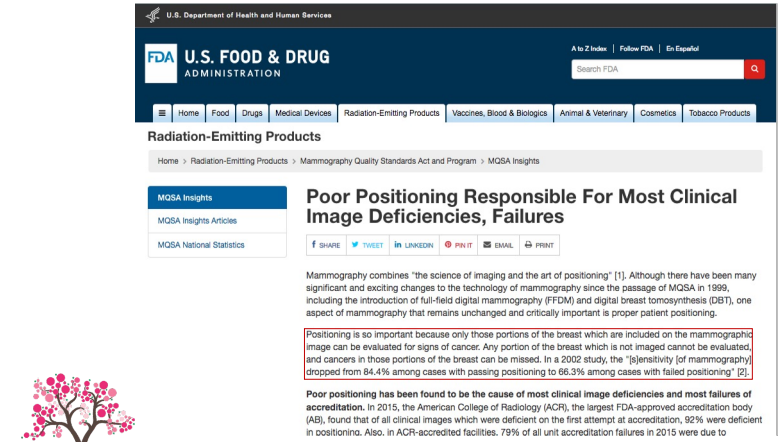
The Importance of Standardized Positioning:

The Basics of Mammography That You Were Never Taught

Louise C. Miller, R.T.(R)(M)(ARRT), CRT(M), FSBI, FNCBC
Director of Education, Mammography Educators

MAMMOGRAPHY EDUCATORS

1



MAMMOGRAPHY EDUCATORS

Source: U.S. Food & Drug Administration

2

US Food and Drug Administration

- "In a 2002 study, the '[s]ensitivity [of mammography] dropped from 84.4% among cases with passing positioning to 66.3% among cases with failed positioning'."
- "Poor positioning has been found to be the cause of most clinical image deficiencies and most failures of accreditation." (92%)

MAMMOGRAPHY EDUCATORS

3

Decreased Sensitivity

- 84.4% with proper positioning
- 66.3% with failed positioning

= 18.1% decreased sensitivity

MAMMOGRAPHY EDUCATORS

4

Quality Standards – Why?

ALL industries have established *standardized* methods in the performance of tasks to:

- Establish and maintain quality
- Increase consumer satisfaction
- Increase profit
- Reduce possibility of litigation
- Reduce errors

MAMMOGRAPHY EDUCATORS

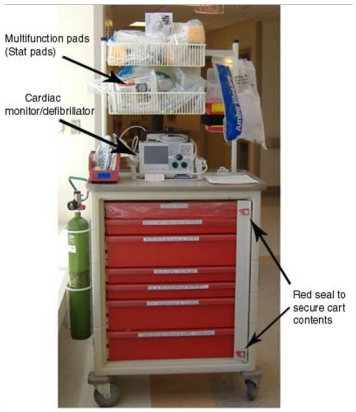
5

How do we reduce medical errors?

- Standardization
- Consistency
- Reproducibility

MAMMOGRAPHY EDUCATORS

6



MAMMOGRAPHY EDUCATORS

7

Standardized Technologist Training for General Radiology

MAMMOGRAPHY EDUCATORS

8

Standardization

We *all*:

- Position the same way for every body part
- Position in the same sequence
- Set up the machine before we bring in the patient
- Position the whole patient, not just the body part

MAMMOGRAPHY EDUCATORS

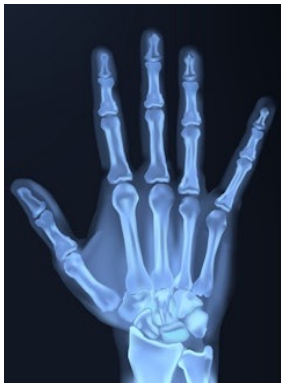
9

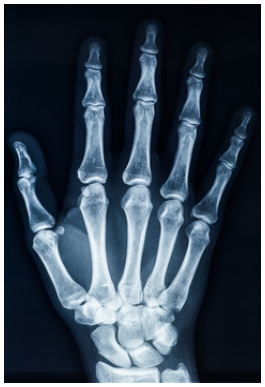
In General Radiology…

All training is competency based and a technologist's skills will be evaluated for *positioning techniques*, as well as *clinical image evaluation*.

MAMMOGRAPHY EDUCATORS

10





MAMMOGRAPHY EDUCATORS

11

Consistency and Ergonomics

- **M**achine
- **P**atient
- **B**ody Part (Breast)

MAMMOGRAPHY EDUCATORS

12

We position the **whole patient**, not just the body part!

MAMMOGRAPHY EDUCATORS

13

MAMMOGRAPHY EDUCATORS

14

All exams are done using the *same* positioning technique, in the *same* sequence.

MAMMOGRAPHY EDUCATORS

15

Why???

- Consistency
- Reproducibility
- Efficiency
- Proficiency
- Use of proper body mechanics

MAMMOGRAPHY EDUCATORS

16

But in mammography…
We are "all over the map"

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

MAMMOGRAPHY EDUCATORS

17

My Suggestion

- CCs first
- Then do the MLO on the side you just finished the CC
- Finish with the other MLO

Example: RCC, LCC, LMLO, RMLO

MAMMOGRAPHY EDUCATORS

18

So why is this true for all body parts in radiology EXCEPT in Mammography???

MAMMOGRAPHY EDUCATORS

19

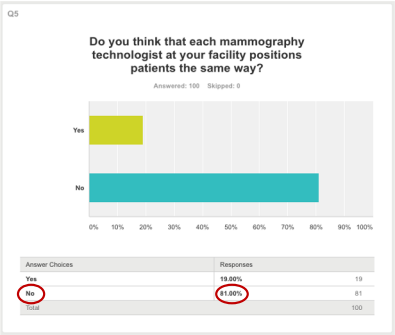
In Mammography…

- Most technologists have not been taught a standardized method of positioning
- Most technologists have been taught various positioning methods by various technologists

MAMMOGRAPHY EDUCATORS

20

Most technologists *do not* practice a standardized method of positioning or position the same way.



MAMMOGRAPHY EDUCATORS

21

No Standards for Mammography Positioning

There are standards for *WHAT* images should look like, but not *HOW* you get to that point!

MAMMOGRAPHY EDUCATORS

22

So the problem is…

No standardization or follow-through, which means:

- Less consistency and reproducibility
- More repeats and rejects
- More accreditation failures
- Increased radiation exposure
- MISSED BREAST CANCERS

MAMMOGRAPHY EDUCATORS

23

How can we make things better?

Consistency and Reproducibility

MAMMOGRAPHY EDUCATORS

24

Mammography Positioning Techniques

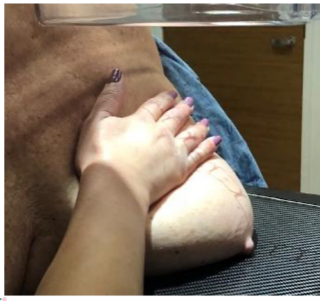
Should be:

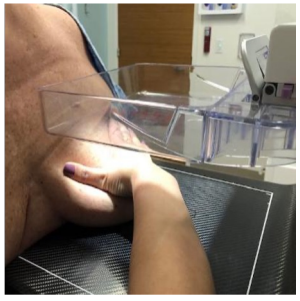
- Consistent
- Reproducible
- Efficient
- Proficient
- Based on sound ergonomic principles

Common Work-Related Injuries

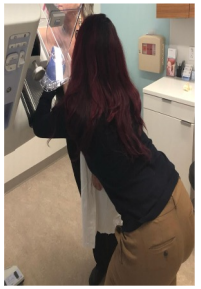
- Wrists
- Shoulders
- Back
- Knees
- Hips

YES!!! NO!!!

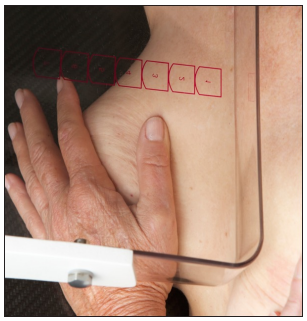




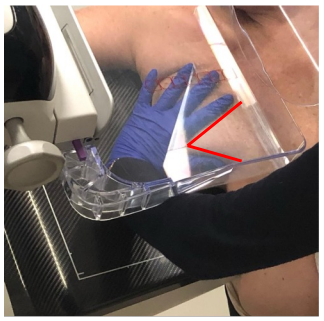
YES!!! NO!!!



YES!!!



NO!!!



MAMMOGRAPHY EDUCATORS

29

Do Standardized Positioning Techniques for Mammography Work?

- Scientific studies prove that standardized positioning techniques improve quality
  - Visualization of more posterior and lateral breast tissue, IMF and pectoralis muscle on the CC
- Unpublished data showed that standardized positioning techniques decrease repeats, rejects and technical callbacks by up to 50%!

MAMMOGRAPHY EDUCATORS

30

AJR American Journal of Roentgenology

ibael Linver on 09/06/17 from IP address 76.113.43.146. Copyright ARRS. For personal use only; all rights reserved

Mammography Positioning Standards in the Digital Era: Is the Status Quo Acceptable?

Ashley I. Huppe[1]
Kelly L. Overman[2]
Jason B. Gatewood[1]
Jacqueline D. Hill[1]
Louise C. Miller[3]
Marc F. Inciardi[1]

OBJECTIVE. The objective of our study was to evaluate positioning of full-field digital mammography (FFDM) and digital breast tomosynthesis (DBT) compared with film-screen (FS) mammography positioning standards.

MATERIALS AND METHODS. A retrospective study was conducted of consecutive patients who underwent screening FFDM in 2010–2012 and DBT in 2012–2013 at an academic institution. Examinations were performed by five experienced technologists who underwent updated standardized positioning training. Positioning criteria were assessed by consensus reads among three breast radiologists and compared with FS mammography data from a 1993 study by Bassett and colleagues.

RESULTS. One hundred seventy patients ($n = 340$ examinations) were analyzed, showing significant differences between FFDM and DBT examinations ($p < 0.05$) for medial or inferior skin folds (FFDM vs DBT: craniocaudal [CC] view, 16% [$n = 56$] vs 23% [$n = 77$]; mediolateral oblique [MLO] view, 35% [$n = 118$] vs 45% [$n = 154$]), inclusion of lateral glandular tissue on CC view (FFDM vs DBT, 73% [$n = 247$] vs 81% [$n = 274$]), and concave pectoralis muscle shape (FFDM vs DBT, 36% [$n = 121$] vs 28% [$n = 95$]). In comparison with Bassett et al. data, all positioning criteria for both FFDM and DBT examinations were significantly different ($p < 0.05$). The largest differences were found in visualization of the pectoralis muscle on CC views and the inframammary fold on MLO views, inclusion of posterior or lateral glandular tissue, and inclusion of skin folds, with DBT and FFDM more frequently exhibiting all criteria than originally reported Bassett et al. findings.

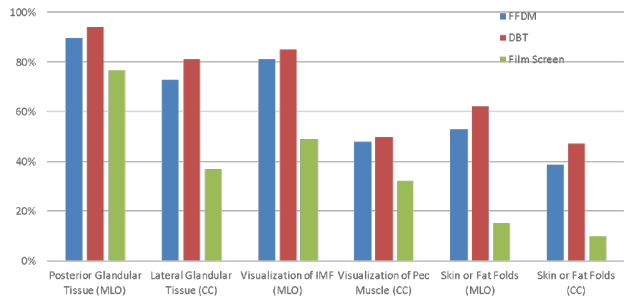
CONCLUSION. DBT and FFDM mammograms more frequently include posterior or lateral tissue, the inframammary fold on MLO views, the pectoralis muscle on CC views, and skin folds than FS mammograms. Inclusion of more breast tissue with newer technologies suggests traditional positioning standards, in conjunction with updated standardized positioning training, are still applicable at the expense of including more skin folds.

MAMMOGRAPHY EDUCATORS

Source: American Journal of Roentgenology: 209, December 2017

31

Criteria Met After Standardized Training



MAMMOGRAPHY EDUCATORS

Source: American Journal of Roentgenology: 209, December 2017

32

Reasonable Expectations for the CC

	Positioning Criteria	FFDM	DBT	Bassett
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%	-

Source: American Journal of Roentgenology: 209, December 2017

33

Reasonable Expectations for the MLO

	Positioning Criteria	FFDM	DBT	Bassett
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%	-

Source: American Journal of Roentgenology: 209, December 2017

34

Reasonable Expectations

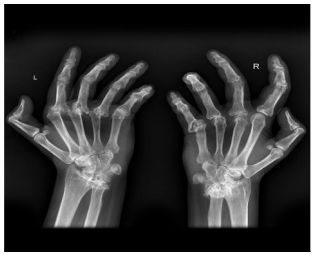
- Our patients have different and often challenging body habitus
- Their breast size, shape, mobility and tenderness are hugely variable

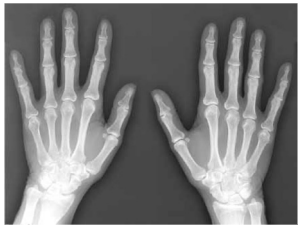
35

Reasonable Expectations

Even the "perfect" patient, in terms of body habitus, breast mobility, etc. may provide a challenge that inhibits the technologist's ability to position and compress properly.

36





MAMMOGRAPHY EDUCATORS

37

MAMMOGRAPHY EDUCATORS

38

MAMMOGRAPHY EDUCATORS

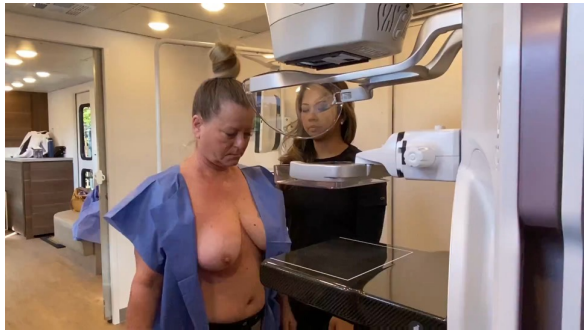
39

But regardless of these variables, we CAN improve image quality by ***using standardized positioning techniques*** *and* developing a strong knowledge-based foundation that depends on the technologist's understanding of correlative anatomy.

MAMMOGRAPHY EDUCATORS

40

RCC: Steps 1-9 (Front)



MAMMOGRAPHY EDUCATORS

41

Quick Steps for the CC (Left)

___ 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 the breast onto the IR with both hands (left hand on top; right hand on bottom) and at the same time ask the patient to step forward into the machine (no leaning) and have them turn their face towards you
___ 4. Switch hands, so your right hand is on the top (palm down) and anchor the breast with the base of your right thumb.
___ 5. Lift the opposite/contralateral breast onto the IR with your left hand, palm facing up; then ask the patient to turn their right hip forward.
___ 6. Guide the patient's head forward and around the face shield, if possible
___ 7. Place your left elbow and forearm at the mid thoracic region (where their bra clasp would be) and gently push the patient forward
___ 8. Relax patient's left shoulder with your left hand, if possible
___ 9. Pull superior breast tissue forward by placing the base/edge of your right thumb on top of the breast against the chest wall, then apply compression while continuing to "push" the patient forward

MAMMOGRAPHY EDUCATORS

Source: Mammography Educators

42

RMLO: Steps 1-10

MAMMOGRAPHY EDUCATORS

43

Quick Steps for the MLO (Left)

___ 1. Stand perpendicular to the patient with your sternum pressing against patient's right humerus
___ 2. Lift patient's left shoulder/arm up over the corner of the IR with your right hand in the patient's axilla.
At the same time, your right hand should "meet" your left hand in the axilla and help to lift the patient's left shoulder up and over the IR
___ 3. IR is placed in back of axilla (just interior to latissimus dorsi)
___ 4. Patient's left hand should be resting on bar, with their elbow bent behind the IR
___ 5. Place your left hand on patient's left shoulder (if possible) to keep their shoulder relaxed and down
___ 6. Your right hand, with palm facing up, slides down lateral side of the breast to pull [illegible] lateral breast tissue and smooth out any skin folds

MAMMOGRAPHY EDUCATORS

Source: Mammography Educators

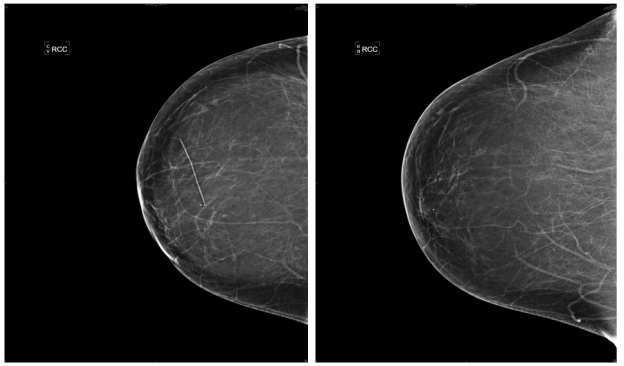
44

Does it work??

