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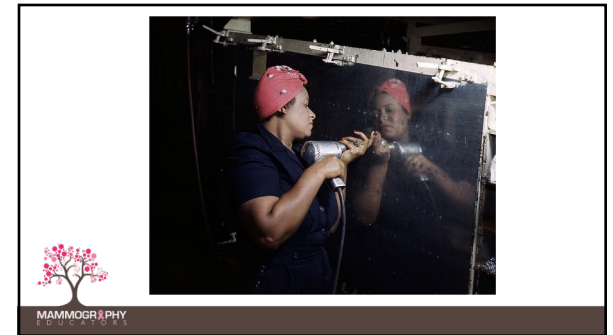
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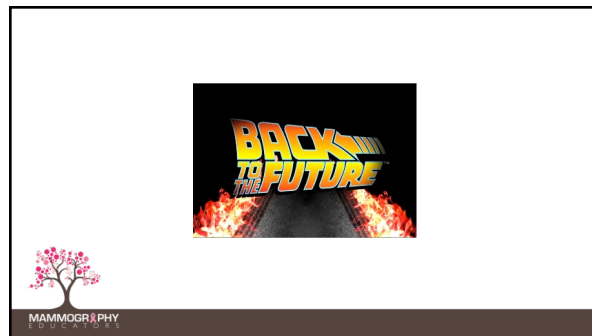
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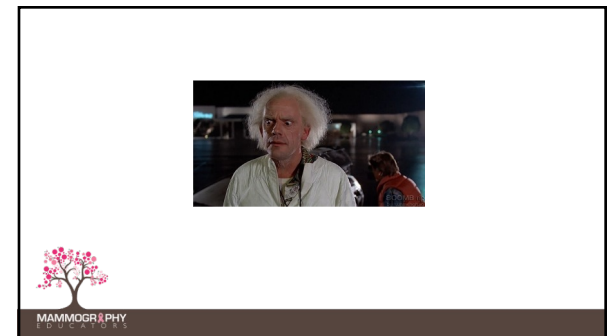
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The successes and mistakes of the past can provide useful lessons and guidance for the future.




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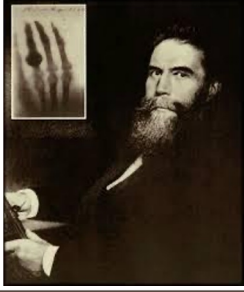

Breast Cancer through the ages

- First documentation breast cancer in 1600 BC
- Detection and treatment changed most dramatically in the European Renaissance period
- Discovery of x-ray the biggest advance in breast cancer dx and tx



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1949 - Uruguayan Raul Leborgne emphasizes the need for breast compression to identify calcifications.

1966 – The first dedicated mammography system is introduced.

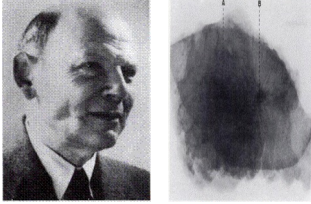

1971 – Commercial introduction of xeromammography

1980 – Introduction of single emulsion film



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- Egan technique
- Xeroradiography
- Dedicated mammography units
- Film/screen systems (grids)
- Rigid compression
- Is there a benefit from screening?
- Needle localization
- Ultrasound
- Tomography
- MRI



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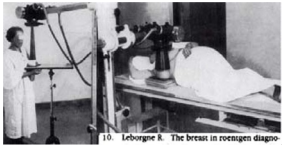
Mammography technology has come a long way since the first machine specifically designed for producing mammograms was introduced in 1966.




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Uruguay 1953



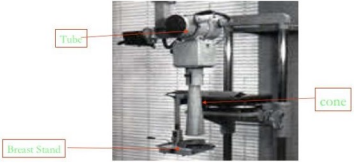
10. Leborgne R. The breast in roentgen diagnosis



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Mammography



Past & Present

Similar equipments were & are still being used, these can be called as old fashioned equipments



