


Positioning Problem-Solving

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1

Why? How?





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2

Reasonable Expectations Chart for the CC and MLO

	CC	MLO	CC	MLO
Visualization of Pectoral Muscle to PNL	80%	97%	81%	97%
Concave Pnc	30%	20%	-	-
Convex Pnc	45%	40%	-	-
Concave Pnc	23%	20%	-	-
Wide Marginal Level of Pnc	90%	90%	-	-
No Margin	90%	97%	90%	90%
Position: Medial Tissue	90%	90%	-	-
Included	80%	82%	80%	80%
Repeat or Reroll	53%	42%	53%	53%
Upper Location	22%	17%	-	-
Lower Location	30%	40%	-	-
Visualization of Retromammary Fat	81%	80%	80%	80%
Requires More Than One View	13%	13%	-	-
Pnc Muscle Visualized	48%	50%	50%	52%
No Margin	100%	100%	-	-
Level of Axillary Tissue	73%	81%	57%	-
Revised	84%	81%	80%	-
Site or Fat Ticks	39%	47%	33%	-
Shield Location	100%	100%	-	-
Level Location	20%	32%	-	-
Visualization of Axilla	14%	16%	-	-
Requires More Than One View	5%	7%	-	-

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3

There are only 2 margins for error...

- EQUIPMENT:** The way the machine is set-up (i.e.: height, angle, compression, paddle size, etc.)
- PATIENT:** The way the patient is "set-up": both feet, hips and shoulders facing forward





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4

The MLO

- Inclusion of all breast tissue within perimeter
- Pectoral muscle fully visualized
- Tissue well separated
- Tissue visualized back to retromammary fat space
- IMF


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5

The MLO

Visualization of the pectoral muscle:

- The pectoralis muscle is not really part of the breast
- However, it serves as an important anatomical landmark for positioning and film evaluation

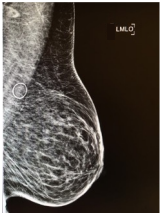



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6

The MLO

- Visualized down to the PNL
- Wide margin at the axilla
- Convex/straight
- Radiolucent

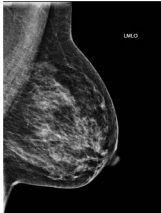




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7

LENGTH OF MUSCLE

Should be visualized down to the level of the PNL





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8

EQUIPMENT: Angle for the MLO

- Angle to the free margin of the pectoralis muscle
- Keep angulation consistent
- Steeper angle for patients with longer thoraxes and small breast
- Lesser angles for shorter thoraxes and larger breasts




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9

Recommended Angulation for MLO

- Depends on body habitus
- Maintain consistency from year to year




10



Practical!

Beneficial!


Applicable!



11

Keep Angles Consistent


- 40 degrees for shorter, heavier patients with large breasts
- 45 degrees for average patients
- 50 degrees for tall, thinner patients with smaller breasts



12

Keep Angles Consistent


- Use variations of 5-degree increments
- No more 47, 42, 48, 53 etc.



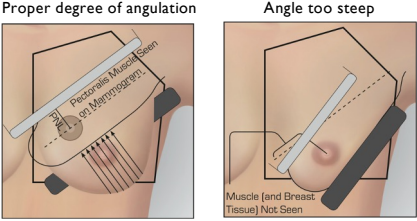
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Keep Angles Consistent

- I am **not** saying NEVER use 35 or 55, but try to keep it consistent, so comparison is easier from year to year
- A MLO angled at 56-degrees one year will look markedly different than a MLO angled at 42-degrees the next year



14




Proper degree of angulation

Angle too steep

Pectoralis Muscle Evident


Muscle (and Breast Tissue) Not Seen



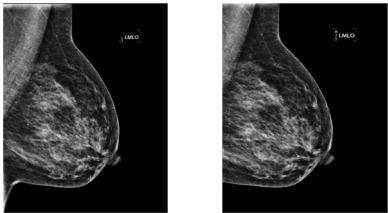
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PATIENT: Length of muscle is related to the position of the patient.

The patient must be turned into the machine with both feet, hips and shoulders as far forward as possible as not to impede progress of the compression paddle.




