POSITIONING AND QC
IN MAMMOGRAPHY

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CLINICS FOR ONKOLEGY AND RADIOTHERAPY,
BREAST CANCER SCREENING PROGRAMME,
PODGORICA, MONTENEGRO
RADIOGRAPHER NEEDS

- Basic knowledge of breast anatomy
- Professional qualifications
- Participation in continuing medical education and updates
- Necessary certificate of competence
TRAINING PROGRAMME FOR RADIOGRAPHERS

- 2 days theoretical course
- 2 days positioning course – theoretical, practical
- 3 weeks practice in reference center (DORA – Institute for Oncology, Ljubljana)
- Certificate
<table>
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<tr>
<th>THE RADIOGRAPHER’S RESPONSIBILITIES ARE:</th>
<th>TO DO HIGH QUALITY MAMMOGRAMS:</th>
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<tr>
<td>• CARRY OUT A WEEKLY TEST</td>
<td>• BASIC KNOWLEDGE OF BREAST ANATOMY</td>
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<td>• COMMUNICATION WITH WOMEN</td>
<td>• HIGHT QUALITY POSITIONING</td>
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<td>• ANAMNESTIC FORM</td>
<td>• COMMUNICATION</td>
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<td>• POSITIONING</td>
<td>• TIME (15 min.)</td>
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<td>• PRODUCTION OF OPTIMUM IMAGES</td>
<td>• PROFESSIONALISM</td>
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<td>• ASSESSING THE MAMMOGRAMS</td>
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**MAMMOGRAPHY TERMINOLOGY**

<table>
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<tr>
<th>Abbreviation</th>
<th>Description</th>
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<td>AX</td>
<td>Axillary</td>
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<tr>
<td>CC</td>
<td>Craniocaudal</td>
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<tr>
<td>MLO</td>
<td>Mediolateral oblique</td>
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<tr>
<td>XCCL</td>
<td>Exaggerated craniocaudal</td>
</tr>
<tr>
<td>LM</td>
<td>Lateromedial</td>
</tr>
<tr>
<td>ML</td>
<td>Mediolateral</td>
</tr>
<tr>
<td>ID</td>
<td>Implant Displacement</td>
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ANAMNESTIC FORM

- NAME, SURNAME
- ID NUMBER
- Reason for Examination - MS, MD
- Personal history of breast cancer (Mastectomy, Lumpectomy, Benign Biopsy, Reduction Mammoplasty, Implants/Saline, Silicone)
- Family history of BREAST cancer - Who had it and year diagnosed
- Currently taking Estrogen
- Date of the last period
- Date of the last breast exam
**SIGNS AND SYMPTOMS**

- **LOCATION** on diagram:

- **M** - moles
- **I** - discharge from nipple
- **R** - retracted skin or nipple
- **C** - redness of the skin
- **P** - changes on the skin or on the nipple
- **O** - scar
- **B** - pain

Breast self-exam: Visual inspection

Changes in skin texture

Retraction or indentation of nipple

Discharge from nipple

Atypical fullness and/or puckering
**STANDARD VIEWS IN MAMMOGRAPHY**

The primary goal in breast positioning is to show as much tissue as possible.

- RCC / cranio-caudal right
- LCC / cranio-caudal left
- From head to feet

- RMLO / right mediolateral oblique
- LMLO / left mediolateral oblique
- From the middle of the chest out to side of the body with the X-ray tube at an angle
# Recommended Views for the Patient with Implants (for Augmentation)

<table>
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<tr>
<th>View</th>
<th>ID</th>
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<tbody>
<tr>
<td>RCC</td>
<td>RCC – ID</td>
</tr>
<tr>
<td>LCC</td>
<td>LCC – ID</td>
</tr>
<tr>
<td>RMLO</td>
<td>RMLO – ID</td>
</tr>
<tr>
<td>LMLO</td>
<td>LMLO – ID</td>
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- **ID** - Implant Displacement

- is used to help image the breast tissue in front of the implant.
- Imaging the breast augmentation presents special problems and challenges.
- Degree of compression is limited by the compressibility of the implants.
COMPRESSION

- Very important for high quality mammography
- REDUCES THE THICKNESS OF THE BREASTS
- BETTER CONTRAST
- REDUCING THE OVERLAPPING OF TISSUE SHADOWS
- REDUCED RADIATION DOSE
- MOVEMENT ARTIFACTS ARE REDUCED

- YES, I DID HAVE MY MAMMOGRAM TODAY... WHY DO YOU ASK?
CC MAMMOGRAM

- CORRECT HEIGHT OF THE MACHINE
- BREAST ON THE CENTER OF DETECTOR
- NIPPLE IN PROFILE (should be shown in at least one view. When the nipple is not shown in profile on any view, an extra view can be done)
- With one hand under the breast and the other on top of the breast, gently pull breast tissue away from the chest wall and position the nipple in the center of the detector.