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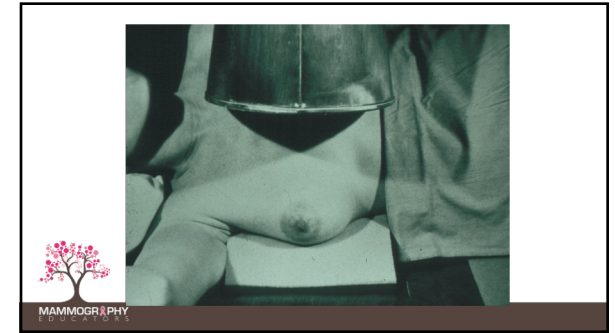
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Usually done when a patient had a very large palpable mass

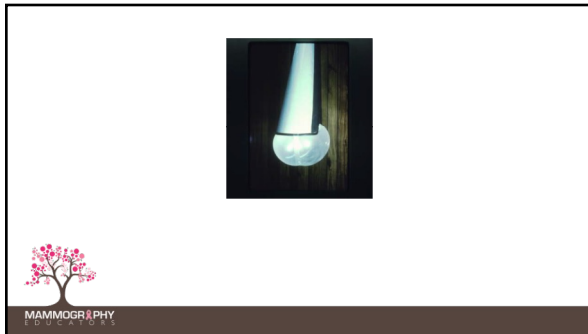
- Limited productivity; 4-5 patients imaged per day
- Limited to CC and MLO views; no ability to do extra diagnostic views



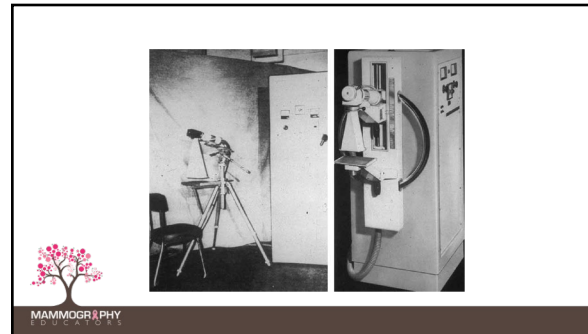
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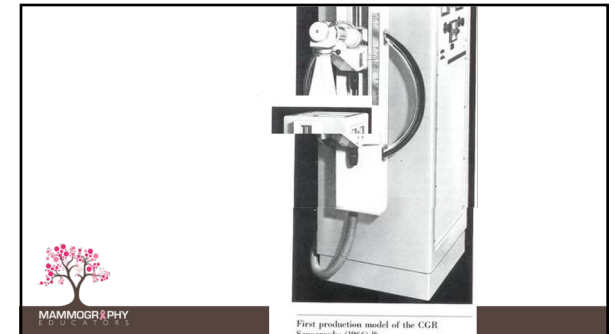
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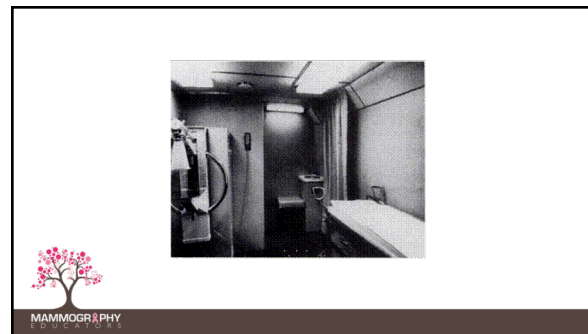
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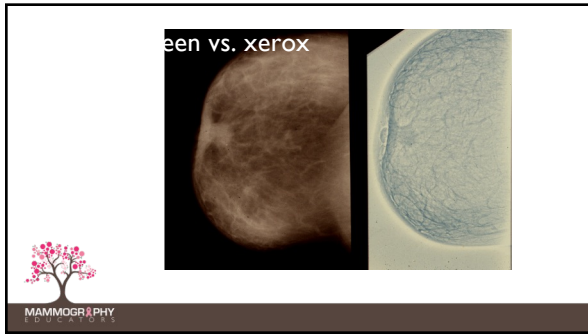


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Xerography

- Introduced in 1971
- Provided better image quality than systems using industrial film packs
- Allowed excellent visualization of chest wall
- The Granddaddy of selenium digital technology
- Key Inventor – Lothar Jeromin (“Mr. Xerox”)
- Holds 23 patents

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Positioning Training for Technologists