MAMMOGRAPHY EDUCATORS

45

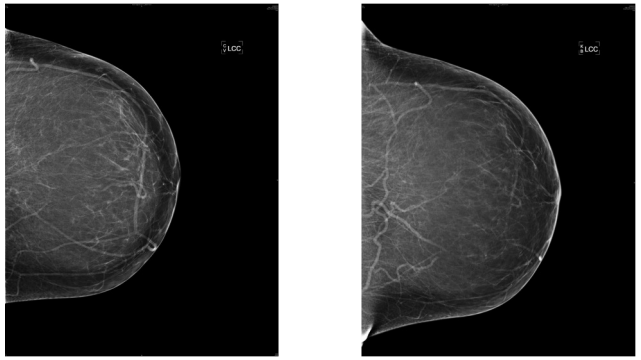
BEFORE 13.6 cm | STANDARDIZED POSITIONING + 3.0 cm | AFTER 16.6 cm



MAMMOGRAPHY EDUCATORS

46

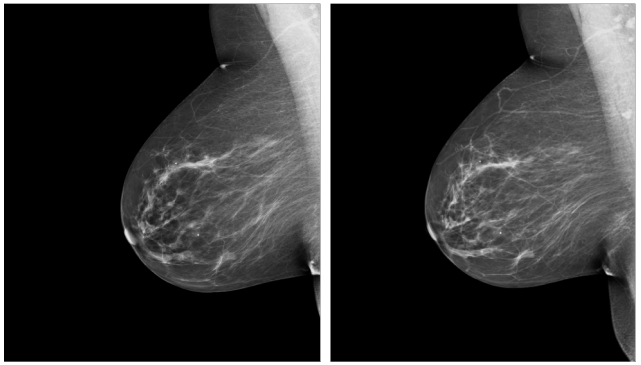
BEFORE 14.8 cm | STANDARDIZED POSITIONING + 2.0 cm | AFTER 16.8 cm



MAMMOGRAPHY EDUCATORS

47

BEFORE 13.9 cm | STANDARDIZED POSITIONING + 0.7 cm | AFTER 14.6 cm



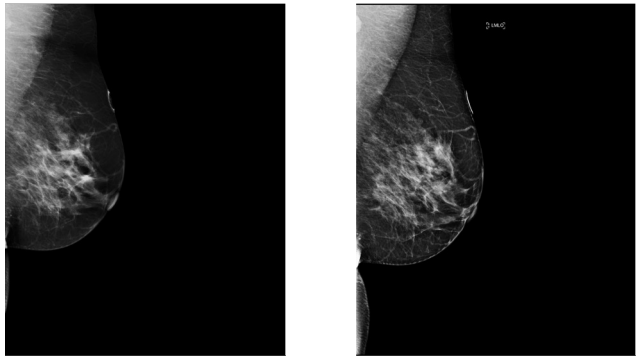
MAMMOGRAPHY EDUCATORS

48

BEFORE
11.8 cm

STANDARDIZED POSITIONING
+ 1.0 cm

AFTER
12.8 cm

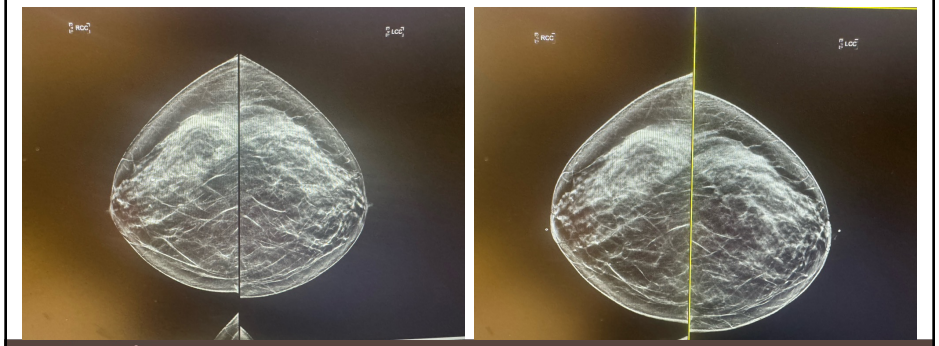


MAMMOGRAPHY EDUCATORS

49

Consistency and Reproducibility

Different techs – Different years – Miller Method

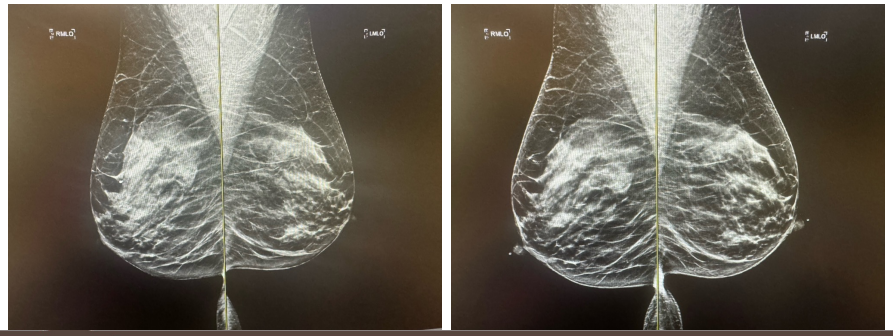


MAMMOGRAPHY EDUCATORS

50

Consistency and Reproducibility

Different techs – Different years – Miller Method



MAMMOGRAPHY EDUCATORS

51

MAMMOGRAPHY EDUCATORS

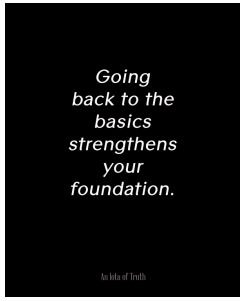
52

It is ALL our responsibility to make sure that ALL patients receive the highest quality mammogram achievable.

MAMMOGRAPHY EDUCATORS

53

Back To The Basics



MAMMOGRAPHY EDUCATORS

54

Mammography should be taught according to scientific principle, NOT ANECDOTE!

MAMMOGRAPHY EDUCATORS

55

Anecdote vs. Science

MAMMOGRAPHY EDUCATORS

56

Anecdote vs. **Science**

MAMMOGRAPHY EDUCATORS

57

SCIENCE:

ANATOMY – PHYSIOLOGY – PHYSICS

MAMMOGRAPHY EDUCATORS

58

You lucked out…

MAMMOGRAPHY EDUCATORS

59

Except…

- Newton's Third Law: for every action there is reaction
- Law of gravity

MAMMOGRAPHY EDUCATORS

60

Anatomy and Physiology

- As they relate to mammography positioning, using general radiology principles…

61

Goals for **General Radiology** Positioning

- Bring the body part back to its true anatomical position OR the position that will best visualize the body part
- Use palpable and visible anatomical landmarks for positioning and clinical image evaluation
- Use consistent and reproducible methods

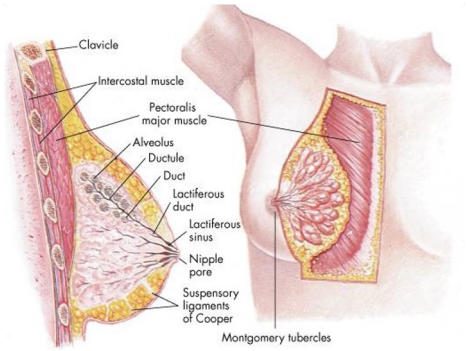
62

Goals for **Mammography** Positioning

Bring the breast back to its natural anatomical position (*with the nipple perpendicular to the chest wall as possible)* on both screening views to maximize visualization of breast tissue and to avoid superimposition of structures.

63

Anatomy of the Breast



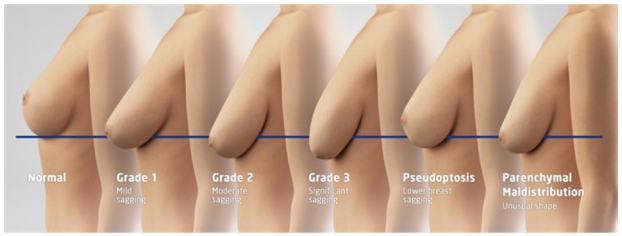
64

Normal or natural position of the breast is when the nipple is perpendicular to the chest wall.

MAMMOGRAPHY EDUCATORS

65

When positioning for mammography we need to bring the breast back to its 'normal' position.



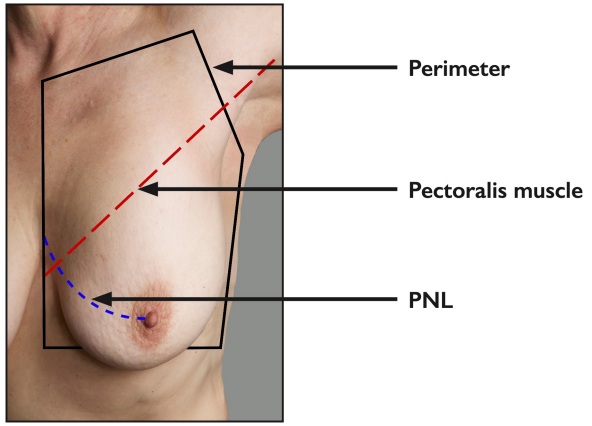
MAMMOGRAPHY EDUCATORS

66

In order to accomplish this and include the maximum amount of breast tissue, we must consider the anatomical landmarks that will be used for positioning and clinical image analysis.

MAMMOGRAPHY EDUCATORS

67



MAMMOGRAPHY EDUCATORS

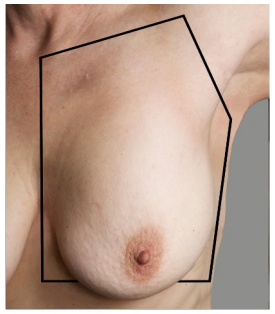
68

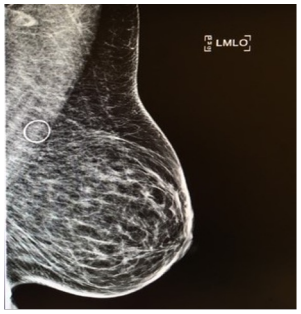
Perimeter of the Breast

MAMMOGRAPHY EDUCATORS

69

Perimeter Used for Positioning and Clinical Image Analysis

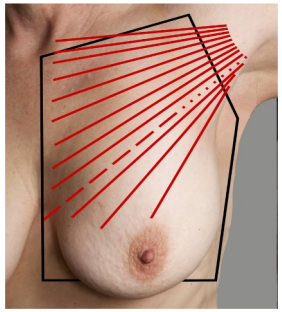


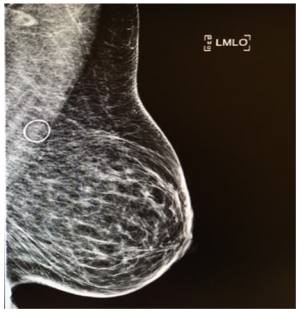


MAMMOGRAPHY EDUCATORS

70

Pectoralis Used for Positioning and Clinical Image Analysis



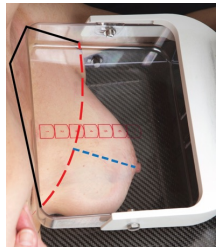


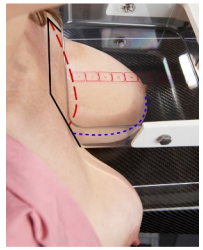
MAMMOGRAPHY EDUCATORS

71

PNL Used for Positioning

Elevate the breast so that the PNL is as close as possible to perpendicular to the chest wall.



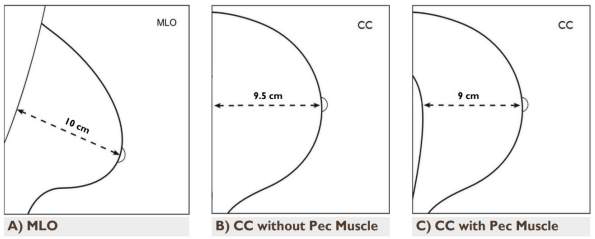


MAMMOGRAPHY EDUCATORS

72

PNL Used for Clinical Image Analysis

PNL measurement of CC should be within 1cm of the PNL measurement on the MLO.

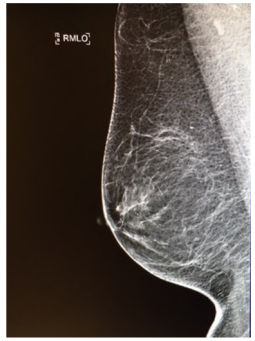


MAMMOGRAPHY EDUCATORS

73

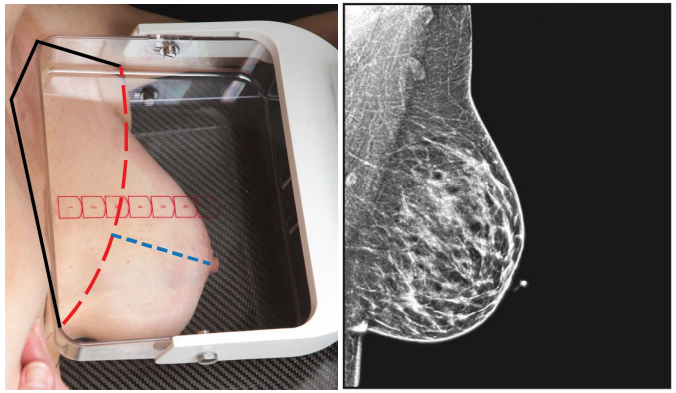
The MLO

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



MAMMOGRAPHY EDUCATORS

74



MAMMOGRAPHY EDUCATORS

75

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 image evaluation

MAMMOGRAPHY EDUCATORS

76

The absence or presence of these characteristics will tell you exactly what you did right or wrong when positioning and therefore, whether you included or excluded breast tissue!

77

Remember

There are only two margins for error:

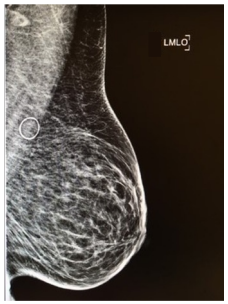
1) The way the **machine** is set up (i.e., height, angle, compression paddle size, etc.)

2) The way the **patient** is "set up": both feet, hips, and shoulders facing forward

78

The MLO

- **Width**: wide margin at the top
- **Length**: down to the level of the PNL
- **Shape**: convex/straight

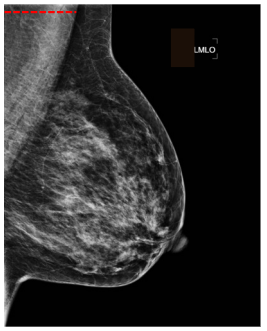


79

The MLO

WIDTH of the Muscle

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

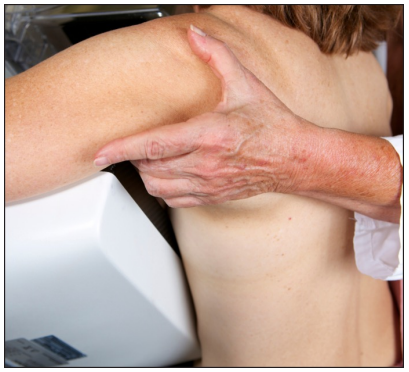


80

The MLO

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

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

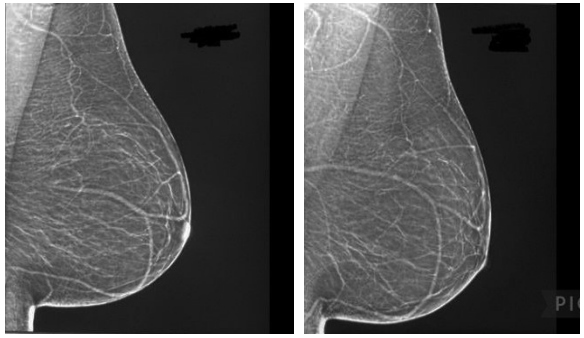


The MLO

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 shoulders as far forward as possible. The patient's shoulder should be down and relaxed and if possible, held in position by the technologist.