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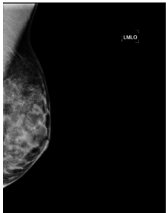

Proper degree of angulation

Angle too steep



17

Is it the angle or the patient?

18

WIDTH OF MUSCLE

There should be a wide margin of the pectoralis muscle at the top of the image (in the axilla).



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19

EQUIPMENT: Width of the muscle is related to placement of the IR in the axilla

The back corner of the IR should be placed just anterior to the latissimus dorsi.



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PATIENT: Width of the muscle is related to the position of the patient

The patient must be turned into the machine with both feet, hips and shoulder as far forward as possible, with the shoulder down, relaxed and pulled forward.



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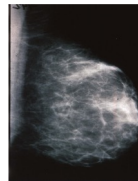
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22

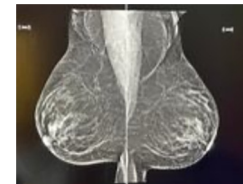
Is it the placement of the IR in the axilla or the patient?



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23

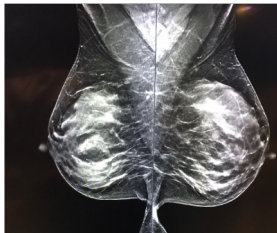
Width of the Muscle



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24

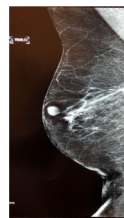
Visualization of the Lat Dorsi



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Patient Has HX of Lumpectomy RUOQ



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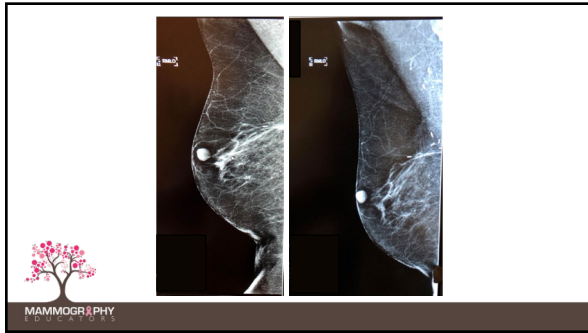
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Normal Placement of the IR Just Anterior to the Latissimus Dorsi



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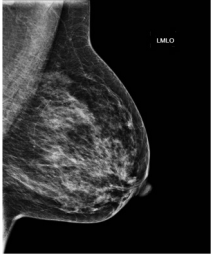
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28

SHAPE AND OPACITY OF THE MUSCLE


The muscle should be convex or straight.



29

EQUIPMENT: The shape and opacity of the muscle is related to the height of the IR


The top of the IR should be positioned at height of the sternoclavicular joint, or halfway between the top of the shoulder and the axillary crease.



30

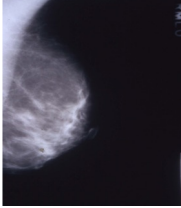
PATIENT: The shape and opacity of the muscle is related to relaxation of the pectoralis muscle

Patient's shoulder, arm and hand must be relaxed



31

Is it the height of the IR or the patient?




32

Reasonable Expectations

Positioning Criteria	FFDM	DBT	Bassett
Visualization of Pec Muscle to PNL	86%	87%	81%
Concave Pec	36%	28%	-
Straight Pec	41%	46%	-
Convex Pec	23%	26%	-


Source: ACR, 2010, December 2017



33

Problems with the MLO

- No visualization of the IMF
- Folds in the IMF
- Breast drooping




34

Visualization of the IMF

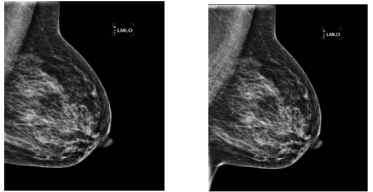

Equipment challenges:
Change of the angle will not compensate for the increased length and the width of IR for FFDM and DBT (compared to the bucky)

Change should be made in the patient position.