- See one, do one, teach one
- Watch one, botch one

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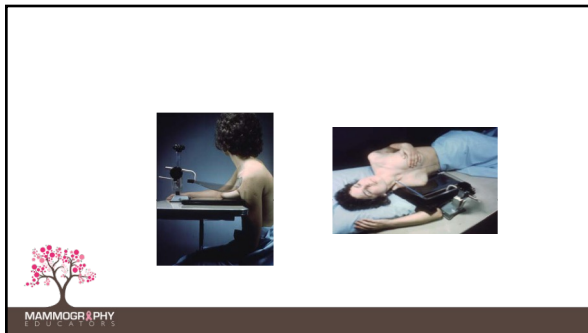
29

Pat Troyer, X-ray Technician, shows a compressed mammograph and the X-ray technician's equipment. At the Kaiser Hospital which has taught breast cancer only to hundreds of women over the past three years. A balloon for protection, a clear plastic panel can protect the breast and breast the breast and breast a clear picture of the breast.

Xeroradiography produces a sharp, detailed picture on plastic coated paper. A phosphor screen (fluoroscopic) can improve the picture without the use of the special imaging equipment the special imaging equipment is needed to read X-rays. This new or both breast tissue, mammary glandular, non-malignant condition of the breast, if

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Xerox Key Operator Class (but NO positioning classes!)

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AT THE SAME TIME....

- Single emulsion film for use in mammography was being introduced, with the promise of providing faster processing, improved image quality, and significantly decreased dose
- By 1986, screen-film mammography was being used by more than half of all radiologists
- Production of xeromammography was halted in 1989, due to declining sales
- Screen-film mammography became the gold standard in the late 1980's – early 1990's

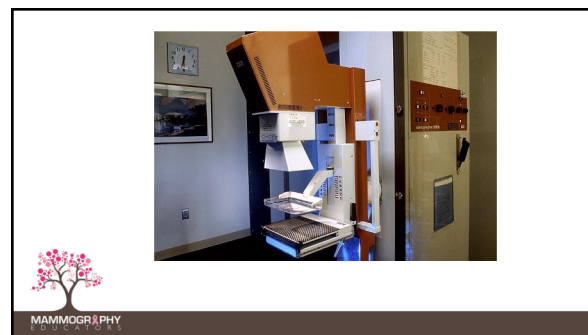
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1970's Siemens, Phillips, Picker and GE begin selling special mammography systems

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1986-ACS and ACR develop a breast screening accreditation program for radiologists and technologists

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ACS/ACR Consensus Meeting - 1989

- Developed a "curriculum" for technologists
- Produced (with ASRT) the first "Positioning Guidebook" which showed "how" to position for the CC and MLO
- Included instruction on additional views
- Out of publication by 2000



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1992- Federal Mammography Quality Standards Act passed **MQSA** in the US



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MQSA Requirements

- 40 hours of education related to specific topics in Mammography which included positioning
- Requirement for 25 hands-on "under supervision"
- 15 CEUs in mammography every 5 years
- No requirements for hands-on!



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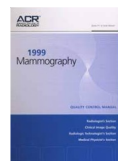
ACR QA Manuals 1993 - 1999

- Included sections on positioning
- All images were taken on film screen units
- Has not been updated since then
- Includes no recommendations for FFDM or DBT formats



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1980's-90's

Major improvements in mammography equipment include reduced radiation dosage; automatic exposure controls;



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Better film; film emulsifiers and processing; digital imaging, and computerized diagnosis.....but better positioning techniques?



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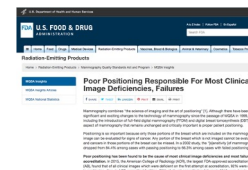
Rigid Compression – Taut – Up and Out



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Importance of Proper Positioning




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Decreased Sensitivity

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

= 18.1% decreased




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We Need to Correct

- **Lack of updated standardized training**
- Little or no consistency and reproducibility in positioning sequence
- Little or no consistency and reproducibility in positioning technique
- Lack of use of proper body ergonomics




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Standardized Positioning Techniques

- Data shows a distinct improvement with the use of updated positioning techniques designed for use with FFDM and DBT
- Sets reasonable expectations