Width of the Muscle



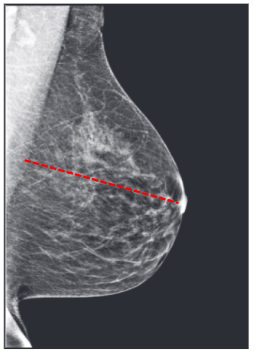
MAMMOGRAPHY EDUCATORS

85

The MLO

LENGTH of the Muscle

Should be visualized down to the level of the PNL.



MAMMOGRAPHY EDUCATORS

86

The MLO

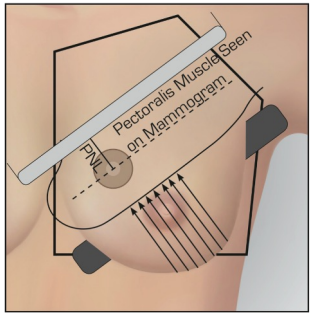
EQUIPMENT: Angle for the MLO

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

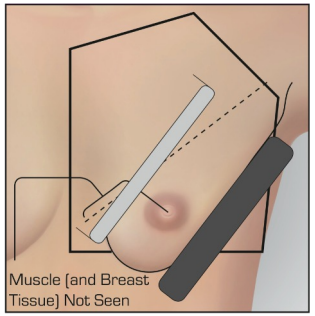
MAMMOGRAPHY EDUCATORS

87

Proper degree of angulation



Angle too steep



MAMMOGRAPHY EDUCATORS

88

Recommended Angulation for the MLO

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

*An MLO angled at 56-degrees one year will look markedly different than an MLO angled at 42-degrees the next year.

MAMMOGRAPHY EDUCATORS

89

Keep Angles Consistent

Use 5-degree increments – no more 43, 48, 52 degrees

- 40 degrees for shorter, heavier patients with large breasts
- 45 degrees for average patients
- 50 degrees for tall, thinner patients with smaller breasts
- 35 degrees for patients who have undergone reduction

MAMMOGRAPHY EDUCATORS

90

The MLO

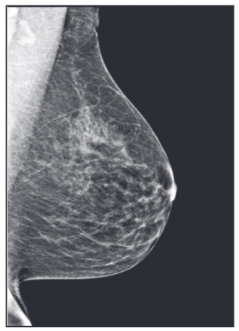
PATIENT: Length of the muscle is related to the position of the patient.

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

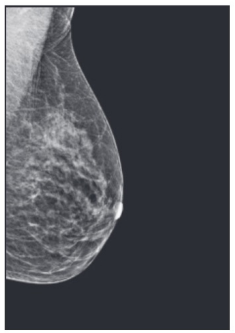
MAMMOGRAPHY EDUCATORS

91

Proper degree of angulation



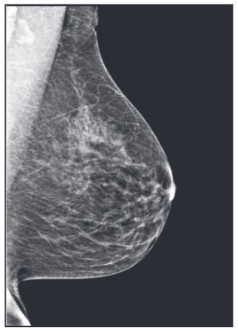
Angle too steep

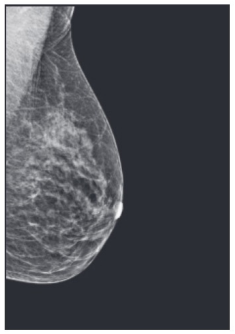


MAMMOGRAPHY EDUCATORS

92

OR…
The patient is not facing the machine properly.





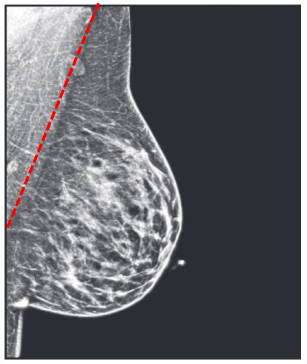
MAMMOGRAPHY EDUCATORS

93

The MLO

SHAPE of the Muscle

The muscle should be convex or straight.



MAMMOGRAPHY EDUCATORS

94

The MLO

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 the height of the sternoclavicular joint or halfway between the top of the shoulder and the axillary crease.

MAMMOGRAPHY EDUCATORS

95

The MLO

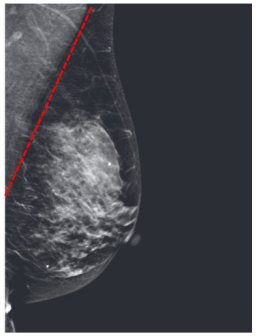
PATIENT: The shape and opacity of the muscle is related to the relaxation of the pectoralis muscle.

Patient's shoulder, arm and hand must be relaxed with the elbow bent and relaxed behind the IR.

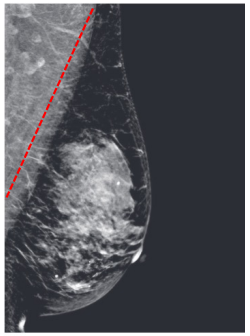
MAMMOGRAPHY EDUCATORS

96

Concave



Convex



MAMMOGRAPHY EDUCATORS

97

The MLO

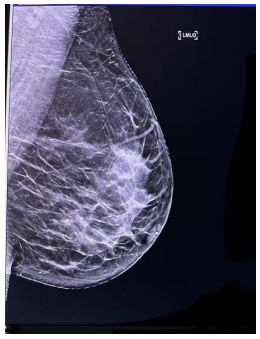
Common problems:

- No visualization of the IMF
- Breast drooping

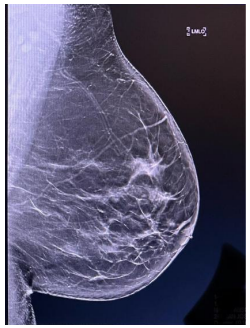
MAMMOGRAPHY EDUCATORS

98

No IMF



IMF



MAMMOGRAPHY EDUCATORS

99

Keep Angles Consistent

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

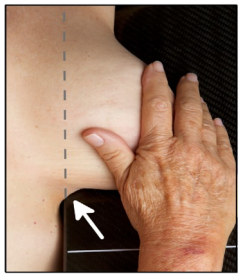
- Patient must be facing forward with both feet also forward
- Lower, front corner of the IR should be directly below the patient's nipple or halfway between their ASIS and umbilicus
- This requires the patient taking a side step towards you

MAMMOGRAPHY EDUCATORS

100

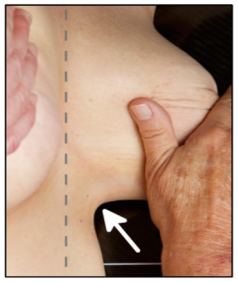
Improper

Edge of IR in front of IMF



Proper

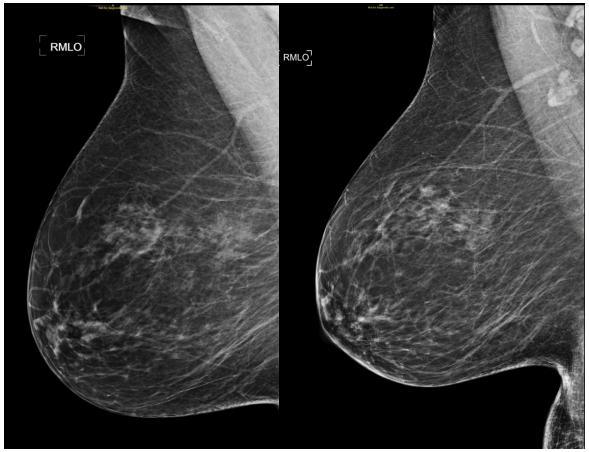
Edge of IR behind IMF



Top edge of IR indicated by vertical dotted line.

MAMMOGRAPHY EDUCATORS

101



MAMMOGRAPHY EDUCATORS

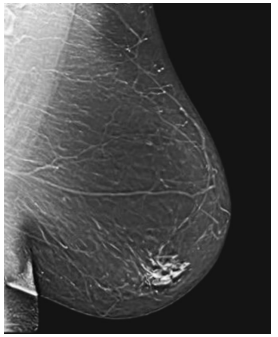
102

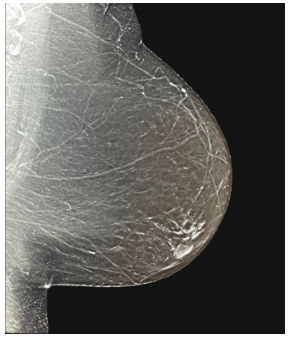
The "Sagging" Breast

MAMMOGRAPHY EDUCATORS

103

The "Sagging" Breast

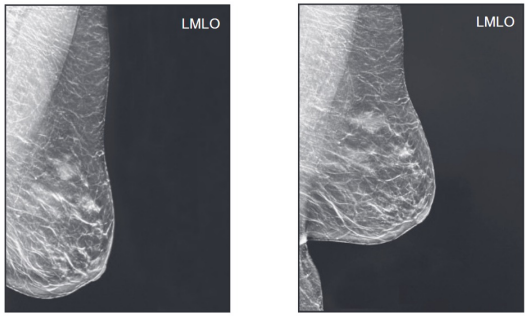




MAMMOGRAPHY EDUCATORS

104

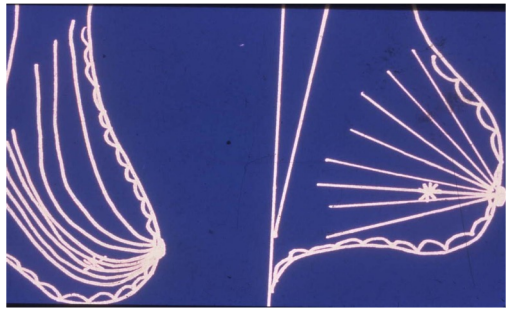
The "Sagging" Breast



MAMMOGRAPHY EDUCATORS

105

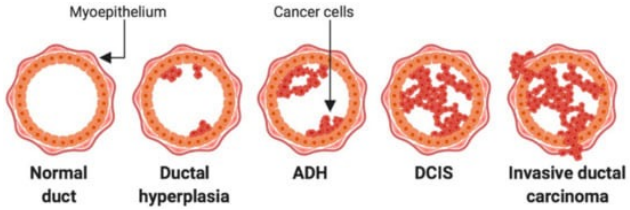
The "Sagging" Breast



MAMMOGRAPHY EDUCATORS

106

Stages of Breast Cancer Development



MAMMOGRAPHY EDUCATORS

107

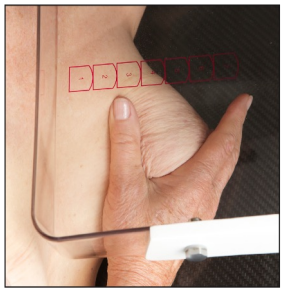
Position of the Breast

- Breast must be held in the "up and out" position to bring the breast back to its "normal" position (nipple perpendicular to the chest wall)
- Maintained by adequate compression
- Don't let go until compression is complete

MAMMOGRAPHY EDUCATORS

108

Solution for the "Sagging" Breast



Hold the breast in up and out position.

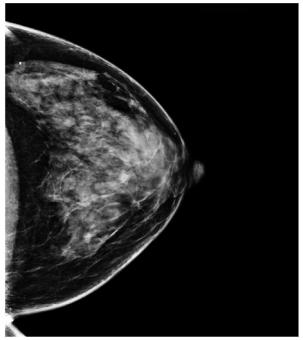
Compress.

MAMMOGRAPHY EDUCATORS

109

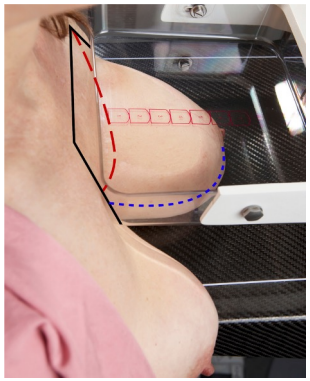
The CC

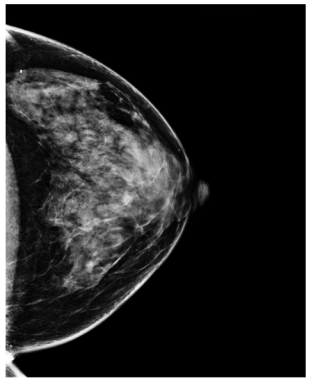
- Include maximum amount of breast tissue in the axial/transverse plan
- Visualization of medial breast tissue
- Visualization of pectoralis muscle on approximately 50% of all CCs
- PNL within 1cm of PNL on MLO



MAMMOGRAPHY EDUCATORS

110





MAMMOGRAPHY EDUCATORS

111

The CC

- The CC is done to provide an "orthogonal" view from the MLO
- When added to the MLO, it increases breast cancer detection
- While the CC is not primarily done to visualize medial breast tissue (cleavage), it is a "by-product" of a good CC
- If you miss breast tissue on the MLO, it will be medial tissue, so it's important to try to include that on the CC view

MAMMOGRAPHY EDUCATORS

112

The CC

Is it the equipment or the patient?

Equipment:
- IR too high or too low
- Compression paddle size

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

MAMMOGRAPHY EDUCATORS

113

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

MAMMOGRAPHY EDUCATORS

114

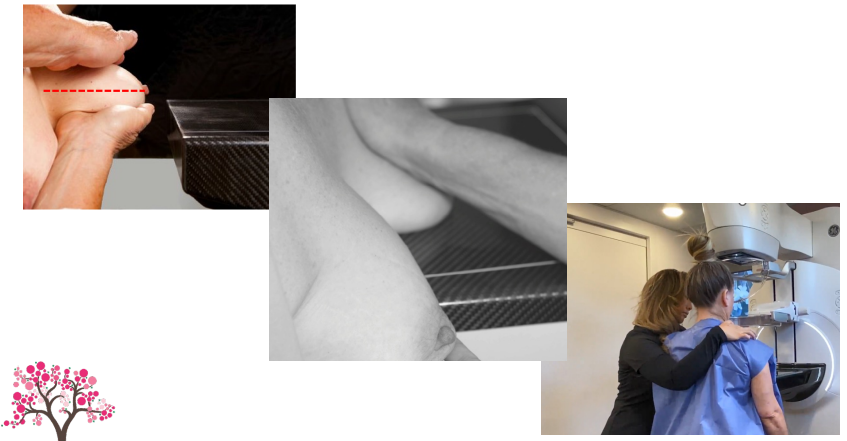
The CC

Common problems:
- Short CC (PNL measurement on CC is less than 1 cm of PNL measurement on the MLO)
- No pec muscle (remember the 50% rule!)
- No visualization of deep medial breast tissue (cleavage)

All of these are most often related to positioning technique vs. equipment and patient position. (Although they are still important!)

MAMMOGRAPHY EDUCATORS

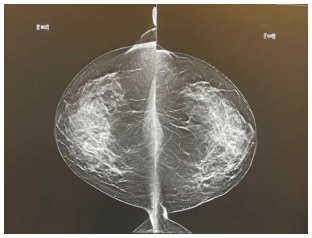
115



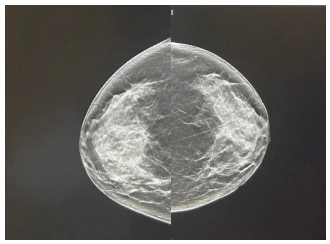
MAMMOGRAPHY EDUCATORS

116

Meet, Beat, **Repeat**



Year 1



Year 2

MAMMOGRAPHY EDUCATORS

Focus On…

- Consistency
- Reproducibility
- Efficiency
- Proficiency
- Ergonomic principles

MAMMOGRAPHY EDUCATORS

Mammography Saves Lives!

But it is up to you…….

Even the best radiologist, in the best breast center cannot diagnose a cancer that is not included on the image.