35


No IMF **IMF**

36

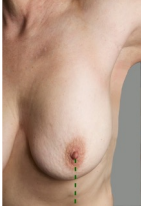

The position of the patient related to the bottom, front corner of the IR is critical:

- Patient must be facing forward with both feet
- Lower front corner of the IR should be directly below the patient's nipple (VNL) or half between her ASIS and umbilicus
- This requires the patient taking a "side step" towards you



37

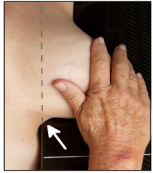
Vertical Nipple Line (VNL)

38


Improper

Edge of IR in front of IMF




Proper

Edge of IR behind IMF



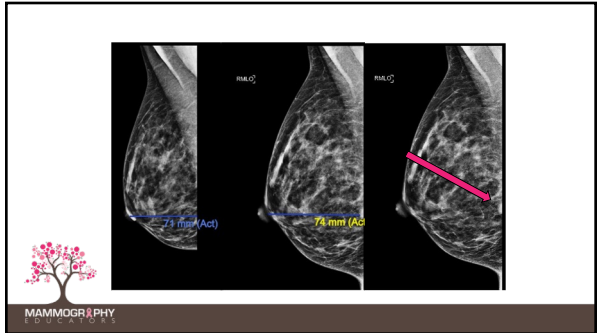
Top edge of IR indicated by vertical dotted line



39

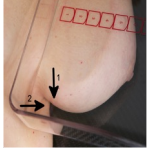



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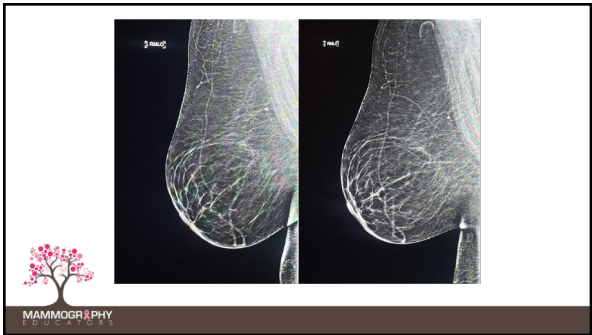
Folds in the IMF

1. Horizontal fold is in the medial breast
2. Vertical fold is in the lateral breast

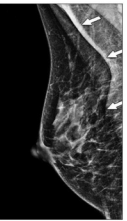



42



43

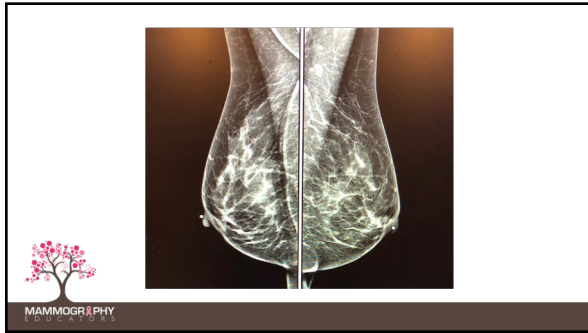
Skin and Fat Folds

44



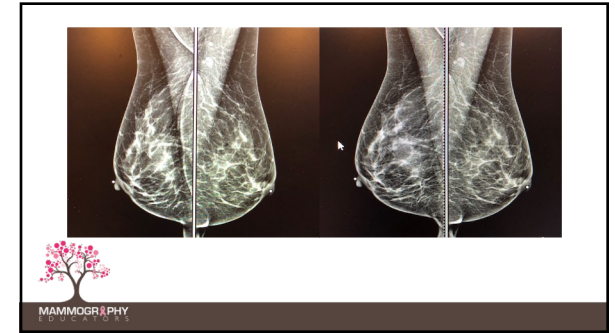
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46