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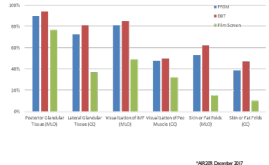
AJR American Journal of Roentgenology
 American Journal of Roentgenology, April, Vol. 210, No. 4, pp. 507-515
 Improving Performance of Mammographic Breast Positioning in an Academic Radiology Practice
 Sumbit Patel, Debra M. Bieda, Robert A. Jernigan, L. Jake Michelson... Show all
<https://doi.org/10.2214/AJR.17.18212>
 American Journal of Roentgenology, December, Vol. 208, No. 6, pp. 1419-1425
 Mammography Positioning Standards in the Digital Era: Is the Status Quo Acceptable?
 Ashley L. Huzar, Kelly L. Overman, Jason B. Gahwood, Jacqueline D. Hill, Louise C. Miller, and Marc F. Riccardi
<https://doi.org/10.2214/AJR.16.17322>




MAMMOGRAPHY

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Criteria met after Updated Standardized Positioning Training*



*QIPR December 2017




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Reasonable Expectations

Positioning Criteria	FFDM	DBT	Mean
Visualization of Pectoral Muscles	80%	80%	80%
Clipping Free	20%	20%	20%
Image Free	42%	40%	41%
Clipping Free	22%	20%	21%
Mammogram at Top of Field	92%	90%	91%
No Rotation	80%	80%	80%
Protonic Glarular Tissue Included	90%	90%	77%
Upper to Profile	80%	80%	80%
Lower to Profile	50%	50%	50%
Upper Location	20%	20%	20%
Lower Location	70%	60%	65%
Visualization of Inferiormary Field	85%	85%	85%
Upper to Profile One View	100%	100%	100%
Pre-Mammogram	90%	90%	90%
Clipping Free	80%	80%	80%
Lateral Glarular Tissue Included	70%	65%	67%
Upper to Profile	90%	90%	90%
Side or Top View	90%	85%	87%
Upper Location	100%	100%	100%
Lateral Location	20%	20%	20%
Visualization of Image	100%	100%	100%
Upper to Profile One View	90%	70%	80%




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We Need to Correct


- Lack of updated standardized training
- **Little or no consistency and reproducibility in positioning sequence**
- Little or no consistency and reproducibility in positioning technique
- Lack of use of proper body ergonomics



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Most medical imaging exams are done using the *same* positioning technique, in the *same* sequence.




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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




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My Suggestion:

- Do CC's first.
- Then do the MLO on the side you just finished the CC on.
- Finally, do the other MLO.


Example: RCC, LCC, LMLO, RMLO



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We Need to Correct

- Lack of updated standardized training
- Little or no consistency and reproducibility in positioning sequence
- **Little or no consistency and reproducibility in positioning technique**
- Lack of use of proper body ergonomics

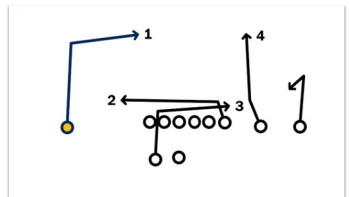



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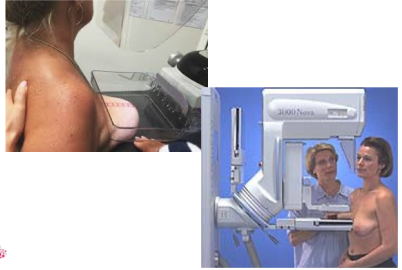

Most technologists *do not* practice a standardized method of positioning



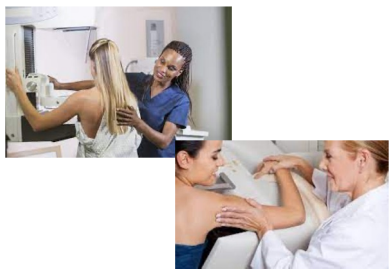


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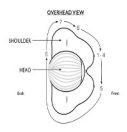

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The Miller Method®

CC QUICK STEPS

The following steps should be performed prior to your patient's exam with a breast monitor in charge. **CRITICAL:** All of the steps in this sequence must be performed in the order listed and in the order listed. Do not skip any steps.

1. Show the patient the PDA (or PDA) in preparation for the exam.
2. Ask the patient to stand with their feet on the scale.
3. Ask the patient to stand with their feet on the scale.
4. Ask the patient to stand with their feet on the scale.
5. Ask the patient to stand with their feet on the scale.
6. Ask the patient to stand with their feet on the scale.
7. Ask the patient to stand with their feet on the scale.
8. Ask the patient to stand with their feet on the scale.
9. Ask the patient to stand with their feet on the scale.
10. Ask the patient to stand with their feet on the scale.