MAMMOGRAPHY EDUCATORS

MAMMOGRAPHY EDUCATORS

Additional Mammographic Views

Louise C. Miller, R.T.(R)(M)(ARRT), CRT(M), FSBI, FNCBC
Director of Education, Mammography Educators

Additional Views Lexicon

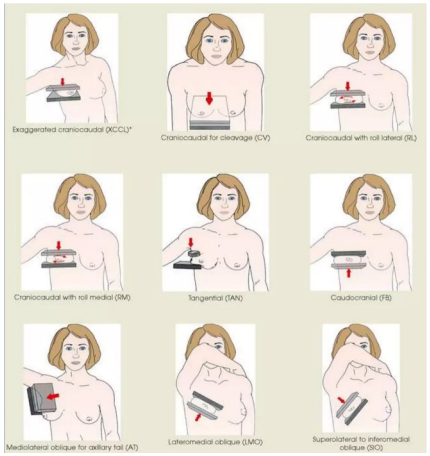
- XCCL – Exaggerated Craniocaudal Lateral
- CV – Cleavage
- LM – Lateromedial
- ML – Mediolateral
- AT – Axillary Tail
- TAN – Tangential

Additional Views Lexicon

- RL – Rolled Lateral
- RM – Rolled Medial
- RS – Rolled Superior
- RI – Rolled Inferior
- FB – Caudocranial

Additional Views Lexicon

- SIO - Superior Lateral to Inferior Medial Oblique
- LMO – Lateromedial Oblique
- M – Magnification
- ID – Implant Displaced
- *No label:* Spot Compression



Source: Hologic Selenia Unit

Labeling Codes (Lexicon)

The name is the view (labeling code), always preceded by identification of laterality:

- i.e., LXCCL or RXCCL

Most Commonly Used Additional Views

- XCCL
- CV
- LM/ML

Why We Do Additional Views

- To show a specific component of the anatomy not seen on standard views
- To provide localization of an area of concern medial/lateral or superior/inferior to the nipple

Or…

- To show an area of concern in better details
- To counteract superimposition of structures
- To triangulate a lesion

MAMMOGRAPHY EDUCATORS

129

Commonly used additional views are done to show a specific component of the anatomy not seen on standard views.

MAMMOGRAPHY EDUCATORS

130

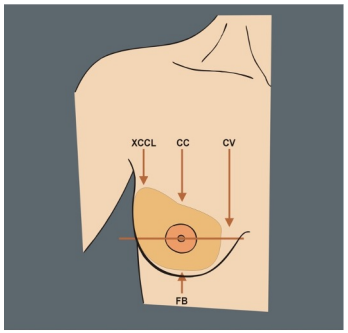
Ask and Answer

- Which part of the breast do I want to visualize?
- In which projection?
- Which view will accomplish this?

MAMMOGRAPHY EDUCATORS

131

Imaging the Breast in a Transverse or Axial Plane

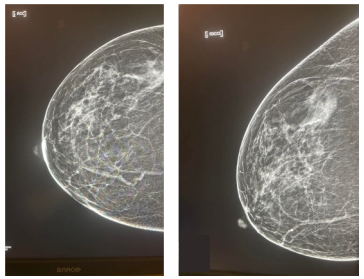


MAMMOGRAPHY EDUCATORS

132

XCCL – Exaggerated Craniocaudal Lateral

Visualization of lateral breast tissue in a CC projection.



MAMMOGRAPHY EDUCATORS

133

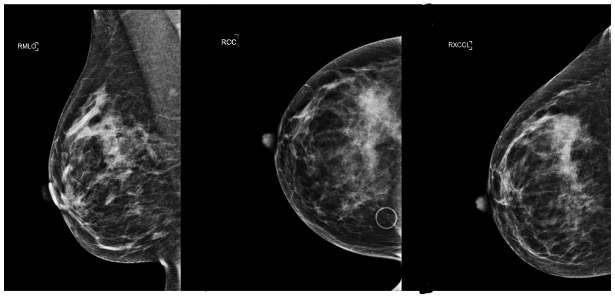
Use of the XCCL

- Should be used on a *baseline* exam when lateral posterior breast tissue is missing on the CC view
- If glandular breast tissue on subsequent screening views is visualized back to the retromammary fat space on the MLO, an XCCL is not needed

MAMMOGRAPHY EDUCATORS

134

XCCL is required for baseline, but not on subsequent screenings.



MAMMOGRAPHY EDUCATORS

135

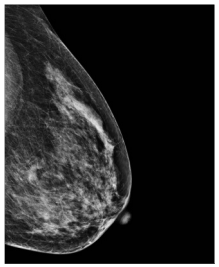
Use of the XCCL

- Should be performed on less than 10% of all patients
- Performed at 0-degree angulation
- Patient's body should be at 45-degree angle to IR
- Nipple should be pointing towards the upper corner of the image receptor (IR)

MAMMOGRAPHY EDUCATORS

136

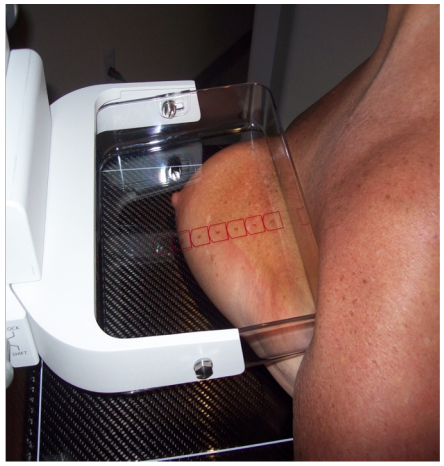
Muscle or no muscle?



NO MUSCLE!

MAMMOGRAPHY EDUCATORS

137

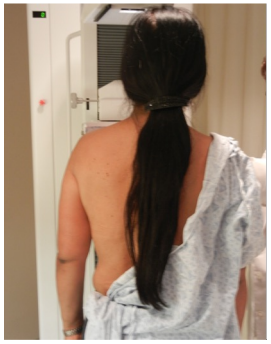


MAMMOGRAPHY EDUCATORS

138

Incorrect

Correct

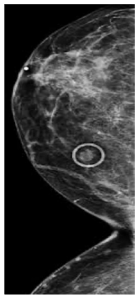


MAMMOGRAPHY EDUCATORS

139

CV – Cleavage

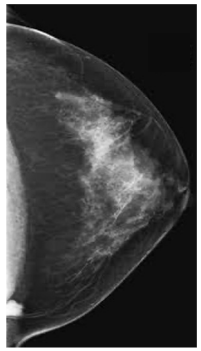
Used for visualization of medial breast tissue in a CC view.



MAMMOGRAPHY EDUCATORS

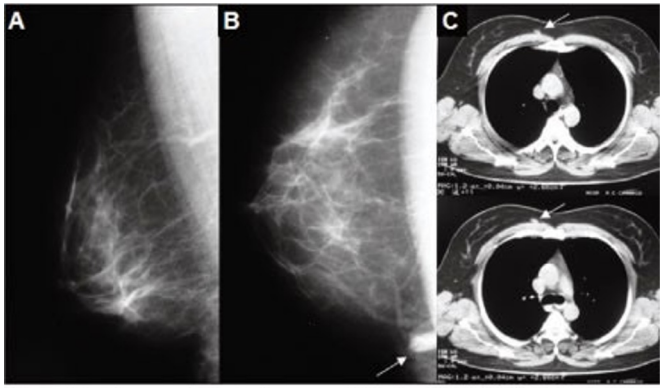
140

Sternalis Muscle



MAMMOGRAPHY EDUCATORS

141



MAMMOGRAPHY EDUCATORS

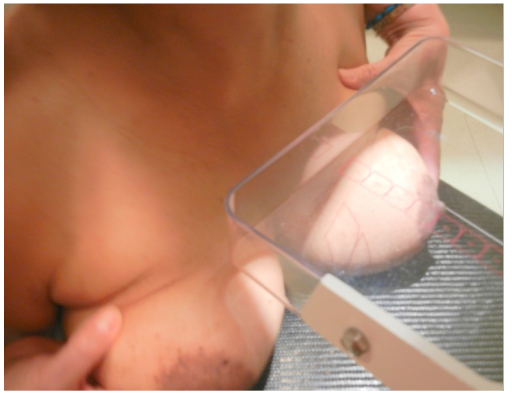
142

Sternalis Muscle

- Flame-like appearance (similar to an appendix)
- Present in only 7-10% of the population
- Seen medially on a mammogram
- Often misdiagnosed as the insertion of the pectoralis muscle

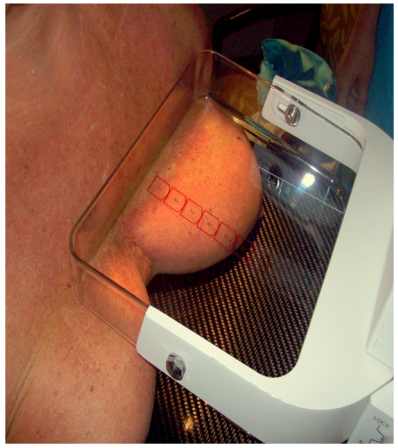
MAMMOGRAPHY EDUCATORS

143



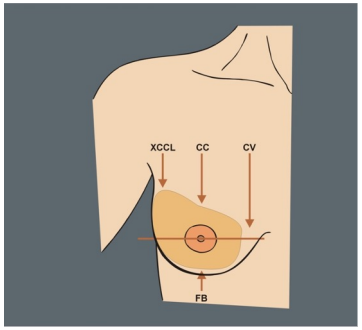
MAMMOGRAPHY EDUCATORS

144



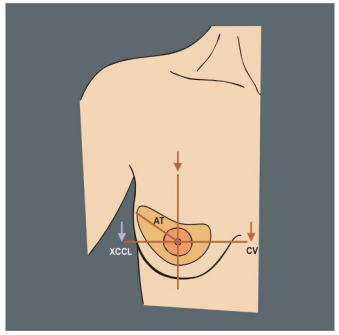
145

Medial or Lateral Orientation to the Nipple



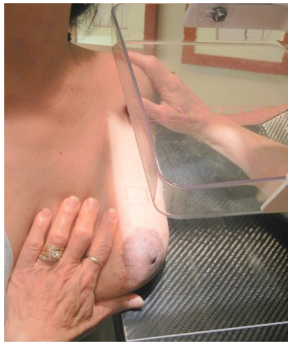
146

AT – Axillary Tail



147

AT – Axillary Tail



148

AT – Axillary Tail

- Angle tube to axillary tail
- Approximately 30 degrees

MAMMOGRAPHY EDUCATORS

149

AT – Axillary Tail

It is never used to localize a lesion.

MAMMOGRAPHY EDUCATORS

150

AT – Axillary Tail

- Only used for focal compression of the axillary tail
- Anterior to posterior orientation and compression

MAMMOGRAPHY EDUCATORS

151

AT – Axillary Tail

It will not give you true lateral/medial or true superior/inferior orientation to the nipple.

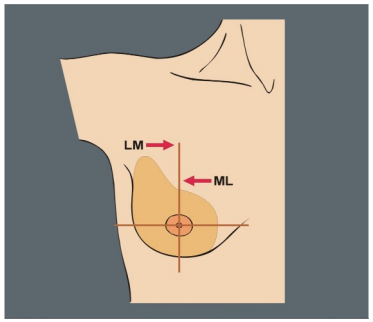
MAMMOGRAPHY EDUCATORS

152

90-Degree (True) Lateral

- LM – Lateromedial
- ML – Mediolateral

Superior or Inferior Orientation to the Nipple (LM or ML)



Use of the Lateral

- Shows effects of gravity on air fluid levels (milk of calcium)
- Used as a "tie breaker" view (to overcome superimposition of structure)
- Visualizes the breast in the sagittal plane (demonstrates an AOC superior or inferior to the nipple)

Why do the LM?

When you did the MLO, you showed the lateral breast in better detail; The LM…

- Shows the medial breast in better detail
- Takes advantage of the lateral mobile border of the breast, thus facilitates positioning

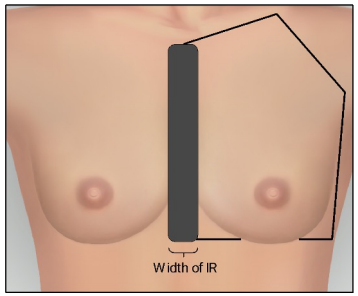
Why do the LM?

- The posterior medial breast is hardest part of the breast to image and the area most often missed on the MLO.
- If done properly, by off-setting the IR into the contralateral breast, you will be able to go deeper against the chest wall.
- There is no issue of the contralateral breast impeding the path of the compression paddle.

MAMMOGRAPHY EDUCATORS

157

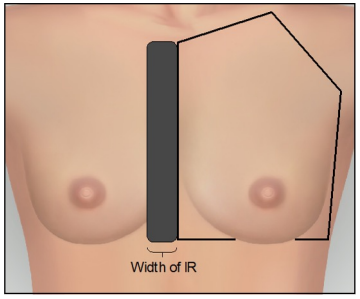
Improperly positioned LM with breasts separated, so the middle of the IR is centered on midsternal line. This excludes deep medial breast tissue on the side you are imaging.



MAMMOGRAPHY EDUCATORS

158

Properly positioned LM with breasts separated, so the *top edge of the IR* is centered on midsternal line and the width of the IR is pressing against the contralateral breast.

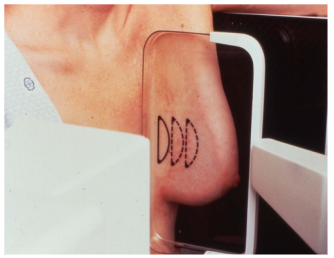


MAMMOGRAPHY EDUCATORS

159

ML – Mediolateral

The opposite breast must be pulled back to allow the compression paddle to pass and may therefore eliminate visualization of deep medial breast tissue.



MAMMOGRAPHY EDUCATORS

160

Additional Views for Clarification of AOC

- TAN
- Spot Compression
- Spot Compression with Magnification
- Rolled Views

TAN – Tangential View

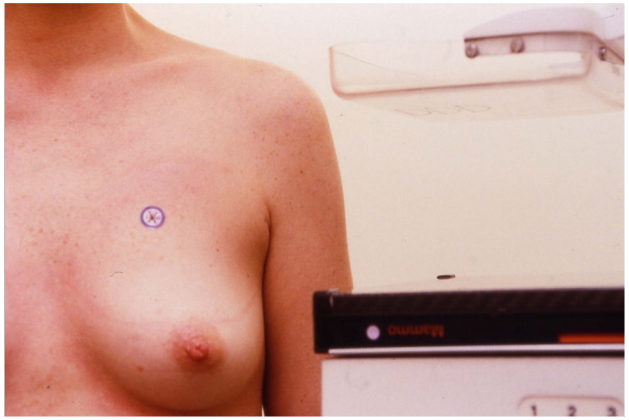
- To prove the existence of dermal calcifications
- Enhanced visualization of palpable masses that may otherwise be superimposed on glandular breast tissue

Localization for Verification of Skin Calcifications

- Decreased with use of DBT
- Set up the same as needle localization
- Determines which quadrant the calcifications are located

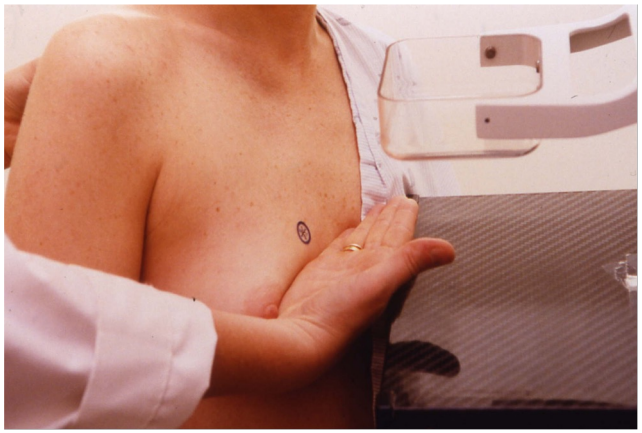
Localization for Verification of Skin Calcifications

- Use biopsy paddle
- Select direction of approach so the window of biopsy paddle is closest to the area in question