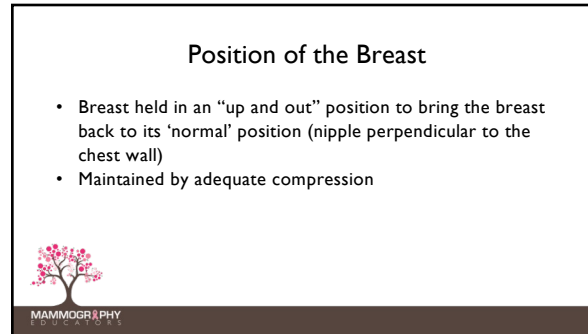
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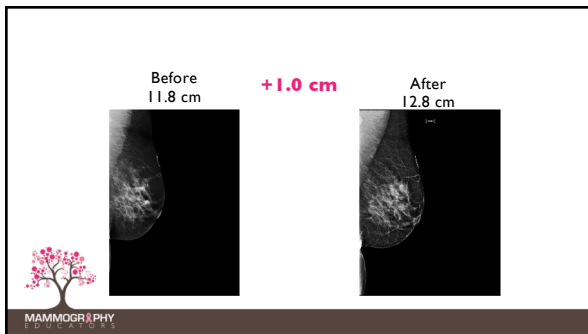
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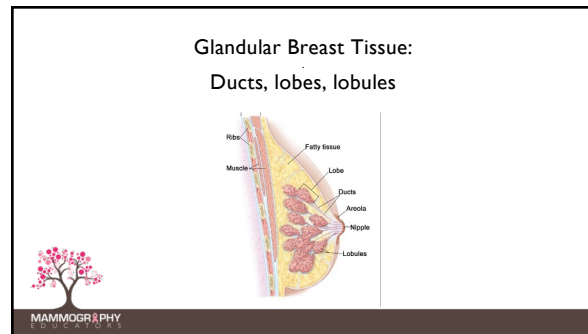
50



51



52



53



54

Breast Sagging

Image Courtesy: Stephen Feig, MD

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55

Maintain the Breast in the "Up and Out" Position*

- Keep the nipple as close as possible to perpendicular to the chest wall.
- Don't let go of the breast until compression **is complete**.

* This will help eliminate the "sagging breast."

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56

Solution for "Sagging" Breast

Hold the breast in up and out position

Compress

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57

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58

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59

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60

Have the Patient Lift and Flatten Her Opposite Breast – Never "Pull" Back

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61

The CC

- Include maximum amount of breast tissue in the axial/transvers plane
- Visualization of medial breast tissue (cleavage) if possible
- Visualization of pectoralis muscle on approximately 30% of all CCs

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62

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63

Is it the Equipment or the Patient?

The Equipment:

- IR too high or too low
- Compression paddle size

The Patient:

- Facing towards the machine with both feet, hips and shoulders forward



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64

Due to lack of anatomical landmarks,
positioning techniques are extremely important!!



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65

Standardized Method

Stand on the medial side of the breast to be imaged to:

- Facilitate the performance of the exam
- Helps you use your arm to keep patient forward
- Enable you to lift the other breast onto IR
- Facilitate better eye contact with the patient



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66

Standardized Method

1. Elevate the breast to the correct height
2. Pull the breast on with both hands
3. Anchor the breast
4. Push the patient in with your elbow/arm
5. "Crawl" up on the chest wall to include more pec muscle



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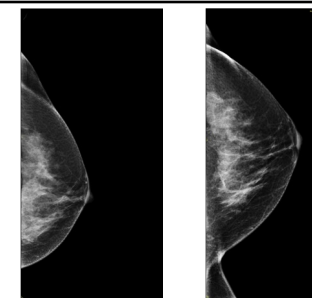
67

Step 1: Elevate the breast/IMF
and adjust the height of the IR



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68



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69

Step 2: Pull the breast onto the
IR with both hands



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70

Step 3: Anchor the breast



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71

Step 4: Place your elbow and
forearm at the mid-thoracic
region of her spine and gently
"push" her forward



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72

Step 5: 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

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73

One-handed “Plop” Two-handed Pull

12.5 cm 14.8 cm

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74

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75

Failure to pull on lateral posterior breast tissue

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76

Nipple in Profile
Nipple Centered

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77

Nipple Centered

- Nipple should be centered on the CC view, if possible, and without sacrificing breast tissue
- Nipple may not be centered due to prominent medial or lateral fullness of the breast, which should be noted on the history sheet

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78

Patient with Prominent Medial Fullness

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79

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80

Nipple Centered

- Breast tissue should never be sacrificed in order to center the nipple or show the nipple in profile
- An additional view should be added and labeled appropriately
- Notation should be made on hx sheet

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81

WHY???

- Consistency
- Reproducibility
- Efficiency
- Proficiency
- Ergonomically sound



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82



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83

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84