ 8. Push the breast up and out with the base of your thumb, fingers pointing to the upper outer corner of the IR (opposite the axilla)

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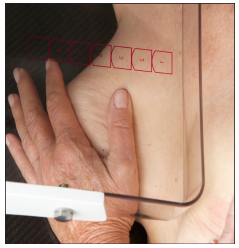
7. Turn Your Hand Over – Palm Down



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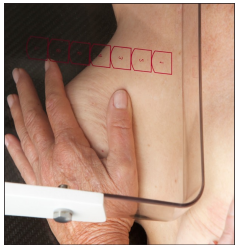
8. Push the Breast Up and Out With the Base of Your Thumb



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Steps 6-8 (Front)

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Steps 6-8 (Front Slo-Mo)

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Steps 6-8 (Back)

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Pulling Back Lateral, Posterior Tissue

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Quick Steps for the LMLO

___ 9. At the same, ask the patient to **lift and flatten** their other breast. Caution: Do not ask the patient to pull their breast back

___ 10. Continue to hold the breast in the up and out position until compression is complete

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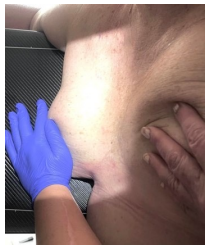
9. Ask the Patient to Lift and Flatten her Opposite Breast



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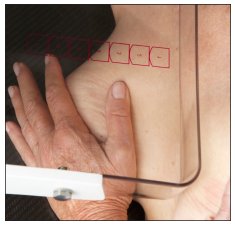
10. Continue to Hold the Breast in the Up and Out Position Until Fully Compressed



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Steps 9-10 (Front)

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Steps 9-10 (Front Slo-Mo)

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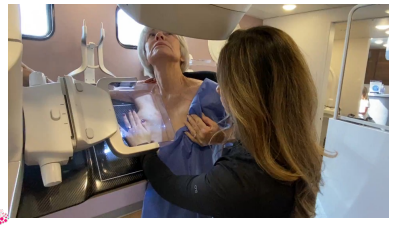
10. Continue to Hold the Breast in the Up and Out Position Until Fully Compressed



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10. Continue to Hold the Breast in the Up and Out Position Until Fully Compressed

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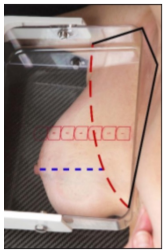
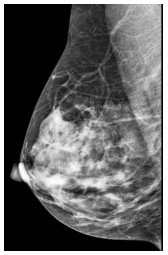
Proper Positioning of the MLO





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Summary for MLO

- Proper positioning of the MLO will ensure maximum visualization all breast tissue for all mammographic examinations.
- The addition of the CC view will detect approximately 16% more abnormalities than performing a single view screening exam (the MLO).

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Summary for Positioning Demonstration

- Standardized positioning techniques were established by the American College of Radiology in 1999.
- An update of those techniques, which were designed for digital application, was presented by the Society of Breast Imaging in 2017 and therefore established a more current standard of care.

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References

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- Miller, Louise C. (2015) *Mammography Positioning Guidebook*. San Diego, CA.
- Miller, Louise C. (2020) *Image Quality & Positioning Problem-Solving For Breast Imagers*. San Diego, CA.

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Thank you!

For questions or more information, contact us at:

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