Positioning Techniques: Where Are We Now?

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BACK TO THE FUTURE !

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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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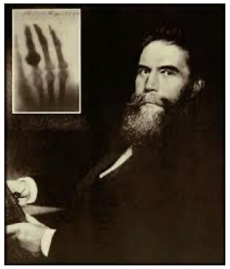

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- **1949** - Uruguayan Raul Leborgne emphasizes the need for breast compression to identify calcifications.
- **1966** – The first dedicated mammography system is introduced.
- **1971** – Commercial introduction of xeromammography
- **1980** – Introduction of single emulsion filem

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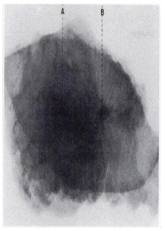

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- Egan technique
- Xeroradiography
- Dedicated mammography units
- Film/screen systems (grids)
- Rigid compression

- 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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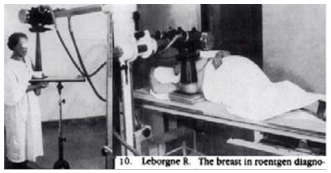
Uruguay 1953



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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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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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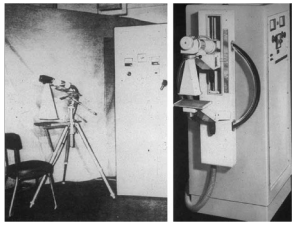

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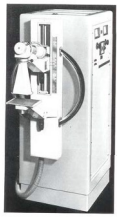

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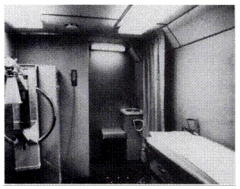

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Xerography

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

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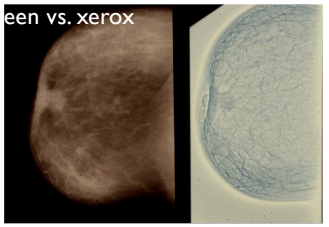

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Positioning Training for Technologists

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

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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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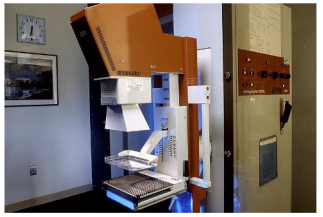

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1986- ACS and ACR develop a breast screening accreditation program for radiologists and *technologists*

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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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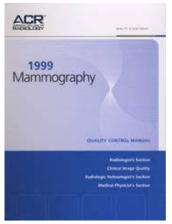

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1980's-90's

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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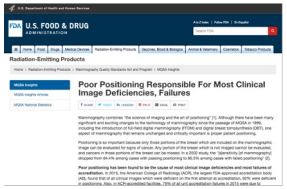
Importance of Proper Positioning



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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. 807-815

Improving Performance of Mammographic Breast Positioning in an Academic Radiology Practice

Sunita Pal, Debra M. Ikeda, Robert A. Jesinger, L. Jake Mickelsen ... Show all

https://doi.org/10.2214/AJR.17.18212

American Journal of Roentgenology, December, Vol. 209, No. 6 : pp. 1419-1425

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

Ashley I. Huppe, Kelly L. Overman, Jason B. Gatewood, Jacqueline D. Hill, Louise C. Miller, and Marc F. Inciardi

https://doi.org/10.2214/AJR.16.17522

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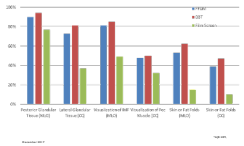
Criteria met after Updated Standardized Positioning Training*