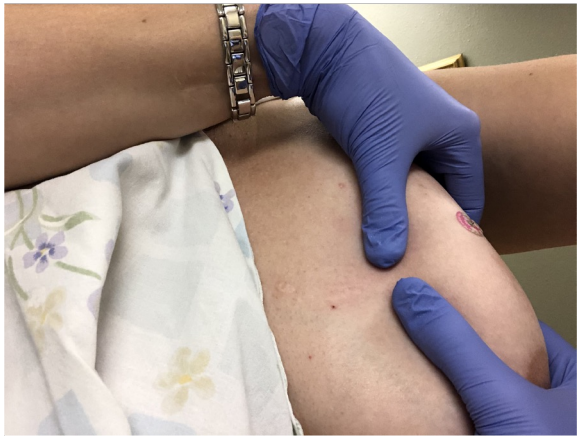
MAMMOGRAPHY EDUCATORS

165



MAMMOGRAPHY EDUCATORS

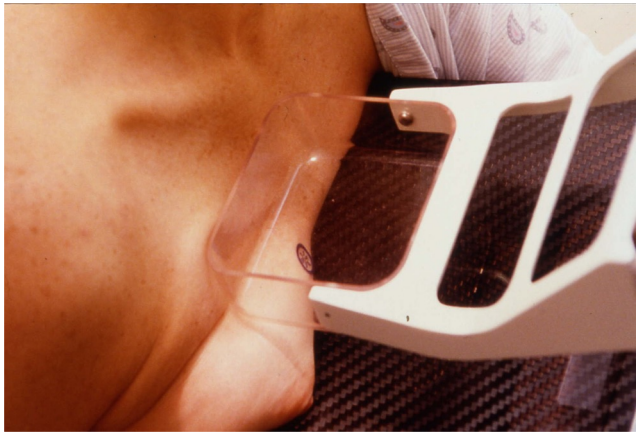
166



MAMMOGRAPHY EDUCATORS

Image Courtesy of Robyn Hadley, R.T.(R)(M)

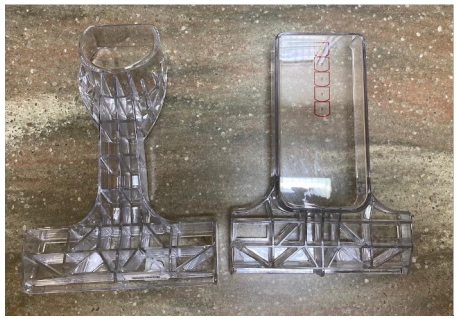
167



MAMMOGRAPHY EDUCATORS

168

Spot Compression Paddles

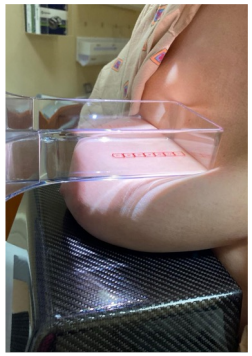


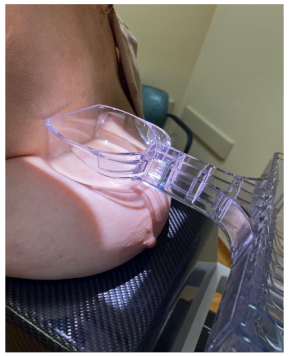
MAMMOGRAPHY EDUCATORS

Image Courtesy of Robyn Hadley, R.T.(R)(M)

169

Square vs. Round Paddle





MAMMOGRAPHY EDUCATORS

Image Courtesy of Robyn Hadley, R.T.(R)(M)

170

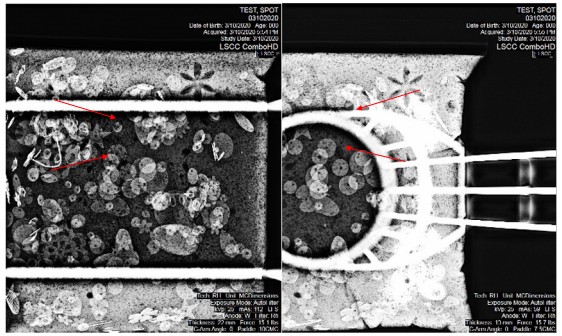
Spot Compression with Magnification

MAMMOGRAPHY EDUCATORS

Image Courtesy of Robyn Hadley, R.T.(R)(M)

171

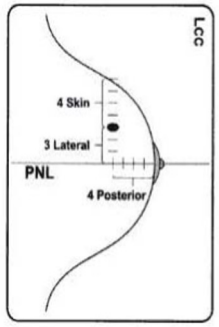
Square vs. Round Paddle



MAMMOGRAPHY EDUCATORS

Image Courtesy of Robyn Hadley, R.T.(R)(M)

172



Spot/Mag Measurements

RIGHT LEFT

CC MLO LM ML

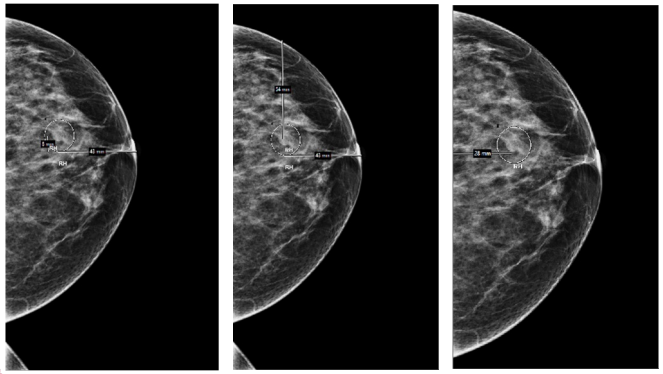
4 POSTERIOR / ANTERIOR ____

3 MED / LAT SUP / INF ____

4 SKIN ____

MAMMOGRAPHY EDUCATORS

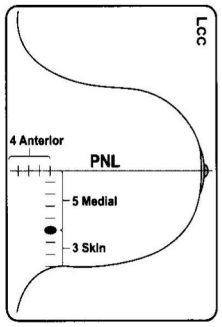
173



MAMMOGRAPHY EDUCATORS

Images Courtesy of Robyn Hadley, R.T.(R)(M)

174



Spot/Mag Measurements

RIGHT LEFT

CC MLO LM ML

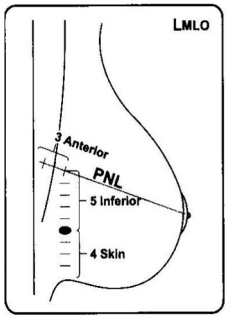
____ POSTERIOR / ANTERIOR 4

5 MED / LAT SUP / INF ____

3 SKIN ____

MAMMOGRAPHY EDUCATORS

175



Spot/Mag Measurements

RIGHT LEFT

CC MLO LM ML

____ POSTERIOR / ANTERIOR 3

____ MED / LAT SUP / INF 5

____ SKIN 4

MAMMOGRAPHY EDUCATORS

176

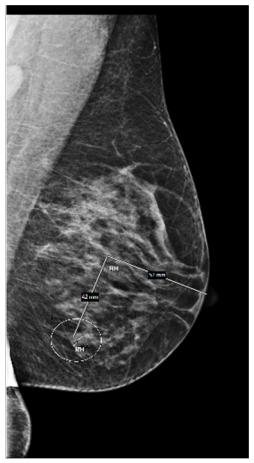


Image Courtesy of Robyn Hadley, R.T.(R)(M)

177

Remember…

- You must stimulate compression when making measurements on the breast.
- Mark the center of the target area with a surgical marker so you can make appropriate corrections on subsequent images, if needed.

178

Imaging of Augmented Breasts

- CC views of each breast with implants in place
- MLO views of each breast with implants in place
- CCID views of each breast with implant displaced
- MLOID views of each breast with implant displaced

179

Imaging of Augmented Breasts

Full implant views:

- Should be done with only enough compression to immobilize the breast to prevent motion unsharpness
- Curved paddle can be used, if available
- Appropriate technique (usually manual) should be used

180

Imaging of Augmented Breasts

ID views:

- Depending on implant mobility, can be performed with taut compression
- Half paddle can be used for patients with small amount of natural breast tissue
- Appropriate techniques (patients without implants) should be used
- Patient can be positioned from behind (tech standing and/or patient seated)

MAMMOGRAPHY EDUCATORS

181

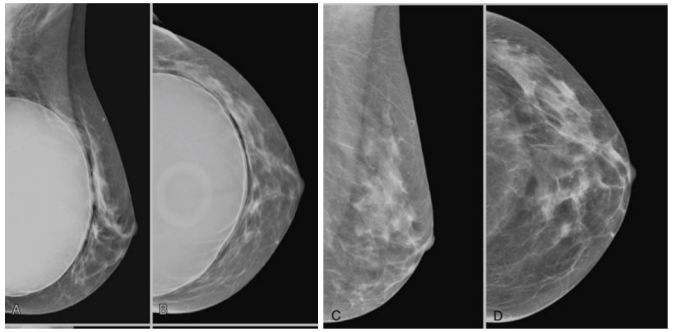
Half Paddle

MAMMOGRAPHY EDUCATORS

Image Courtesy of Robyn Hadley, R.T.(R)(M)

182

Imaging of Augmented Breasts



MAMMOGRAPHY EDUCATORS

183

Working from Behind for CCID Views

MAMMOGRAPHY EDUCATORS

184

Working from Behind for MLOID Views

MAMMOGRAPHY EDUCATORS

185

Conclusion

Additional views:

- Helpful in identifying true location of areas of concern
- Used for diagnostic workups
- Can provide valuable information to aid in diagnosis of breast cancer

MAMMOGRAPHY EDUCATORS

186

References

- Miller, L. C., RTRM. (2015). *Mammography Positioning Guidebook*. CA: Mammography Educators.
- Miller, L. C., R.R.(R)(M)(ARRT), Lehmann, T. L., B.S. R.T. (R)(M)(ARRT). (2020). *Image Quality & Positioning Problem-Solving for Breast Imagers: Meeting EQUIP Standards* (1st ed.). San Diego, California: Mammography Educators.
- Long, S. M., Miller, L. C., Botsco, M. A., & Martin, L. L. (2010). *Handbook of Mammography* (5th ed.). Edmonton: Mammography Consulting Services.
- Derenberger, Dawn, Hadley, Robyn., "Most Commonly Used Additional Views, Part 3: Defining Structures and Clarifying Presence of Abnormalties." SBI News Issue 1, 2021, https://mammographyeducation.com/most-commonly-used-additional-views-part-3-defining-structures-and-clarifying-presence-of-abnormalities/

MAMMOGRAPHY EDUCATORS

187

Positioning for the CC and MLO Views

Louise Miller, R.T.(R)(M)(ARRT), CRT(M), FSBI, FNCBC
Director of Education, Mammography Educators

MAMMOGRAPHY EDUCATORS

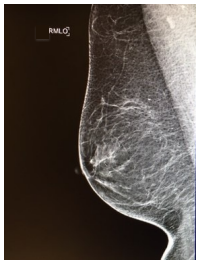
188

The MLO View

189

The MLO View

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



190

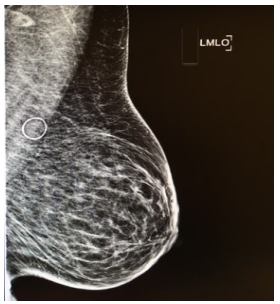
MLO: Visualization of the Pectoral Muscle

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

191

MLO: Visualization of the Pectoral Muscle

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



192

The MLO View

Remember, there are only two margins for error:

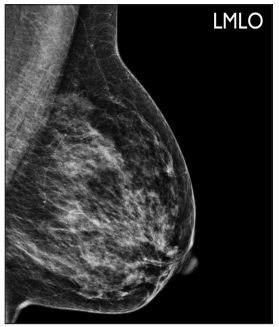
1. The way the machine is set up (i.e. height, angle, compression paddle size, etc.)
2. The way the patient is "set up": both feet, hips and shoulders forward

MAMMOGRAPHY EDUCATORS

193

MLO – Length of the Muscle

Should be visualized from axilla down to the level of the PNL.



MAMMOGRAPHY EDUCATORS

194

MLO – 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

MAMMOGRAPHY EDUCATORS

195

MLO – Angle

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

MAMMOGRAPHY EDUCATORS

196

MLO – Angle

Recommended angulation:
- Depends on body habitus
- Maintain consistency from year to year

197

I am going to say something that is shocking!!

198

Keep Angles Consistent

Use variations at 5-degree increments… No more 47, 42, 53 etc.

199

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

200

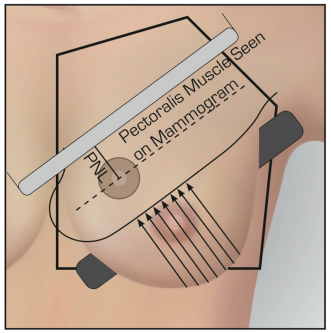
Keep Angles Consistent

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

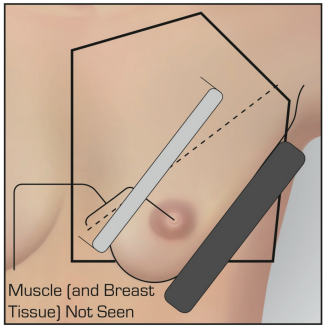
MAMMOGRAPHY EDUCATORS

201

Proper Degree of Angulation



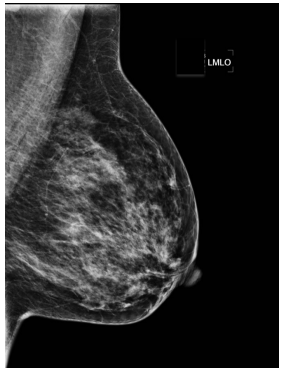
Angle Too Steep



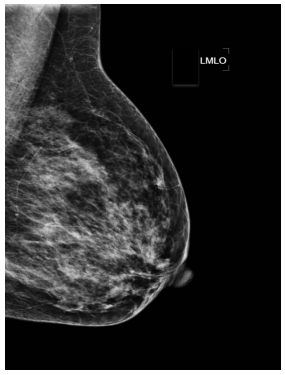
MAMMOGRAPHY EDUCATORS

202

Proper Degree of Angulation



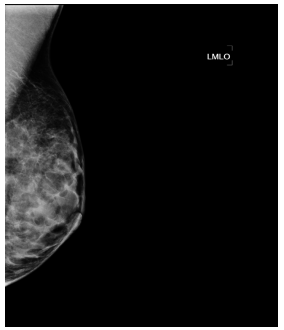
Angle Too Steep



MAMMOGRAPHY EDUCATORS

203

Is it the angle or the patient?

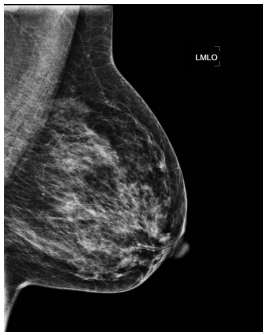


MAMMOGRAPHY EDUCATORS

204

MLO – Width of the Muscle

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



MAMMOGRAPHY EDUCATORS

205

MLO – 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

MAMMOGRAPHY EDUCATORS

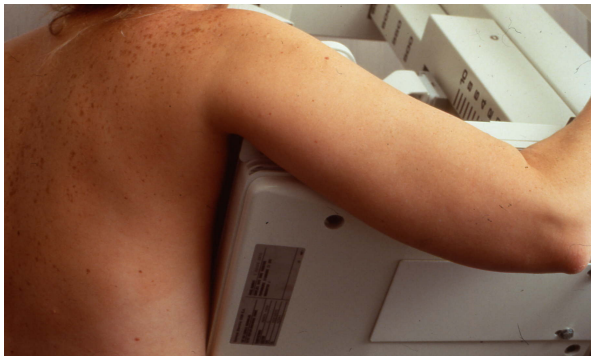
206

MLO – 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

MAMMOGRAPHY EDUCATORS

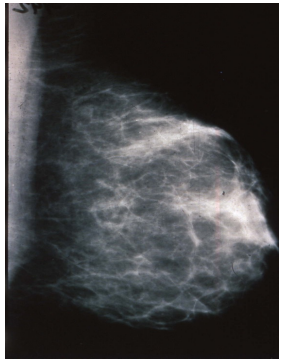
207



MAMMOGRAPHY EDUCATORS

208

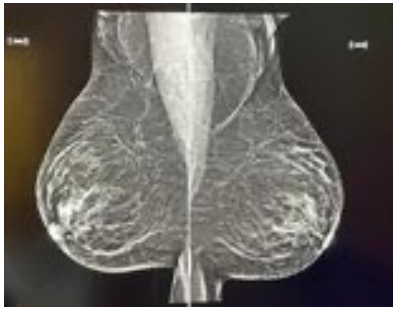
Is it the placement of the IR in the axilla or the patient?