- With one hand placed on top of the breast near the chest wall, hold the breast in this position and push the contralateral breast over the corner of the detector.
- As compression is applied, the hand on top of the breast gently pulls the tissue forward to prevent wrinkles in the skin from occurring. If wrinkles appear on the lateral side of the breast, use one finger to laterally smooth them out.
Why is it necessary to fix breast with hand?
MLO MAMMOGRAM

- Visualize maximum of breast tissue in a single view
- Detector angle from 30 to 60 degrees
- **Standard is 45 degrees**
- Tall and thin patients typically use 55 degrees (from 50-60)
- Short and heavy patients typically use less than 40 angle degrees (35°)
MLO MAMMOGRAM

Relax PM

Look out

Open IMF
MLO / MEDIOLATERAL OBLIQUE

- Move the patient’s shoulder as close as the corner of the detector is posterior to the axilla, behind the pectoral muscle, but in front of the latissimus dorsi
- Angle of the image receptor is parallel with the angle of the pectoral muscle of the individual patient
- Patient relax pectoral muscle
- Move muscle anteriorly and medially, make sure your hand is behind the breast and muscle with your fingers in the axilla.
- Pull breast away from the chest wall
MLO / MEDIOLATERAL OBLIQUE

- Begin to apply compression
- The upper corner of the compression paddle will be just below the clavicle
- Patient deeply breathes in and strongly breathes out during the compression
- Bringing the hips in front of the image receptor is imperative to imaging the IMF. Pulling abdominal tissue down in order to open the inframammary fold, keep the inferior breast out and up under compression!
- Fat is visualised posterior to all of the fibroglandular tissues
- Deep and superficial breast tissues are well separated
- Inframammary fold is open
- Nipple is in profile
- Breast symmetrical to include axillary tail
- Nipple should be in profile
- Nipple should point straight not pointing lateral or medial
- Artefacts acceptable provided they do not obscure
- Breast tissue from the nipple to the edge of the pectoral muscle is included
- The length of the posterior nipple line is within 1 cm of the posterior nipple line on the MLO view
- Breast symmetrical to include medial border
- Pectoral muscle should always be seen
- Ok to include a bit of cleavage
Perfect Cranio-Caudal
Perfect Medio-Lateral Oblique

- Skin folds over pectoral muscle are acceptable
- 3 cm of pectoral muscle at top of image (20 degree)
- The length of the posterior nipple line is within 1 cm of the posterior nipple line on the CC view.
- Nipple in profile (retro-areolar tissue well separated)
- Framammary fold well demonstrated

Pectoral muscle is down to nipple level
Perfect Medio-Lateral Oblique
PNL= b-a

1. Grupa  
PNL do 1 cm

2. Grupa  
PNL > 1cm

3. Grupa  
insufficient length of the muscle
1. Position the patient as usual for the intended view (CC or MLO). The x-rays cannot penetrate silicone or saline implants well.

2. **ID**: Lift the breast and feel for the anterior portion of the implant. Place the thumb and forefinger between the breast tissue and the implant. Bring this portion of the breast to rest on the image receptor. Still holding the breast between the thumb and forefinger, lower the compression paddle while pulling the breast tissue forward and outward, allowing the implant to be displaced posteriorly. Compress as usual. If the breast tissue is over the AEC detector, automatic exposure control is possible; if the implant rests over the detector, manual technique should be used.
Difficult to position,
Reverse MLO may be necessary, this is called an LMO
This view will improve visualization of medial breast tissue
LATERAL - 90 degrees / ML-LM

- Is used to triangulate the exact location of lesions in the breast
- Is used to demonstrate the gravity-dependent calcifications (Milk of calcium)
- Is taken to determine if the abnormality (which is shown on the one standard view, but not the other—either CC or LMO) is real, superimposed tissue, artifact on radiograph, or in the skin.
- Used to determine whether the lesion is in the lateral, medial or central aspect of the breast
**Projection of the lesion – triangulation**

1. Triangulation involves lining up the mammographic views from largest angle (lateral – 90 degrees) to the lowest angle (CC – 0 degrees). A lateral lesion will move inferiorly on the lateral view compared to the MLO view, while a medial lesion will move superiorly on the lateral view compared to the MLO view.
ANOTHER DIAGNOSTIC PROJECTIONS

- XCCL – exaggerated craniocaudal
- SPOT COMPRESSION
- CV - cleavage
- TAN - tangential
- AT - axillary tail
- RL, RM - rolled
- SIO - superolateral to inferomedial
- FB - caudocranial
- M - magnification
For lesions in the axillary tail:

Begin positioning for CC view and rotate patient until lateral aspect of the breast is positioned on the detector

Both shoulders should be at the same level, do not push the shoulder down

Can be used 0-7 degree gentry angle
The cleavage view is performed to visualize deep lesions in the posteromedial aspect of the breast. Extreme medial tissue

Manual technique must be used if the photocell (x-ray) is under an open cleavage
This view is used:

- for better delineation of the number, distribution and morphology of calcifications
- for differentiating benign from malignant lesions by permitting a more precise evaluation of margins and other architectural characteristics of a focal density or mass

There is magnification platform which is used to separate the compressed breast from detector for 1.5 to 1.8 times magnification

To perform magnification views there has to be an X-ray tube with small focal spot to neutralise the geometric unsharpness.
Magnification - M
Pacemaker may hide the small (or big) area of breast tissue behind the pacemaker.
NIPPLE IN PROFILE?

- should be shown in at least one view.
- When the nipple is not shown in profile on any view, an extra view will be done.
-pectoral muscle should be at the level of the nipple line,

- it should look like the letter V.
Pectoral muscle is not relaxed
Simmetry-Asymmetry
Look out
Good positioning is creativity

Thank you for your attention