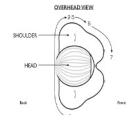
63

The Miller Method[®]

MLO QUICK STEPS

The training steps should be performed after allowing the proper degree of separation of the pectoral muscles (steps 1-3) and the shoulder to flexion (step 4). The patient is then placed with both feet flat and shoulders flexed and bent. The goal is to position the patient with the breast in the MLO plane. The patient's arms are positioned in the MLO plane (steps 5-7).

1. Stand perpendicular to the patient.
2. Ask patient's arms up over 90°.
3. Ask patient to back of both arms (use mirror to determine angle).
4. Flexion's hand using a chair, elbow bent.
5. Place your left hand on patient's left shoulder.
6. Your right hand should be bent side of breast.
7. Your knee up on top of breast.

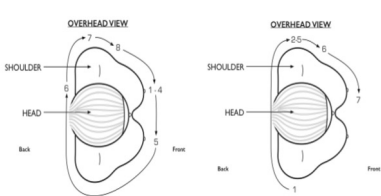


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CC **MLO**

OVERHEAD VIEW **OVERHEAD VIEW**



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Stand Up Straight!



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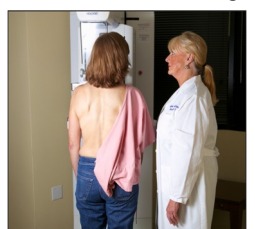
My Mom Says So!



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And Stand on the **Medial** Slide of the Breast to be Imaged




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In Mammography

- Most technologists have not been taught a standardized method of positioning.
- Most technologists have not been trained by a qualified trainer.

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How did this happen?

- No current standardization for positioning for FFDM and DBT
- CEUs for hands-on positioning not required
- Initial 25 mammograms required, but under whose supervision?

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How did this happen?

- Updated positioning trainings are not provided by employers.
- Until recently, there was no current published data to establish parameters for positioning criteria.



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How did this happen?

- Technologists are getting most CEUs online (no actual education for positioning).
- Radiologists are passing inadequate images and/or can only give feedback regarding positioning criteria.



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How did this happen?

- No updates for positioning with FFDM or DBT (and the new equipment design requires a modification of positioning techniques used for FS).



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FS/FFDM/DBT

- Increased length of the IR by up to 40%
- Increased thickness of the IR by up to 80%
- Increased width of face shield up to 50%



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So the problem is:

- No standardization or follow-through
- Which means less consistency and reproducibility
- More repeats and rejects
- More accreditation failures
- Increased exposure
- More job related injuries
- Increased costs to employers
- MISSED BREAST CANCERS???



MAMMOGRAPHY

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STANDARDIZED
POSITIONING TECHNIQUES
ARE KEY!!



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WHY???

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



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Room for Improvement

Remember when evaluating new imaging techniques:

Data is needed!!



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Room for Improvement

Remember when evaluating new positioning techniques:

Data is needed!!



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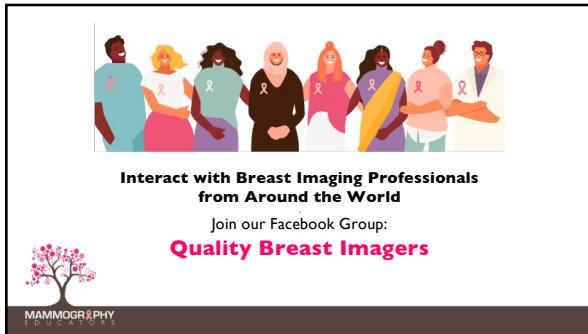
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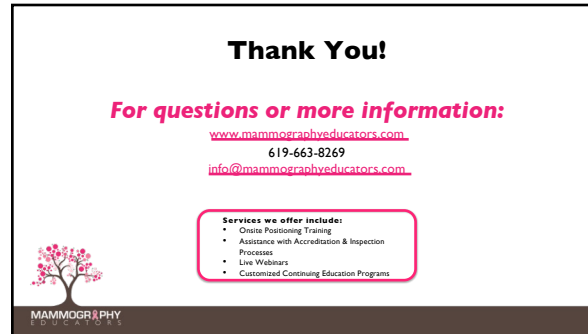
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