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Reasonable Expectations

Positioning Criteria	FFDM	DBT	Results
MLO View	Visualization of Pec Muscle to PNL	86%	87%	86%
	Concave Pec	26%	26%	-
	Straight Pec	45%	46%	-
	Convex Pec	23%	26%	-
	Wide Margin at Top of Pec	95%	93%	-
	No Motion	98%	97%	98%
	Posterior Glandular Tissue Included	90%	94%	77%
	Nipple in Profile	89%	92%	88%
	Skin or Fat Folds	53%	52%	53%
	Upper Location	25%	27%	-
	Lower Location	28%	45%	-
	Visualization of Inframammary Fold	85%	85%	48%
	Requires More Than One View	13%	17%	-
CC View	Pec Muscle Visualized	48%	52%	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	45%	34%	-
	Requires More Than One View	5%	3%	-

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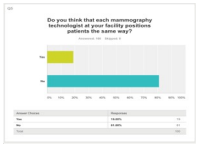
Most technologists *do not* practice a standardized method of positioning



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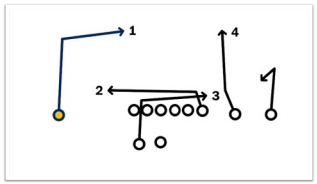

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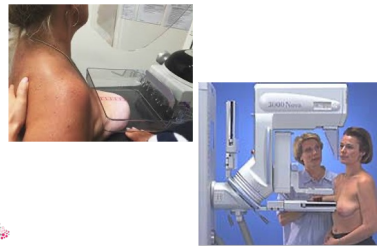

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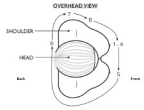
The Miller Method™

CC QUICK STEPS

The following steps should be performed after the proper compression paddle size is chosen, machine is in 0-degree angulation and the patient is facing the machine with feet, hips, and shoulders forward and level. Expand on the medial side of the breast to be imaged. Steps below describe positioning for the L(CC).

___ 1. Elevate breast/IMF (unit aka PM), is perpendicular to the chest wall)
___ 2. Adjust IR height (so top edge is parallel with elevated IMF)
___ 3. Pull breast onto IR with both hands (left hand on top; right hand on bottom)
___ 4. Anchor breast with the base of your thumb (after switching hands)
___ 5. Lift softer breast onto IR (turn patient forward, if needed)
___ 6. Guide the patient's head forward and around
___ 7. Relax shoulder on side being imaged with your hand
___ 8. Pull on lateral breast tissue and compress

OVERHEAD VIEW



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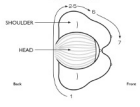
The Miller Method™

MLO QUICK STEPS

The following steps should be performed after choosing the proper degree of angulation, the machine is in the MLO position and the patient is facing the machine with feet, hips, and shoulders forward and level. You should be standing on the medial side of the breast to be imaged. Determine angle and adjust machine height. (Steps below describe positioning for the L(MLO)

___ 1. Stand perpendicular to the patient
___ 2. Lift patient's arm up over IR
___ 3. IR placed in back of axilla (just inferior to latissimus dorsi)
___ 4. Patient's hand resting on bar, elbow bent
___ 5. Place your left hand on patient's left shoulder
___ 6. Your right hand slides down lateral side of breast
___ 7. Hold breast up and out and compress

OVERHEAD VIEW



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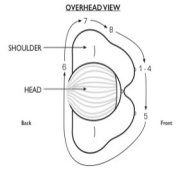
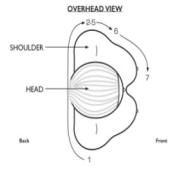
CC MLO

OVERHEAD VIEW



OVERHEAD VIEW



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Stand Up Straight!

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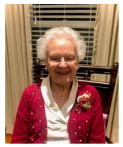
My Mom Says So!



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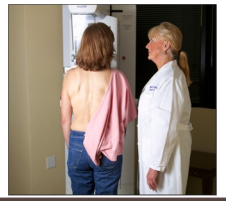
And Stand on the **Medial** Slide of the Breast to be Imaged



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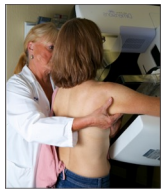

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In Mammography

- 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?

70

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???

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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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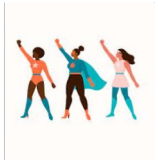
Super Mammotechs of the World!



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Quality Breast Imagers

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