MAMMOGRAPHY EDUCATORS

209

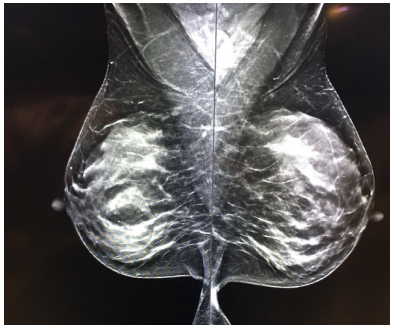
MLO – Width of the Muscle



MAMMOGRAPHY EDUCATORS

210

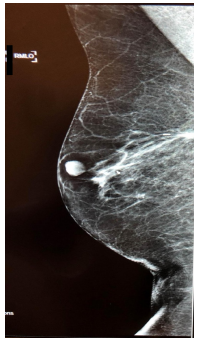
Visualization of the Lat Dorsi



MAMMOGRAPHY EDUCATORS

211

Patient HX – Lumpectomy RUOQ



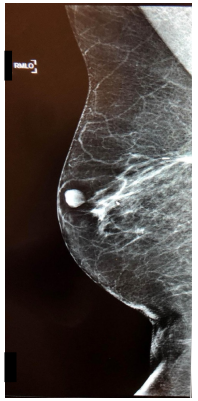
MAMMOGRAPHY EDUCATORS

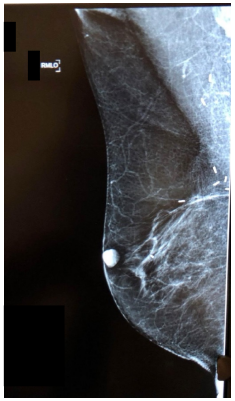
212

Normal Placement of the IR Just Anterior to the Latissimus Dorsi

MAMMOGRAPHY EDUCATORS

213



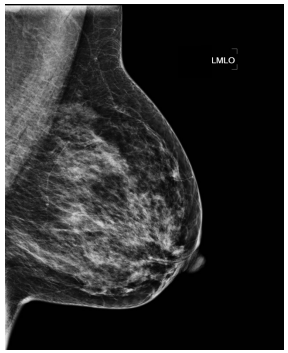


MAMMOGRAPHY EDUCATORS

214

MLO – Shape and Opacity of the Muscle

The muscle should be convex or straight



MAMMOGRAPHY EDUCATORS

215

MLO – 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 axilla crease

MAMMOGRAPHY EDUCATORS

216

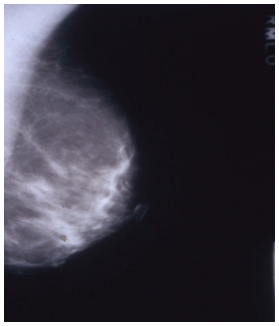
MLO – Patient

- The shape and opacity of the muscle is related to relaxation of the pectoralis muscle
- Patient's shoulder, arm and hand must be relaxed

MAMMOGRAPHY EDUCATORS

217

Is it the height of the IR or the patient?



MAMMOGRAPHY EDUCATORS

218

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%	-

MAMMOGRAPHY EDUCATORS

*AJR:209, December 2017

219

Problems with the MLO

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

MAMMOGRAPHY EDUCATORS

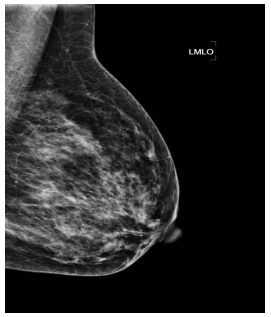
220

MLO – Visualization of the IMF

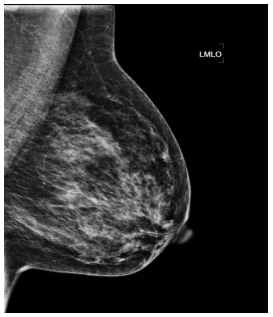
Equipment challenges:

- 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

No IMF



IMF

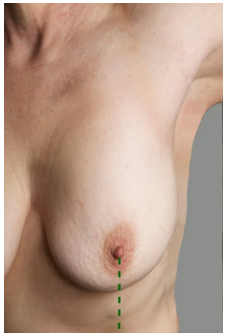


MLO – Visualization of the IMF

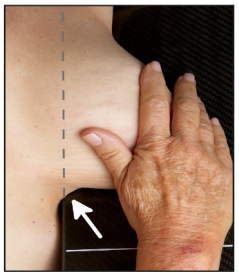
The position of the patient related to the bottom, front corner of the IR is **critical**:

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

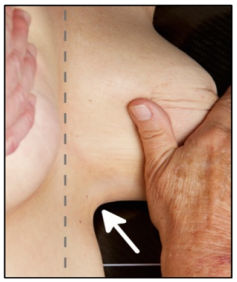
Inferior Nipple Line



IMPROPER
Edge of the IR is in Front of IMF



PROPER
Edge of the IR is Behind IMF

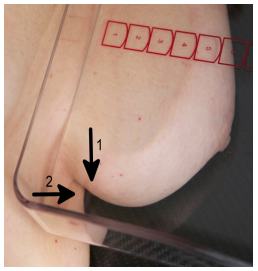


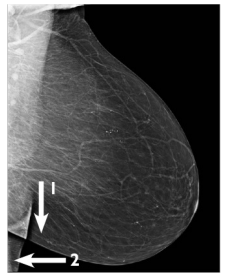
*Top edge of IR indicated by vertical dotted line

MAMMOGRAPHY EDUCATORS

225

Folds in the IMF



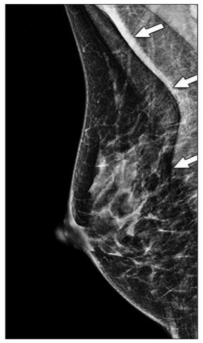


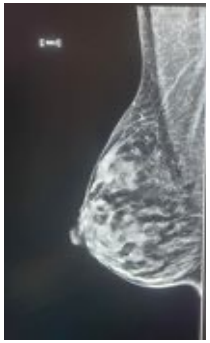
1) Horizontal fold is in the medial breast
2) Vertical fold is in the lateral breast

MAMMOGRAPHY EDUCATORS

226

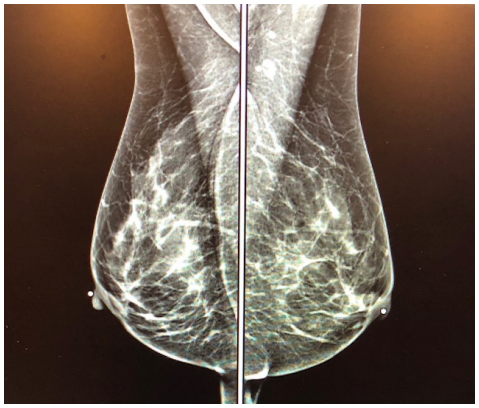
Skin and Fat Folds





MAMMOGRAPHY EDUCATORS

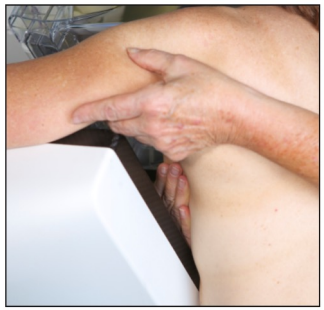
227



MAMMOGRAPHY EDUCATORS

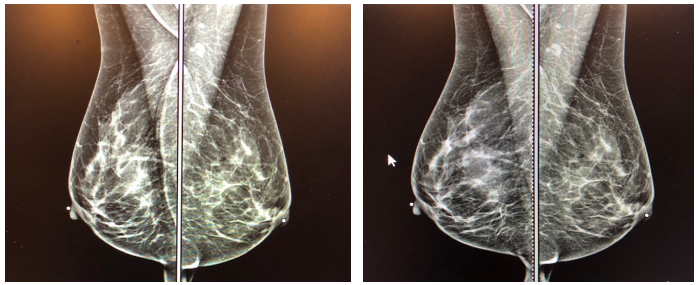
228

Your hand slides down the lateral side of the breast.



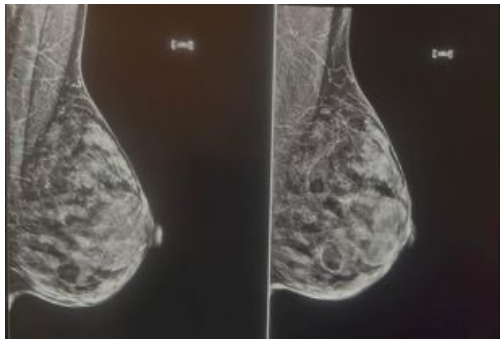
MAMMOGRAPHY EDUCATORS

229



MAMMOGRAPHY EDUCATORS

230



MAMMOGRAPHY EDUCATORS

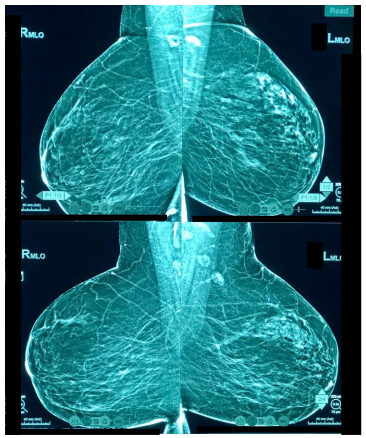
231

Position of the Breast

- Breast held in the "up and out" position to bring the breast back to its "normal" position (nipple perpendicular to the chest wall)
- Maintained by adequate compression

MAMMOGRAPHY EDUCATORS

232

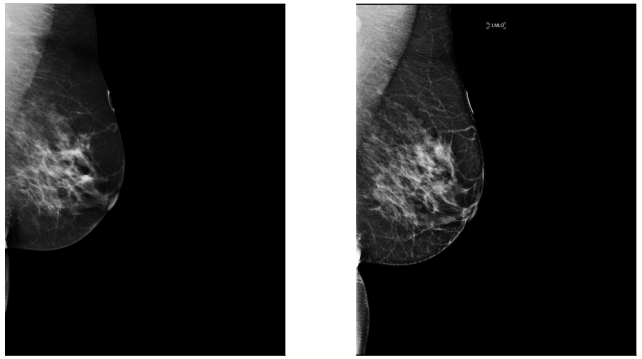


233

BEFORE 11.8 cm

STANDARDIZED POSITIONING + 1.0 cm

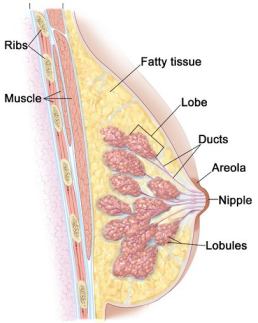
AFTER 12.8 cm



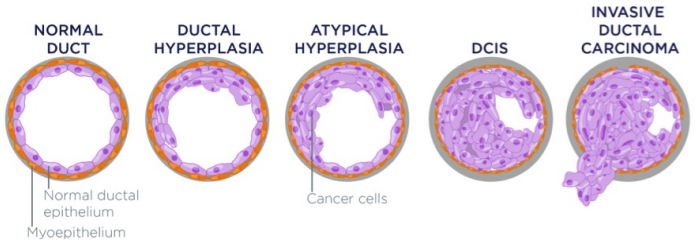
234

Glandular Breast Tissue

Ducts, lobes, and lobules



235



236

Breast Sagging

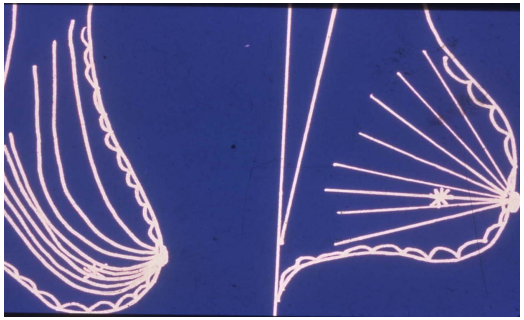


Image Courtesy Stephen Feig, MD

MAMMOGRAPHY EDUCATORS

237

"Up and Out" Position

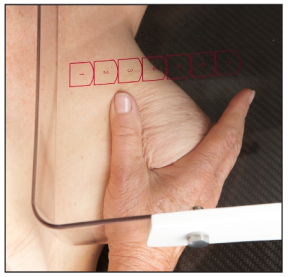
Maintain the breast in the "up and out" position*

- 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"

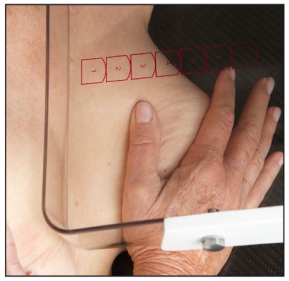
MAMMOGRAPHY EDUCATORS

238

Solution for "Sagging" Breast



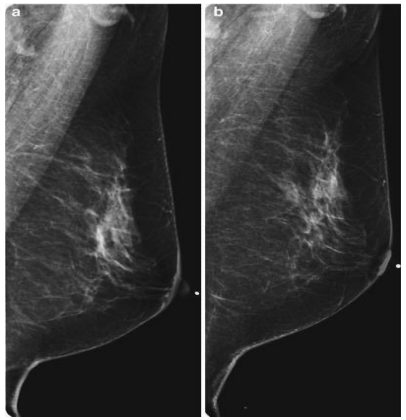
Hold the breast in up and out position.



Compress.

MAMMOGRAPHY EDUCATORS

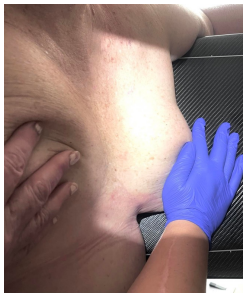
239



MAMMOGRAPHY EDUCATORS

240

Have the patient lift and flatten their opposite breast – never "pull" back.



MAMMOGRAPHY EDUCATORS

241

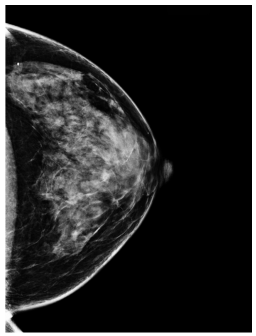
The CC View

MAMMOGRAPHY EDUCATORS

242

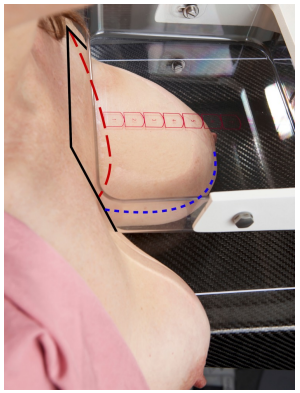
The CC View

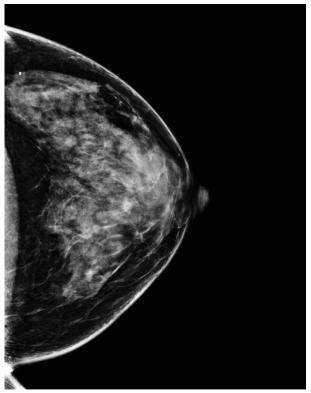
- Include maximum amount of breast tissue in the axial/transverse plane
- Visualization of medial breast tissue (cleavage) if possible
- Visualization of pectoralis muscle on approximately 40-50% of all CCs



MAMMOGRAPHY EDUCATORS

243





MAMMOGRAPHY EDUCATORS

244

The CC View – Equipment or Patient?

Equipment:
- IR too high or too low
- Compression paddle size

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

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

Stand on the Medial Side

- So you can see if medial breast tissue is included
- To facilitate the performance of the exam
- To keep the patient "pushed" forward
- To maintain eye contact

Remember 5 Things…

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

1) Elevate the breast/IMF and adjust the height of the IR

MAMMOGRAPHY EDUCATORS

249

2) Pull the breast onto the IR with both hands

MAMMOGRAPHY EDUCATORS

250

3) Anchor the breast

MAMMOGRAPHY EDUCATORS

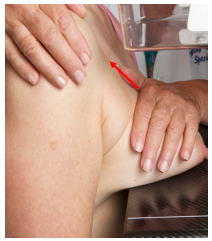
251

4) Place your elbow and forearm at the mid-thoractic region of the patient's spine and gently "push" her forward

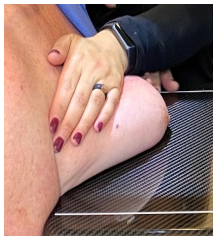
MAMMOGRAPHY EDUCATORS

252

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



Before

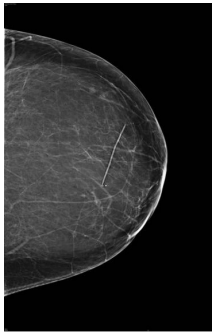


After

MAMMOGRAPHY EDUCATORS

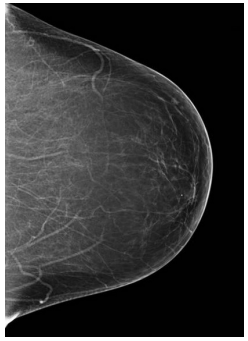
253

One-handed "Plop"



12.5 cm

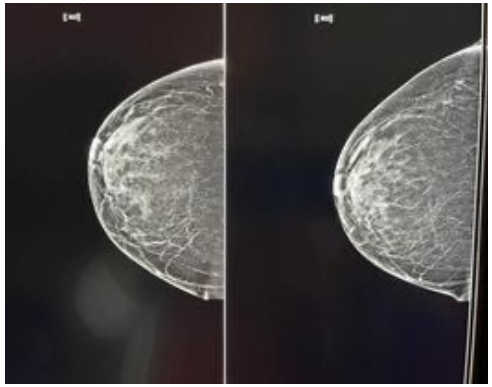
Two-handed Pull



14.8 cm

MAMMOGRAPHY EDUCATORS

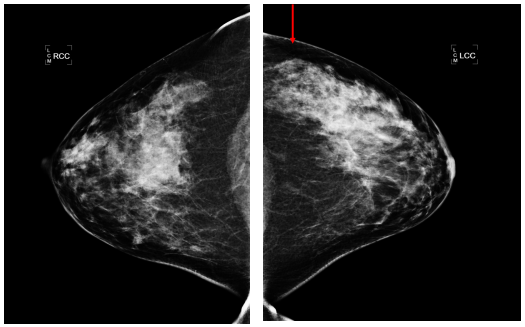
254



MAMMOGRAPHY EDUCATORS

255

Failure to include lateral posterior breast tissue or ???



MAMMOGRAPHY EDUCATORS

256

NIPPLE IN PROFILE
NIPPLE CENTERED

MAMMOGRAPHY EDUCATORS

257

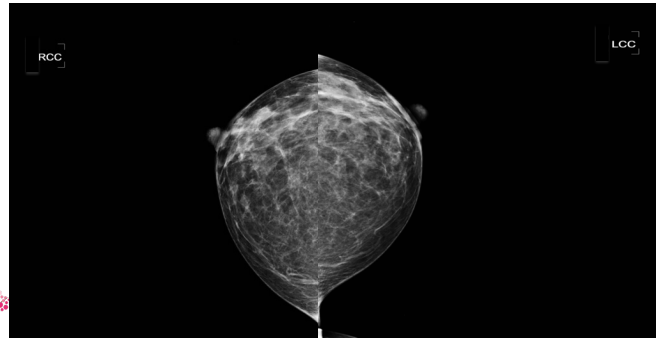
Nipple Centered

- 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

MAMMOGRAPHY EDUCATORS

258

Patient with Prominent Medial Fullness



MAMMOGRAPHY EDUCATORS

259

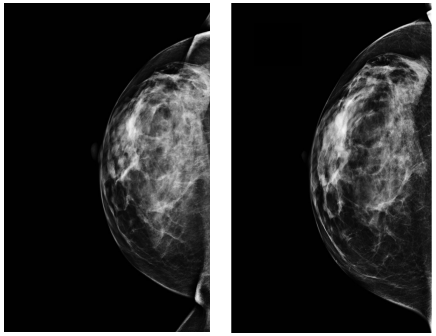
Nipple Centered

- 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 history sheet

MAMMOGRAPHY EDUCATORS

260

Compression



MAMMOGRAPHY EDUCATORS

261

Solutions – Compression

Criteria: Breast should be compressed until taut or less than painful and glandular tissue should be well separated

- Technologist must compress the breast until "taut" or less than painful
- Technologist must work with the patient to achieve adequate compression

MAMMOGRAPHY EDUCATORS

262

Focus On…

- Consistency
- Reproducibility
- Efficiency
- Proficiency
- Ergonomic principles

MAMMOGRAPHY EDUCATORS

263

Mammography Saves Lives!

But it is up to you… Even the best radiologist, in the best breast center cannot diagnose a cancer that is not included on the image.

MAMMOGRAPHY EDUCATORS

264

Challenging Patients and Situations in Mammography

Louise C. Miller, R.T.(R)(M)(ARRT), CRT(M), FSBI, FNCBC
Director of Education, Mammography Educators

MAMMOGRAPHY EDUCATORS

MAMMOGRAPHY EDUCATORS

MAMMOGRAPHY EDUCATORS

Challenging Patients and Situations

- Patient Circumstances
- Body Habitus Issues
- Special Needs

MAMMOGRAPHY EDUCATORS

Challenging Patients and Situations

- **Patient Circumstances**
- Body Habitus Issues
- Special Needs

MAMMOGRAPHY EDUCATORS

269

Patient Circumstances

- Mobility
- Limitations
- Breast size

MAMMOGRAPHY EDUCATORS

270

Mobility

- Walkers
- Wheelchairs
- Scooters

MAMMOGRAPHY EDUCATORS

271

Patients with Walkers

- Assess stability
- Have the patient sit up as straight as possible in the chair
- Have the patient sit as far forward as possible in the chair (use pillows to "bolster" them)
- Move foot pedals out of the way

MAMMOGRAPHY EDUCATORS

272


MAMMOGRAPHY EDUCATORS

273

Reduce Fall Risk



MAMMOGRAPHY EDUCATORS

274

Patients in Wheelchairs

- Remove the arms from the chair
- Have the patient sit up as straight as possible in the chair
- Have the patient sit as far forward as possible in the chair (use pillows to "bolster" them)

MAMMOGRAPHY EDUCATORS

275

Turn Wheelchair 45-Degrees Away from IR


MAMMOGRAPHY EDUCATORS

276

277

Let them drive themselves where you need them to be!

278

Mobility

- When in doubt, the patient should be seated!
- Leave the patient in their wheelchair
- Be very cautious of stools with wheels
- Consider patient stability

279

Mobility

- Override automatic compression release
- Let them hang on
- Get assistance
- Accurately assess stability

280

Assessing Stability

Ask them if they do everyday things things that require similar ability:

- "Can you get in and out of bed on your own?"
- "Can you get to the bathroom without help?"

MAMMOGRAPHY EDUCATORS

281

Don't just ask… "Can you stand"?

Mammography requires:

- Balance
- Stability
- ROM

MAMMOGRAPHY EDUCATORS

282

Limitations

- Limited ROM – neck, shoulder, arm, etc.
- Full or partial paralysis

MAMMOGRAPHY EDUCATORS

283

Limitations

- Mostly does not affect CC
- If you can't do an MLO, do a LM or ML
- For visualization of UOQ, do a slightly angled AT

MAMMOGRAPHY EDUCATORS

284

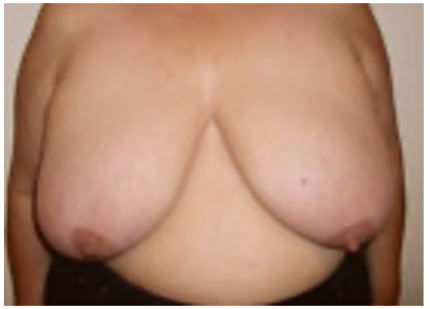
Breast Size

- Extremely large
- Extremely small

MAMMOGRAPHY EDUCATORS

285

Extremely Large Breasts



MAMMOGRAPHY EDUCATORS

286

Extremely Large Breasts – Challenges

- Volume of breast tissue
- Weight of the breast
- Limited IR size
- Increased probability of stretching/tearing of the skin (especially in IMF)
- Protruding abdomen

MAMMOGRAPHY EDUCATORS

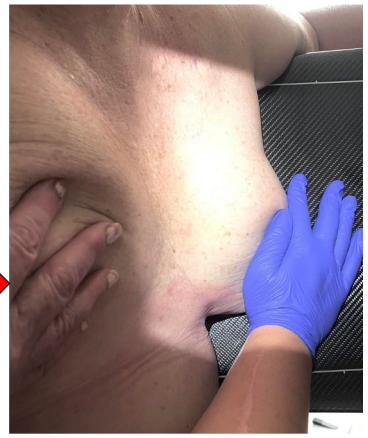
287

Extremely Large Breasts – Tips

- Perform a high and low MLO, if needed
- Do an anterior compression view, if needed
- To help increase visibility of the IMF, have the patient lift and flatter their contralateral breast

MAMMOGRAPHY EDUCATORS

288



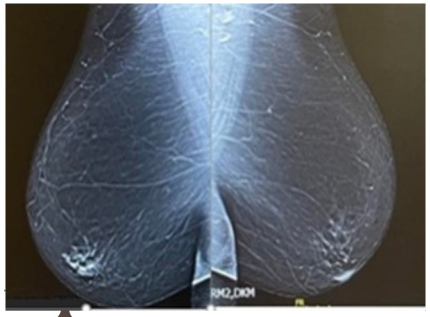
289

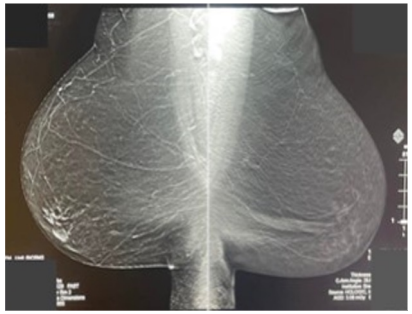
Extremely Large Breasts – Tips

- Hold the breast up higher than you think you need
- Make sure breast is help up and out
- **Don't let go** until compression is complete

290

Holding the Breast in the Up and Out Position Until Compression is Complete





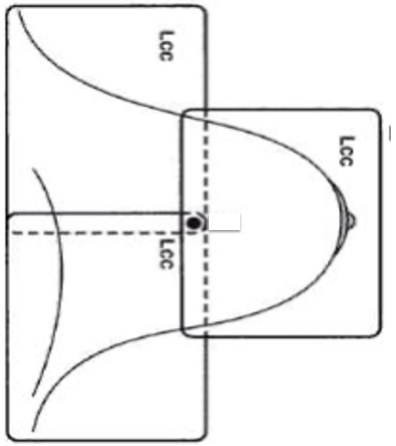
291

Extremely Large Breasts – Challenges

Biggest challenge is that multiple images have to be used and then "pieced" together, making sure breast tissue was not missed.

- Mosaic or tile the breast in segments
- Use "markers" to designate overlap

292



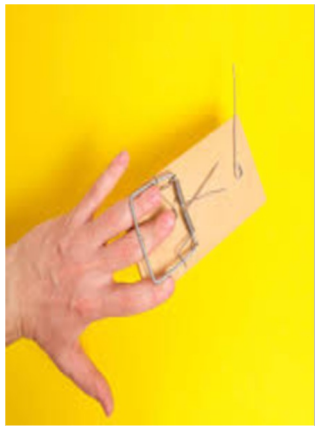
MAMMOGRAPHY EDUCATORS

293

Extremely Small Breasts

MAMMOGRAPHY EDUCATORS

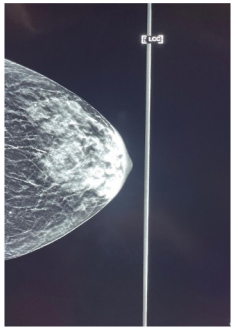
294



MAMMOGRAPHY EDUCATORS

295

Use the Half (Implant) Paddle



MAMMOGRAPHY EDUCATORS

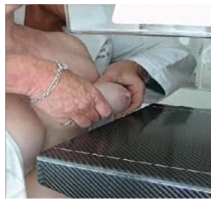
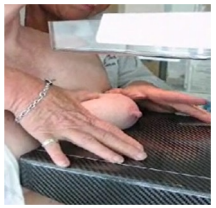
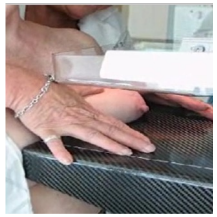
296

Position From Behind the Patient

- Use the implant displacement technique
- If positioning from behind the patient, it is imperative that you explain the process first, to assure their comfort level
- Have the patient seated

MAMMOGRAPHY EDUCATORS

297

MAMMOGRAPHY EDUCATORS

298

Challenging Patients and Situations

- Patient Circumstances
- **Body Habitus Issues**
- Special Needs

MAMMOGRAPHY EDUCATORS

299

Body Habitus Issues

- Pectus Carinatum
- Pectus Excavatum
- Kyphosis
- Lordosis
- Scoliosis

MAMMOGRAPHY EDUCATORS

300

Pectus Carinatum

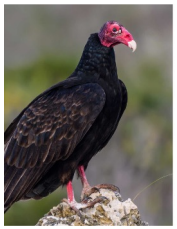
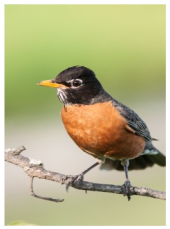
- Also called "pigeon chest"
- A deformity of the chest characterized by a protrusion of the sternum and rubs
- More common in males than females (4:1 ratio)

Hint: Carrion (birds that eat meat)

MAMMOGRAPHY EDUCATORS

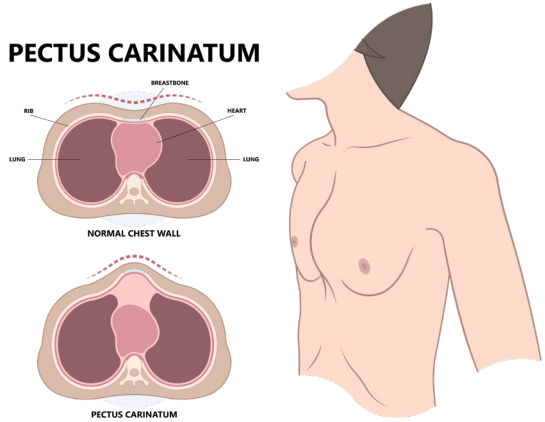
301

Carrions

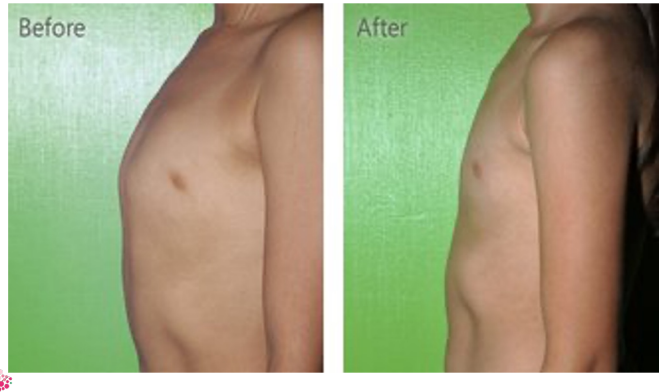
MAMMOGRAPHY EDUCATORS

302



MAMMOGRAPHY EDUCATORS

303



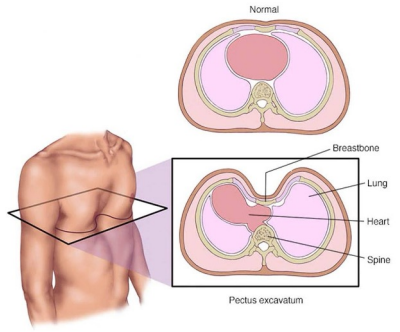
MAMMOGRAPHY EDUCATORS

304

Pectus Excavatum

- Also called "funnel chest"
- A deformity of the chest characterized by an indentation of the sternum accompanied by a protrusion of the ribs
- More common in males than females (3:1 ratio)

Hint: Excavate, cave



Pectus Carinatum & Pectus Excavatum

- Try standard views
- "Chevron" the CCs: XCCL and CV, as needed
- LM as additional view (slightly angle the top of the IR *away* from the breast being imaged, if needed)

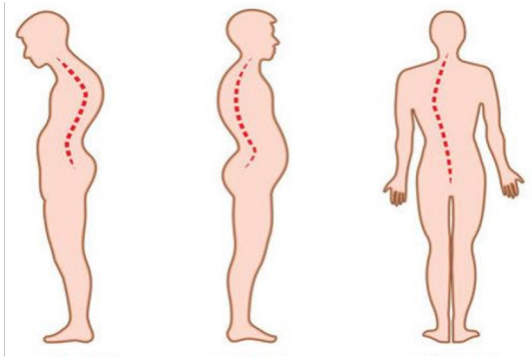
Conditions of the Spine

- Kyphosis – curvature of the **thoracic** spine
- Lordosis – curvature of the **lumbar** spine
- Scoliosis – curvature of the **lateral** spine

MAMMOGRAPHY EDUCATORS

309

Kyphosis Lordosis Scoliosis



MAMMOGRAPHY EDUCATORS

310

Kyphosis/Lordosis – Positioning

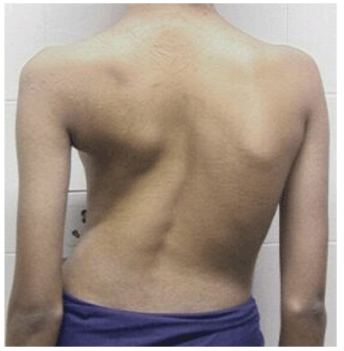
Attempt the standard views first, then add views as needed:

- "Lordotic" CC
- LM
- Use tips recommended for pectus issues (angled LM, "chevroned" CCs)

MAMMOGRAPHY EDUCATORS

311

Scoliosis



MAMMOGRAPHY EDUCATORS

312

Scoliosis

- CCs should not be affected
- 2 different degrees of angulation for the MLOs may be needed

MAMMOGRAPHY EDUCATORS

313

KISS*

MAMMOGRAPHY EDUCATORS

314

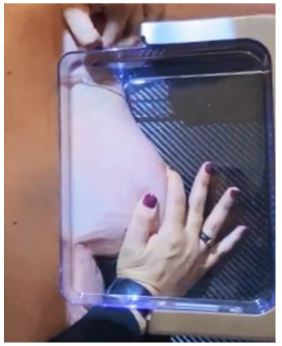
Keep It Simple Sister!

- Attempt the standard views first
- Get "creative" as needed
- I *rarely* do a FB
- I never do a SIO
- I never do an LMO

MAMMOGRAPHY EDUCATORS

315

My Favorite Go-To View?!



MAMMOGRAPHY EDUCATORS

316

Challenging Patients and Situations

- Patient Circumstances
- Body Habitus Issues
- **Special Needs**

MAMMOGRAPHY EDUCATORS

317

Special Needs

- Alzheimer's
- Dementia
- Overly medicated
- Elderly/infirm
- Confused
- Developmentally disabled

MAMMOGRAPHY EDUCATORS

318

Special Needs

- Seek assistance of caretaker
- Let their caretaker stay in the room
- Speak slowly and clearly
- Use terminology they can understand
- Find solutions for recurring problems

MAMMOGRAPHY EDUCATORS

319

Special Needs

MAMMOGRAPHY EDUCATORS

320

DO YOUR BEST!

MAMMOGRAPHY EDUCATORS

321

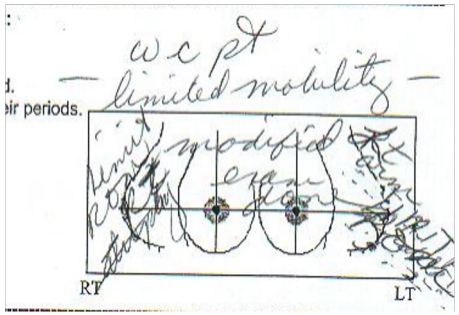
No Matter the Limitations…

- Document… Document…Document!
- Use appropriate terminology
- Keep it concise
- Be consistent

MAMMOGRAPHY EDUCATORS

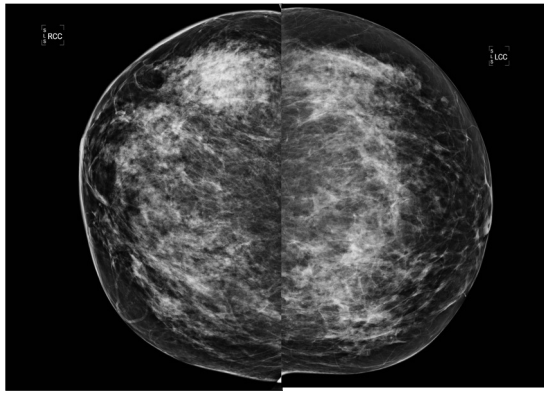
322

What **NOT** To Do



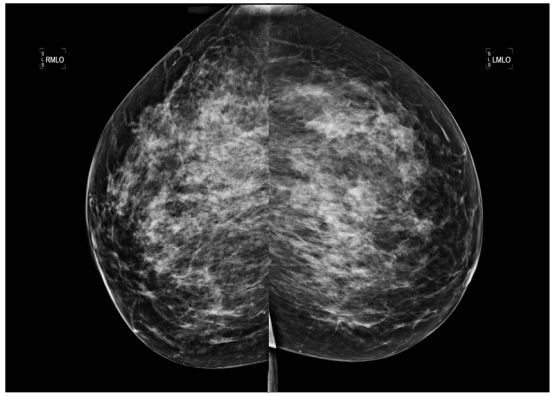
MAMMOGRAPHY EDUCATORS

323



MAMMOGRAPHY EDUCATORS

324



MAMMOGRAPHY EDUCATORS

325

No Magic Bullet

MAMMOGRAPHY EDUCATORS

326

Mission and Motivation: The Critical Role of the Mammographer

Louise Miller, R.T.(R)(M)(ARRT), CRT(M), FSBI, FNCBC
Director of Education, Mammography Educators

MAMMOGRAPHY EDUCATORS

327

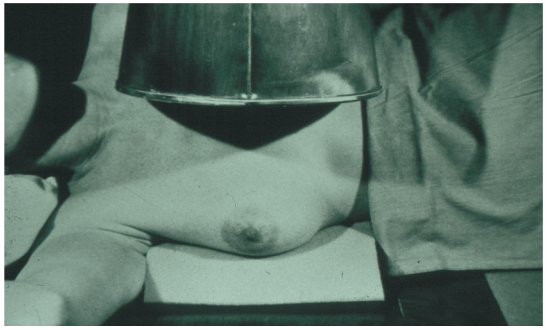
What's Changed?

- Cardboard cassette to Xerography
- Xerography to FS
- FS to FFDM
- FFDM to DBT

MAMMOGRAPHY EDUCATORS

328

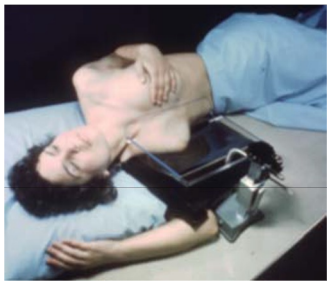
Cardboard Cassettes



MAMMOGRAPHY EDUCATORS

329

Xerography



MAMMOGRAPHY EDUCATORS

330

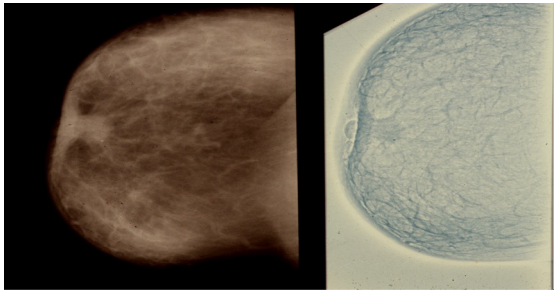
Pat Troyer, X-ray Technologist, shows a completed mammograph and the Xeroradiography equipment at Bess Kaiser Hospital which has helped detect cancer early in hundreds of women over the past three years. A balloon (or sometimes a clear plastic plate) compresses the breast and spreads the tissue to produce a clear picture of the interior.

Xeroradiography produces a highly detailed picture on plastic coated paper. A physician specialist (Radiologist) can interpret the picture without the use of the special viewing apparatus usually needed to read X-rays. This view of both breasts shows mammary dysplasia—a non-malignant condition of the breast. If

MAMMOGRAPHY EDUCATORS

331

Film/screen vs. Xerox



MAMMOGRAPHY EDUCATORS

332

Full Field Digital Mammography

333

Digital Breast Tomosynthesis

- This technology has been tested since the 1990s
- Invented by Dr. Daniel Kopans at Harvard Medical School/Massachusetts General Hospital
- Approved by the FDA in 2011

334

FS - FFDM - DBT

- Increased width in face shield
- Increased thickness and length of IR compared to the bucky

335

With change comes challenge *and* opportunity.

336

Change Is Not Easy

- It is challenging
- It is something different
- It CAN be fun!!

MAMMOGRAPHY EDUCATORS

337

How you approach change will directly affect success!

BE POSITIVE!!

AND STAY CALM……

MAMMOGRAPHY EDUCATORS

338

STAY FOCUSED ON WHAT IS IMPORTANT

MAMMOGRAPHY EDUCATORS

339

Motivation and Mission

Patients and Perspective

MAMMOGRAPHY EDUCATORS

340

Motivation

- How do we motivate others?
- How do we keep ourselves motivated?

MAMMOGRAPHY EDUCATORS

341

Mission

- Our aspirations as individuals
- Our aspirations as a group

MAMMOGRAPHY EDUCATORS

342

Patients

Why we do what we do.

MAMMOGRAPHY EDUCATORS

343

Perspective

How we look at things.

MAMMOGRAPHY EDUCATORS

344

DISTORTED PERSPECTIVE

345

Burnout and Stress

346

In Times of Stress

- Remember your mentor or someone you have mentored
- Remember the patient who thanked you for being kind
- Remember something that was personal and positive related to your work

347

This is personal!

Each and every patient belongs to someone.

Take the time to see them as such.

348

Remembering this will help us focus on the commitment we have made as health CARE professionals.

MAMMOGRAPHY EDUCATORS

349

ARE YOU TOO BUSY?

MAMMOGRAPHY EDUCATORS

350

What about your commitment to your work?

Why are you doing this in the first place?

MAMMOGRAPHY EDUCATORS

351

Committed to a Cause

- Gives us a sense of competence about ourselves and others
- Helps us focus our energy
- Is a positive outlet for our energy
- Creates a positive identification
- Connects us with our spiritual self

MAMMOGRAPHY EDUCATORS

352

When We Are Committed

- Emotional support
- Empathy
- Engage with our self and others
- Utilize our inner resources to guide us

MAMMOGRAPHY EDUCATORS

353

Committed to a Cause

- Gives us a sense of competence about ourselves and others
- Helps us focus our energy
- Is a positive outlet for our energy
- Creates a positive identification

MAMMOGRAPHY EDUCATORS

354

Committed to a Cause

- We benefit emotionally
- Create interdependence
- Add to our mental well-being

MAMMOGRAPHY EDUCATORS

355

COMMITTED TO COMPASSION

MAMMOGRAPHY EDUCATORS

356

HAVING PRIDE IN WHAT YOU DO

MAMMOGRAPHY EDUCATORS

357

PRIDE

Acknowledging all that you have… and all that you have accomplished with humility… but without arrogance.

MAMMOGRAPHY EDUCATORS

358

Individual and Collective Pride

Experiences in which we can say… "I… we… did this well."

MAMMOGRAPHY EDUCATORS

359

Being of service to one another… one colleague, one patient, one life at a time, one moment at a time is essentially what the role of the breast health professional is all about….

MAMMOGRAPHY EDUCATORS

360

Being proud of What you do… And your special role as a link in the chain of life.

MAMMOGRAPHY EDUCATORS

361

Pride we can feel when we are…

- Kind
- Compassionate
- Mentoring
- Teaching
- Motivating
- Sharing
- Healing
- Helping

MAMMOGRAPHY EDUCATORS

362

Making a Difference

MAMMOGRAPHY EDUCATORS

363

This is personal…

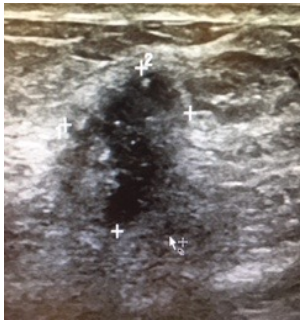
Each and every patient belongs to someone.

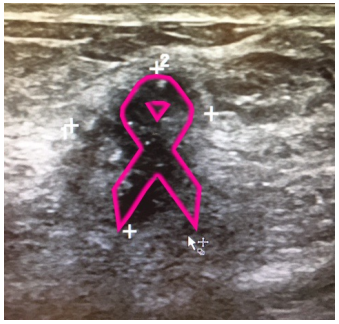
Take the time to see them as such.

The quality of their exam depends on YOU!

MAMMOGRAPHY EDUCATORS

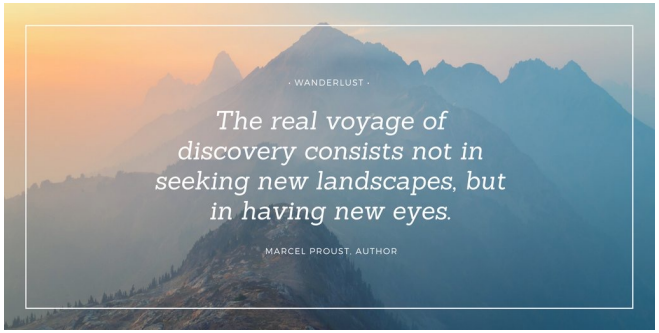
364





MAMMOGRAPHY EDUCATORS

365



MAMMOGRAPHY EDUCATORS

366

MAMMOGRAPHY EDUCATORS

367

Thank You!

Services we offer, include:

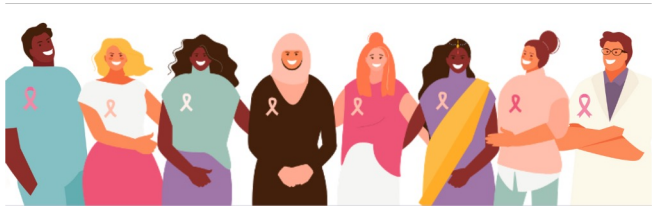
- Onsite Positioning Training
- Assistance with Accreditation & Inspection
- Live Webinars and Conferences
- On-Demand Continuing Education

For questions or more information:

619-663-8269
mammographyeducators.com
info@mammographyeducators.com

MAMMOGRAPHY EDUCATORS

368



Interact with Breast Imaging Professionals from Around the World

Join our Facebook Group:

Quality Breast Imagers

www.facebook.com/groups/qualitybreastimagers

MAMMOGRAPHY EDUCATORS

References: The Importance of Standardized Positioning

"Poor Positioning Responsible For Most Clinical Image Deficiencies, Failures." U.S. Food and Drug Administration, 29 November 2017, https://public4.pagefreezer.com/browse/FDA/27-12-2022T08:32/https://www.fda.gov/radiation-emitting-products/mqsa-insights/poor-positioning-responsible-most-clinical-image-deficiencies-failures

Miller, Louise C., "A Technologist's Perspective of the FDA Report 'Poor Positioning for Most Clinical Image Deficiencies, Failures'." SBI News, 3 June 2016, https://mammographyeducation.com/a-technologists-perspective-of-the-fda-report/

Miller, Louise C., "What Every Mammography Technologist Would Like Their Radiologist to Know About: Our Patients." SBI Newsletter, 2015, https://mammographyeducation.com/what-every-mammography-technologist-would-like-their-radiologist-to-know-about-the-role-of-the-technologist/

James, John T. PhD. "A New, Evidence-based Estimate of Patient Harms Associated with Hospital Care." Journal of Patient Safety, September 2013, https://journals.lww.com/journalpatientsafety/Fulltext/2013/09000/A_New,_Evidence_based_Estimate_of_Patient_Harms.2.aspx

MAMMOGRAPHY EDUCATORS